

DEPARTMENT OF INFORMATION TECHNOLOGY

B.Tech. – INFORMATION TECHNOLOGY

CURRICULUM & SYLLABI

Regulations 2020

(Applicable to candidates admitted in the academic year 2020 - 2021 onwards)



K.S.R. College of Engineering (Autonomous)

(Approved by AICTE, Accredited by NAAC with A++ grade & Affiliated to Anna University)

K.S.R. Kalvi Nagar, Tiruchengode – 637 215

Namakkal (Dt), Tamilnadu, India

Email: info@ksrce.ac.in

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K.S.R. COLLEGE OF ENGINEERING: TIRUCHENGODE - 637 215

(Autonomous)

DEPARTMENT OF INFORMATION TECHNOLOGY

(REGULATIONS 2020)

Vision of the Institution

IV We envision to achieve status as an excellent Educational Institution in the global knowledge hub, making self-learners, experts, ethical and responsible engineers, technologists, scientists, managers, administrators and entrepreneurs who will significantly contribute to research and environment friendly sustainable growth of the nation and the world.

Mission of the Institution

IM 1 To inculcate in the students self-learning abilities that enable them to become competitive and considerate engineers, technologists, scientists, managers, administrators and entrepreneurs by diligently imparting the best of education, nurturing environmental and social needs.

IM 2 To foster and maintain mutually beneficial partnership with global industries and Institutions through knowledge sharing, collaborative research and innovation.

Vision of the Department / Programme: (Information Technology)

DV To produce excellent and competent software professional, researchers and responsible engineers, who can significantly contribute to environment friendly societal industry through quality education.

Mission of the Department / Programme: (Information Technology)

DM 1 To make the students competitive and efficient in technical field through technological transformations in Information Technology, by providing them advanced curriculum, infrastructure and nurturing human values.

DM 2 To provide an excellent forum for higher studies that leads to careers as Computer and IT professionals in the widely diversified domains of industry, government and academia.

Programme Educational Objectives (PEOs): (Information Technology)

The graduates of the programme will be able to

PEO 1 Engineering Acquaintance:Incorporate with necessary background in science and engineering fundamentals to analyze and solve IT problems and prepare them skilled manpower in the field of IT for subsequently generation.

PEO 2 Modern Technical Tools:Enhance in latest programming languages, technologies, software development process and communication technology.

PEO 3 Personality Development:Attain a successful career in industry through effective communication skills, team spirit, learning ethical responsibilities,attitude and adaptation to emerging technologies.

Programme Outcomes (POs) of B.Tech. - Information Technology

Program Outcomes (POs)	
PO1	Engineering Graduates will be able to: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern Tool Usage: Create, select, and apply appropriate techniques, resource, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and Team Work: Function effectively as an individual, and as a member or leader diverse teams, and in multidisciplinary settings..
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadcast context of technological change.
Program Specific Outcomes (PSOs)	
PSO1	Technical competency: Analyze a problem, design algorithm, identify and define the computing requirements appropriate to its solution and implement the same.
PSO2	Professional awareness: Contribute core universal values and social good in the community.

		K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode - 637 215						CURRICULUM UG R - 2020		
Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - I										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20EN151	Technical English - I (Common To All Branches)	HSMC	3	0	0	3	30	70	100
2.	20MA151	Engineering Mathematics - I (Common To All Branches)	BSC	3	1	0	4	30	70	100
3.	20CH051	Engineering Chemistry (Common To All Branches)	BSC	3	0	0	3	30	70	100
4.	20EE041	Basics of Electrical and Electronics Engineering (Common To AU,CE,CS, IT, ME &,SF)	ESC	3	0	0	3	30	70	100
5.	20IT111	Programming for Problem Solving using C	ESC	3	0	0	3	30	70	100
MANDATORY COURSES										
6.	20MC151	Induction Programme* (Common To All Branches)	MC	-	0	0	0	-	-	-
PRACTICAL										
7.	20CH028	Chemistry Laboratory (Common To All Branches)	BSC	0	0	3	1	50	50	100
8.	20IT121	Programming for Problem Solving Laboratory	ESC	0	0	3	1	50	50	100
9.	20AU127	Engineering Graphics Laboratory (Common To CE,CS,EC,EE& IT)	ESC	0	0	3	1	50	50	100
Total				17	1	10	19	800		
(* - Induction Program will be conducted for 3 weeks as per AICTE guidelines)										
SEMESTER - II										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20EN251	Technical English-II (Common To All Branches)	HSMC	3	0	0	3	30	70	100
2.	20MA232	Discrete Mathematics (Common To CS & IT)	BSC	3	1	0	4	30	70	100
3.	20PH051	Engineering Physics (Common To All Branches)	BSC	3	0	0	3	30	70	100
4.	20IT211	Python Software Foundation	PCC	3	0	0	3	30	70	100
5.	20IT212	IT Essential	PCC	3	0	0	3	30	70	100
MANDATORY COURSES										
6.	20MC052	Environmental Science and Engineering (Common To All Branches)	MC	3	0	0	0	-	-	-
PRACTICAL										
7.	20PH028	Physics Laboratory (Common To All Branches)	BSC	0	0	3	1	50	50	100
8.	20GE028	Manufacturing Practices Laboratory (Common To All Branches)	PCC	0	0	3	1	50	50	100
9.	20IT221	PythonSoftware Foundation Laboratory	PCC	0	0	3	1	50	50	100
10.	20IT222	IT Essential Laboratory	ESC	0	0	3	1	50	50	100
Total				14	1	13	20	800		

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Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - III										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit C	Maximum Marks		
				L	T	P		CA	ES	Total
THEORY										
1.	20MA343	Numerical Computational Techniques (Common To CS & IT)	BSC	3	1	0	4	30	70	100
2.	20EC333	Digital Principles and System Design	ESC	3	0	0	3	30	70	100
3.	20IT311	Object Oriented Programming	PCC	3	0	0	3	30	70	100
4.	20IT312	Operating Systems	PCC	3	0	0	3	30	70	100
5.	20IT313	Data Structures	PCC	3	0	0	3	30	70	100
6.	20IT314	Computer Organization	PCC	3	0	0	3	30	70	100
PRACTICAL										
7.	20IT321	Object Oriented Programming Laboratory	PCC	0	0	3	1	50	50	100
8.	20IT322	Operating Systems Laboratory	PCC	0	0	3	1	50	50	100
9.	20IT323	Data Structures Laboratory	PCC	0	0	3	1	50	50	100
10.	20HR351	Career Development Skills I	EEC	0	2	0	0	50	50	100
Total				18	3	9	22	1000		

SEMESTER - IV										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit C	Maximum Marks		
				L	T	P		CA	ES	Total
THEORY										
1.	20MA441	Probability and Decision Models (Common To CS & IT)	BSC	3	1	0	4	30	70	100
2.	20IT411	Database Management Systems	PCC	3	0	0	3	30	70	100
3.	20IT412	Java Programming	PCC	3	0	0	3	30	70	100
4.	20IT413	Design and Analysis of Algorithms	ESC	3	0	0	3	30	70	100
5.	20IT414	Software Engineering Principles and Practices	PCC	3	0	0	3	30	70	100
6.	20HS051	Universal Human Values and Understanding Harmony	HSMC	3	0	0	3	30	70	100
PRACTICAL										
7.	20IT421	Database Systems Laboratory	PCC	0	0	3	1	50	50	100
8.	20IT422	Java Programming Laboratory	PCC	0	0	3	1	50	50	100
9.	20IT423	Design and Analysis of Algorithms Laboratory	PCC	0	0	3	1	50	50	100
10.	20HR462	Career Development Skills II	EEC	0	2	0	0	50	50	100
Total				18	3	9	22	1000		

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Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - V										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20EC532	Micro Controller and Embedded Systems	ESC	3	0	0	3	30	70	100
2.	20IT511	Data Analytics	PCC	3	0	0	3	30	70	100
3.	20IT512	Theory of Computation	PCC	3	1	0	4	30	70	100
4.	20IT513	Computer Networks	PCC	3	0	0	3	30	70	100
5.	20HS002	Total Quality Management (Common To AU,CS,EE,IT,ME,SF)	HSMC	3	0	0	3	30	70	100
6.		Professional Elective - I	PEC	3	0	0	3	30	70	100
PRACTICAL										
7.	20IT521	Data Analytics Laboratory	PCC	0	0	3	1	50	50	100
8.	20IT522	Computer Networks Laboratory	PCC	0	0	3	1	50	50	100
9.	20HR563	Career Development Skills III	EEC	0	2	0	0	50	50	100
Total				18	3	6	21	900		

SEMESTER - VI										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20IT611	Web Technology	PCC	3	0	0	3	30	70	100
2.	20IT612	Software Testing	PCC	3	0	0	3	30	70	100
3.	20IT613	Principles of Compiler Design	PCC	3	1	0	4	30	70	100
4.		Professional Elective - II	PEC	3	0	0	3	30	70	100
5.		Professional Elective - III	PEC	3	0	0	3	30	70	100
6.		Open Elective - I	OEC	3	0	0	3	30	70	100
PRACTICAL										
7.	20IT621	Web Technology Laboratory	PCC	0	0	3	1	50	50	100
8.	20IT622	Compiler Design Laboratory	PCC	0	0	3	1	50	50	100
9.	20IT623	Mini project	PROJ	0	0	6	3	50	50	100
10.	20HR664	Career Development Skills IV	EEC	0	2	0	0	50	50	100
Total				18	3	12	24	1000		

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Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - VII										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20IT711	Mobile Application Development	PCC	3	0	0	3	30	70	100
2.	20IT712	Computer Graphics and Visualization	PCC	3	0	0	3	30	70	100
3.	20IT713	Cryptography and Network Security	PCC	3	1	0	4	30	70	100
4.	20IT714	Artificial Intelligence	PCC	3	0	0	3	30	70	100
5.		Professional Elective-IV	PEC	3	0	0	3	30	70	100
6.		Open Elective - II	OEC	3	0	0	3	30	70	100
PRACTICAL										
7.	20IT721	Mobile Application Development Laboratory	PCC	0	0	3	1	50	50	100
8.	20IT722	Computer Graphics Laboratory	PCC	0	0	3	1	50	50	100
Total				18	1	6	21	800		

SEMESTER - VIII										
Sl.No	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.		Professional Elective - V	PEC	3	0	0	3	30	70	100
2.		Open Elective - III	OEC	3	0	0	3	30	70	100
PRACTICAL										
3.	20IT821	Project Work	PROJ	0	0	12	6	50	50	100
Total				9	0	12	12	300		

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Department		Department of Information Technology									
Programme		B.Tech- Information Technology									
List of Electives											
PROFESSIONAL ELECTIVE - I (SEMESTER - V)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT561	Object Oriented Analysis and Design	S2	PEC	3	0	0	3	30	70	100
2.	20IT562	Advanced Computer Architecture	S4	PEC	3	0	0	3	30	70	100
3.	20IT563	Mobile Computing	S3	PEC	3	0	0	3	30	70	100
4.	20IT564	Unix Internals	S4	PEC	3	0	0	3	30	70	100
5.	20IT565	Agile Methodologies	S4	PEC	3	0	0	3	30	70	100
6.	20IT566	Enterprise Resource and Planning	S2	PEC	3	0	0	3	30	70	100
7.	20IE591	Augmented Intelligence Led Managed Services- I [Industry Elective - Virtusa]	S1	PEC	3	0	0	3	30	70	100

PROFESSIONAL ELECTIVE - II (SEMESTER - VI)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT661	Bioinformatics	S2	PEC	3	0	0	3	30	70	100
2.	20IT662	Cloud Computing	S1	PEC	3	0	0	3	30	70	100
3.	20IT663	Fundamentals of DevOps	S4	PEC	3	0	0	3	30	70	100
4.	20IT664	Augmented and Virtual Reality	S4	PEC	3	0	0	3	30	70	100
5.	20IT665	Functional Programming	S1	PEC	3	0	0	3	30	70	100
6.	20IT666	Internet of Things	S4	PEC	3	0	0	3	30	70	100

PROFESSIONAL ELECTIVE - III (SEMESTER - VI)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT667	Wireless Communication	S3	PEC	3	0	0	3	30	70	100
2.	20IT668	C# and .Net Technologies	S1	PEC	3	0	0	3	30	70	100
3.	20IT669	Machine Learning Techniques	S2	PEC	3	0	0	3	30	70	100
4.	20IT670	Open Source Software	S1	PEC	3	0	0	3	30	70	100
5.	20IT671	Tele Communication and Switching Techniques	S3	PEC	3	0	0	3	30	70	100
6.	20IE691	Augmented Intelligence Led Managed Services - II [Industry Elective - Virtusa]	S1	PEC	3	0	0	3	30	70	100

PROFESSIONAL ELECTIVE – IV (SEMESTER – VII)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT761	Cyber Security	S1	PEC	3	0	0	3	30	70	100
2.	20IT762	Cyber-Physical Systems	S4	PEC	3	0	0	3	30	70	100
3.	20IT763	Digital Image Processing	S2	PEC	3	0	0	3	30	70	100
4.	20IT764	Quantum Computing	S1	PEC	3	0	0	3	30	70	100
5.	20IT765	Video Analytics	S2	PEC	3	0	0	3	30	70	100
6.	20IT766	Business Intelligence and Applications	S2	PEC	3	0	0	3	30	70	100

PROFESSIONAL ELECTIVE – V (SEMESTER - VIII)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT861	Pattern Recognition	S2	PEC	3	0	0	3	30	70	100
2.	20IT862	Green Computing	S4	PEC	3	0	0	3	30	70	100
3.	20IT863	Principles of Blockchain Systems	S1	PEC	3	0	0	3	30	70	100
4.	20IT864	Digital Marketing	S5	PEC	3	0	0	3	30	70	100
5.	20IT865	Wireless Sensor Networks	S3	PEC	3	0	0	3	30	70	100
6.	20IT866	Software Project Management	S2	PEC	3	0	0	3	30	70	100

S1 - Recent Technologies and Computing

S2 - Data and Knowledge Engineering

S3 - Computer Networks and Security

S4 - Systems and Software Engineering

S5 - Entrepreneurship and Managerial Skills

OPEN ELECTIVE COURSES

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
Automobile Engineering											
1.	20AU901	Basics of Automobile Engineering	AE	OEC	3	0	0	3	30	70	100
2.	20AU902	Automotive Engine Technology	AE	OEC	3	0	0	3	30	70	100
3.	20AU903	Automotive Vehicle Technology	AE	OEC	3	0	0	3	30	70	100
4.	20AU904	Automotive Safety	AE	OEC	3	0	0	3	30	70	100
5.	20AU905	Hybrid Vehicles	AE	OEC	3	0	0	3	30	70	100
6.	20AU906	Off Highway Vehicles	AE	OEC	3	0	0	3	30	70	100
7.	20AU907	Modern and Intelligent Vehicle System	AE	OEC	3	0	0	3	30	70	100
8.	20AU908	Vehicle Maintenance	AE	OEC	3	0	0	3	30	70	100
CIVIL ENGINEERING											
9.	20CE901	Architectural Heritage of India	CE	OEC	3	0	0	3	30	70	100
10.	20CE902	Building Planning and Construction	CE	OEC	3	0	0	3	30	70	100
11.	20CE903	Elementary Civil Engineering	CE	OEC	3	0	0	3	30	70	100
12.	20CE904	Energy and Environment	CE	OEC	3	0	0	3	30	70	100
13.	20CE905	Environmental Laws and Policies	CE	OEC	3	0	0	3	30	70	100
14.	20CE906	Global Warming and Climate Change	CE	OEC	3	0	0	3	30	70	100
15.	20CE907	Introduction to Disaster Management and Mitigation	CE	OEC	3	0	0	3	30	70	100
16.	20CE908	Introduction to Earthquake Engineering	CE	OEC	3	0	0	3	30	70	100
17.	20CE909	Solid Waste Management	CE	OEC	3	0	0	3	30	70	100
18.	20CE910	Water and Air Pollution Management	CE	OEC	3	0	0	3	30	70	100
Computer Science and Engineering											
19.	20CS901	Programming in Java	CSE	OEC	3	0	0	3	30	70	100
20.	20CS902	Basic concepts of Data Structure	CSE	OEC	3	0	0	3	30	70	100
21.	20CS903	Fundamentals of Database Concepts	CSE	OEC	3	0	0	3	30	70	100

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit C	Maximum Marks		
					L	T	P		CA	ES	Total
22.	20CS904	Internet Programming	CSE	OEC	3	0	0	3	30	70	100
23.	20CS905	Fundamentals of Mobile Application Development	CSE	OEC	3	0	0	3	30	70	100
24.	20CS906	Principles of Ethical Hacking	CSE	OEC	3	0	0	3	30	70	100
25.	20CS907	Green Technology	CSE	OEC	3	0	0	3	30	70	100
26.	20CS908	Artificial Intelligence and Robotics	CSE	OEC	3	0	0	3	30	70	100
27.	20CS909	Big Data and Analytics	CSE	OEC	3	0	0	0	30	70	100
28.	20CS910	Hardware and Trouble Shooting	CSE	OEC	3	0	0	3	30	70	100
Electrical and Electronics Engineering											
29.	20EE901	Electrical Drives and Control	EE	OEC	3	0	0	3	30	70	100
30.	20EE902	Power Semiconductor Devices	EE	OEC	3	0	0	3	30	70	100
31.	20EE903	Electrical Power Generation Systems	EE	OEC	3	0	0	3	30	70	100
32.	20EE904	Control Engineering	EE	OEC	3	0	0	3	30	70	100
33.	20EE905	Industrial Automation	EE	OEC	3	0	0	3	30	70	100
34.	20EE906	Electrical Instruments and Measurements	EE	OEC	3	0	0	3	30	70	100
35.	20EE907	Energy Conservation and Management	EE	OEC	3	0	0	3	30	70	100
36.	20EE908	Electrical Wiring, Estimation and Costing	EE	OEC	3	0	0	3	30	70	100
37.	20EE909	Fundamentals of Electrical Machinery	EE	OEC	3	0	0	3	30	70	100
38.	20EE910	Principles of Soft Computing Techniques	EE	OEC	3	0	0	3	30	70	100
39.	20EE911	Embedded System Technology	EE	OEC	3	0	0	3	30	70	100
Electronics and Communication Engineering											
40.	20EC901	Basics of Medical Electronics	EC	OEC	3	0	0	3	30	70	100
41.	20EC902	NANO Technology	EC	OEC	3	0	0	3	30	70	100
42.	20EC903	Electronics and Microprocessor	EC	OEC	3	0	0	3	30	70	100

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
43.	20EC904	Analog and Digital Communication	EC	OEC	3	0	0	3	30	70	100
44.	20EC905	Principles of Communication	EC	OEC	3	0	0	3	30	70	100
45.	20EC906	Fundamentals of Robotics	EC	OEC	3	0	0	3	30	70	100
46.	20EC907	Internet of Things Sensing and Actuator Devices	EC	OEC	3	0	0	3	30	70	100
47.	20EC908	Consumer Electronics	EC	OEC	3	0	0	3	30	70	100
Information Technology											
48.	20IT901	Data Science using R	IT	OEC	3	0	0	3	30	70	100
49.	20IT902	Principles of Cyber Security	IT	OEC	3	0	0	3	30	70	100
50.	20IT903	Fundamentals of Business Intelligenc	IT	OEC	3	0	0	3	30	70	100
51.	20IT904	Blockchain Technologies	IT	OEC	3	0	0	3	30	70	100
52.	20IT905	Internet of Things and Applications	IT	OEC	3	0	0	3	30	70	100
53.	20IT906	Principles of Software Testing	IT	OEC	3	0	0	3	30	70	100
54.	20IT907	Foundation Skills in Logic Building	IT	OEC	3	0	0	3	30	70	100
55.	20IT908	Principles of Cloud Computing	IT	OEC	3	0	0	3	30	70	100
56.	20IT909	Open Source Technologies	IT	OEC	3	0	0	3	30	70	100
57.	20IT910	Principles of Software Engineering	IT	OEC	3	0	0	3	30	70	100
Mechanical Engineering											
58.	20ME901	Basic Mechanical Engineering	ME	OEC	3	0	0	3	30	70	100
59.	20ME902	Solar Energy Utilization	ME	OEC	3	0	0	3	30	70	100
60.	20ME903	Production Technology of Agricultura Machinery	ME	OEC	3	0	0	3	30	70	100
61.	20ME904	Selection of Materials	ME	OEC	3	0	0	3	30	70	100
62.	20ME905	Marine Vehicles	ME	OEC	3	0	0	3	30	70	100
63.	20ME906	Sensors and Transducers	ME	OEC	3	0	0	3	30	70	100
64.	20ME907	Energy Auditing	ME	OEC	3	0	0	3	30	70	100
65.	20ME908	Fiber Reinforced Plastics	ME	OEC	3	0	0	3	30	70	100
66.	20ME909	Lean Manufacturing	ME	OEC	3	0	0	3	30	70	100

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
67.	20ME910	Surface Engineering	ME	OEC	3	0	0	3	30	70	100
Safety and Fire Engineering											
68.	20SF901	Occupational Health and Hygiene	SF	OEC	3	0	0	3	30	70	100
69.	20SF902	Construction Safety	SF	OEC	3	0	0	3	30	70	100
70.	20SF903	Building Fire Safety	SF	OEC	3	0	0	3	30	70	100
71.	20SF904	Safety in Electrical Engineering	SF	OEC	3	0	0	3	30	70	100
72.	20SF905	Legal Aspects of Safety	SF	OEC	3	0	0	3	30	70	100
73.	20SF906	Safety in Industries	SF	OEC	3	0	0	3	30	70	100
74.	20SF907	Food Safety	SF	OEC	3	0	0	3	30	70	100
75.	20SF908	Safety Management and its Principles	SF	OEC	3	0	0	3	30	70	100
76.	20SF909	Safety in Automobile Engineering	SF	OEC	3	0	0	3	30	70	100
77.	20SF910	Safety in Transportation	SF	OEC	3	0	0	3	30	70	100
Science and Humanities											
78.	20SH901	Applications of Statistics	FYA	OEC	3	0	0	3	30	70	100
79.	20SH902	Combinatorics and Graph Theory	FYA	OEC	3	0	0	3	30	70	100
80.	20SH903	Optimization Techniques	FYA	OEC	3	0	0	3	30	70	100
81.	20SH904	Basic Military Education and Training	FYA	OEC	3	0	0	3	30	70	100
82.	20SH905	Professional Communication	FYA	OEC	3	0	0	3	30	70	100
83.	20SH906	Fundamentals of Nanoscience and Technology	FYA	OEC	3	0	0	3	30	70	100

LIST OF VALUE ADDED COURSES

Sl. No.	Course Code	Course Name	Number of Hours	Offered by Internal / External
1	20ITV01	PC hardware and Trouble Shooting	15	IT/KSRCE
2	20ITV02	DEVOPS Technologies	15	IT/KSRCE
3	20ITV03	Cyber Security Analytics	15	IT/KSRCE
4	20ITV04	R Programming	15	IT/KSRCE
5	20ITV05	Social Media Manager	15	IT/KSRCE
6	20ITV06	Augmented, virtual, and mixed reality	15	IT/KSRCE
7	20ITV07	Mojo Programming Language	15	IT/KSRCE
8	20ITV08	Life Skill Education	15	External
9	20ITV09	Human Right Education	15	External
10	20ITV10	Yoga Health and Physical Education	15	External
11	20ITV11	Educational psychology	15	External
12	20ITV12	Environmental education	15	External

COURSE COMPONENT SUMMARY

S. No.	Subject Area	Credits Per Semester								Credits Total	Percentage Credits
		I	II	III	IV	V	VI	VII	VIII		
1.	HSMC	3	3	-	3	3	-	-	-	12	7.45
2.	BSC	8	8	4	4	-	-	-	-	24	14.91
3.	ESC	8	1	3	4	3	-	-	-	19	11.80
4.	PCC	-	8	15	11	12	12	15	-	73	45.34
5.	PEC	-	-	-	-	3	6	3	3	15	9.32
6.	OEC	-	-	-	-	-	3	3	3	9	5.59
7.	PROJ	-	-	-	-	-	3	-	6	9	5.59
TOTAL		19	20	22	22	21	24	21	12	161	100

Total No. of Credits = 161

DEPARTMENT OF INFORMATION TECHNOLOGY

B.Tech. – INFORMATION TECHNOLOGY

CURRICULUM & SYLLABI

Regulations 2020

(Applicable to candidates admitted in the academic year 2021 - 2022 onwards)



K.S.R. College of Engineering (Autonomous)

(Approved by AICTE, Accredited by NAAC with A++ grade & Affiliated to Anna University)

K.S.R. Kalvi Nagar, Tiruchengode – 637 215

Namakkal (Dt), Tamilnadu, India

Email: info@ksrce.ac.in

Website: www.ksrce.ac.in

K.S.R. COLLEGE OF ENGINEERING: TIRUCHENGODE - 637 215

(Autonomous)

DEPARTMENT OF INFORMATION TECHNOLOGY

(REGULATIONS 2020)

Vision of the Institution

IV We envision to achieve status as an excellent Educational Institution in the global knowledge hub, making self-learners, experts, ethical and responsible engineers, technologists, scientists, managers, administrators and entrepreneurs who will significantly contribute to research and environment friendly sustainable growth of the nation and the world.

Mission of the Institution

IM 1 To inculcate in the students self-learning abilities that enable them to become competitive and considerate engineers, technologists, scientists, managers, administrators and entrepreneurs by diligently imparting the best of education, nurturing environmental and social needs.

IM 2 To foster and maintain mutually beneficial partnership with global industries and Institutions through knowledge sharing, collaborative research and innovation.

Vision of the Department / Programme: (Information Technology)

DV To produce excellent and competent software professional, researchers and responsible engineers, who can significantly contribute to environment friendly societal industry through quality education.

Mission of the Department / Programme: (Information Technology)

DM 1 To make the students competitive and efficient in technical field through technological transformations in Information Technology, by providing them advanced curriculum, infrastructure and nurturing human values.

DM 2 To provide an excellent forum for higher studies that leads to careers as Computer and IT professionals in the widely diversified domains of industry, government and academia.

Programme Educational Objectives (PEOs): (Information Technology)

The graduates of the programme will be able to

PEO 1 Engineering Acquaintance:Incorporate with necessary background in science and engineering fundamentals to analyze and solve IT problems and prepare them skilled manpower in the field of IT for subsequently generation.

PEO 2 Modern Technical Tools:Enhance in latest programming languages, technologies, software development process and communication technology.

PEO 3 Personality Development:Attain a successful career in industry through effective communication skills, team spirit, learning ethical responsibilities,attitude and adaptation to emerging technologies.

Programme Outcomes (POs) of B.Tech. - Information Technology

Program Outcomes (POs)	
PO1	Engineering Graduates will be able to: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern Tool Usage: Create, select, and apply appropriate techniques, resource, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and Team Work: Function effectively as an individual, and as a member or leader diverse teams, and in multidisciplinary settings..
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadcast context of technological change.
Program Specific Outcomes (PSOs)	
PSO1	Technical competency: Analyze a problem, design algorithm, identify and define the computing requirements appropriate to its solution and implement the same.
PSO2	Professional awareness: Contribute core universal values and social good in the community.

		K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode - 637 215						CURRICULUM UG R - 2020		
Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - I										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20EN151	Technical English - I (Common To All Branches)	HSMC	3	0	0	3	40	60	100
2.	20MA151	Engineering Mathematics - I (Common To All Branches)	BSC	3	1	0	4	40	60	100
3.	20CH051	Engineering Chemistry (Common To All Branches)	BSC	3	0	0	3	40	60	100
4.	20EE041	Basics of Electrical and Electronics Engineering (Common To AU,CE,CS, IT, ME & SF)	ESC	3	0	0	3	40	60	100
5.	20IT111	Programming for Problem Solving using C	ESC	3	0	0	3	40	60	100
MANDATORY COURSES										
	20MC151	Induction Programme* (Common To All Branches)	MC	-	0	0	0	-	-	-
PRACTICAL										
6.	20CH028	Chemistry Laboratory (Common To All Branches)	BSC	0	0	3	1	60	40	100
7.	20IT121	Programming for Problem Solving Laboratory	ESC	0	0	3	1	60	40	100
8.	20AU12	Engineering Graphics Laboratory (Common To CE,CS,EC,EE& IT)	ESC	0	0	3	1	60	40	100
				17	1	10	19	800		

(* - Induction Program will be conducted for 3 weeks as per AICTE guidelines)

SEMESTER - II										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20EN251	Technical English-II (Common To All Branches)	HSMC	3	0	0	3	40	60	100
2.	20MA232	Discrete Mathematics (Common To CS & IT)	BSC	3	1	0	4	40	60	100
3.	20PH051	Engineering Physics (Common To All Branches)	BSC	3	0	0	3	40	60	100
4.	20IT211	Python Software Foundation	PCC	3	0	0	3	40	60	100
5.	20IT212	IT Essential	PCC	3	0	0	3	40	60	100
MANDATORY COURSES										
6.	20MC052	Environmental Science and Engineering (Common To All Branches)	MC	3	0	0	0	-	-	-
PRACTICAL										
7.	20PH028	Physics Laboratory (Common To All Branches)	BSC	0	0	3	1	60	40	100
8.	20GE028	Manufacturing Practices Laboratory (Common To All Branches)	PCC	0	0	3	1	60	40	100
9.	20IT221	PythonSoftware Foundation Laboratory	PCC	0	0	3	1	60	40	100
10.	20IT222	IT Essential Laboratory	ESC	0	0	3	1	60	40	100
Total				14	1	13	20	800		

		K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode - 637 215						CURRICULUM UG R - 2020		
Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - III										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20MA343	Numerical Computational Techniques (Common To CS & IT)	BSC	3	1	0	4	40	60	100
2.	20EC333	Digital Principles and System Design	ESC	3	0	0	3	40	60	100
3.	20IT311	Object Oriented Programming	PCC	3	0	0	3	40	60	100
4.	20IT312	Operating Systems	PCC	3	0	0	3	40	60	100
5.	20IT313	Data Structures	PCC	3	0	0	3	40	60	100
6.	20IT314	Computer Organization	PCC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT321	Object Oriented Programming Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT322	Operating Systems Laboratory	PCC	0	0	3	1	60	40	100
9.	20IT323	Data Structures Laboratory	PCC	0	0	3	1	60	40	100
10.	20HR351	Career Development Skills I	EEC	0	2	0	0	60	40	100
Total				18	3	9	22	1000		

SEMESTER - IV										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20MA441	Probability and Decision Models (Common To CS & IT)	BSC	3	1	0	4	40	60	100
2.	20IT411	Database Management Systems	PCC	3	0	0	3	40	60	100
3.	20IT412	Java Programming	PCC	3	0	0	3	40	60	100
4.	20IT413	Design and Analysis of Algorithms	ESC	3	0	0	3	40	60	100
5.	20IT414	Software Engineering Principles and Practices	PCC	3	0	0	3	40	60	100
6.	20HS051	Universal Human Values and Understanding Harmony	HSMC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT421	Database Systems Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT422	Java Programming Laboratory	PCC	0	0	3	1	60	40	100
9.	20IT423	Design and Analysis of Algorithms Laboratory	PCC	0	0	3	1	60	40	100
10.	20HR462	Career Development Skills II	EEC	0	2	0	0	60	40	100
Total				18	3	9	22	1000		

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Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - V										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20EC532	Micro Controller and Embedded Systems	ESC	3	0	0	3	40	60	100
2.	20IT511	Data Analytics	PCC	3	0	0	3	40	60	100
3.	20IT512	Theory of Computation	PCC	3	1	0	4	40	60	100
4.	20IT513	Computer Networks	PCC	3	0	0	3	40	60	100
5.	20HS002	Total Quality Management (Common To AU,CS,EE,IT,ME,SF)	HSMC	3	0	0	3	40	60	100
6.		Professional Elective - I	PEC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT521	Data Analytics Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT522	Computer Networks Laboratory	PCC	0	0	3	1	60	40	100
9.	20HR563	Career Development Skills III	EEC	0	2	0	0	60	40	100
Total				18	3	6	21	900		

SEMESTER - VI										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20IT611	Web Technology	PCC	3	0	0	3	40	60	100
2.	20IT612	Software Testing	PCC	3	0	0	3	40	60	100
3.	20IT613	Principles of Compiler Design	PCC	3	1	0	4	40	60	100
4.		Professional Elective - II	PEC	3	0	0	3	40	60	100
5.		Professional Elective - III	PEC	3	0	0	3	40	60	100
6.		Open Elective - I	OEC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT621	Web Technology Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT622	Compiler Design Laboratory	PCC	0	0	3	1	60	40	100
9.	20IT623	Mini project	PROJ	0	0	6	3	60	40	100
10.	20HR664	Career Development Skills IV	EEC	0	2	0	0	60	40	100
Total				18	3	12	24	1000		

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Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - VII										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20IT711	Mobile Application Development	PCC	3	0	0	3	40	60	100
2.	20IT712	Computer Graphics and Visualization	PCC	3	0	0	3	40	60	100
3.	20IT713	Cryptography and Network Security	PCC	3	1	0	4	40	60	100
4.	20IT714	Artificial Intelligence	PCC	3	0	0	3	40	60	100
5.		Professional Elective-IV	PEC	3	0	0	3	40	60	100
6.		Open Elective - II	OEC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT721	Mobile Application Development Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT722	Computer Graphics Laboratory	PCC	0	0	3	1	60	40	100
Total				18	1	6	21	800		

SEMESTER - VIII										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.		Professional Elective - V	PEC	3	0	0	3	40	60	100
2.		Open Elective - III	OEC	3	0	0	3	40	60	100
PRACTICAL										
3.	20IT821	Project Work	PROJ	0	0	12	6	60	40	100
Total				9	0	12	12	300		

		K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode - 637 215							CURRICULUM UG R - 2020		
Department		Department of Information Technology									
Programme		B.Tech- Information Technology									
List of Electives											
PROFESSIONAL ELECTIVE - I (SEMESTER - V)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT561	Object Oriented Analysis and Design	S2	PEC	3	0	0	3	40	60	100
2.	20IT562	Advanced Computer Architecture	S4	PEC	3	0	0	3	40	60	100
3.	20IT563	Mobile Computing	S3	PEC	3	0	0	3	40	60	100
4.	20IT564	Unix Internals	S4	PEC	3	0	0	3	40	60	100
5.	20IT565	Agile Methodologies	S4	PEC	3	0	0	3	40	60	100
6.	20IT566	Enterprise Resource and Planning	S2	PEC	3	0	0	3	40	60	100
7.	20IE591	Augmented Intelligence Led Managed Services- I [Industry Elective - Virtusa]	S1	PEC	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - II (SEMESTER - VI)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT661	Bioinformatics	S2	PEC	3	0	0	3	40	60	100
2.	20IT662	Cloud Computing	S1	PEC	3	0	0	3	40	60	100
3.	20IT663	Fundamentals of DevOps	S4	PEC	3	0	0	3	40	60	100
4.	20IT664	Augmented and Virtual Reality	S4	PEC	3	0	0	3	40	60	100
5.	20IT665	Functional Programming	S1	PEC	3	0	0	3	40	60	100
6.	20IT666	Internet of Things	S4	PEC	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - III (SEMESTER - VI)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT667	Wireless Communication	S3	PEC	3	0	0	3	40	60	100
2.	20IT668	C# and .Net Technologies	S1	PEC	3	0	0	3	40	60	100
3.	20IT669	Machine Learning Techniques	S2	PEC	3	0	0	3	40	60	100
4.	20IT670	Open Source Software	S1	PEC	3	0	0	3	40	60	100
5.	20IT671	Tele Communication and Switching Techniques	S3	PEC	3	0	0	3	40	60	100
6.	20IE691	Augmented Intelligence Led Managed Services - II [Industry Elective - Virtusa]	S1	PEC	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE – IV (SEMESTER – VII)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT761	Cyber Security	S1	PEC	3	0	0	3	40	60	100
2.	20IT762	Cyber-Physical Systems	S4	PEC	3	0	0	3	40	60	100
3.	20IT763	Digital Image Processing	S2	PEC	3	0	0	3	40	60	100
4.	20IT764	Quantum Computing	S1	PEC	3	0	0	3	40	60	100
5.	20IT765	Video Analytics	S2	PEC	3	0	0	3	40	60	100
6.	20IT766	Business Intelligence and Applications	S2	PEC	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE – V (SEMESTER - VIII)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT861	Pattern Recognition	S2	PEC	3	0	0	3	40	60	100
2.	20IT862	Green Computing	S4	PEC	3	0	0	3	40	60	100
3.	20IT863	Principles of Blockchain Systems	S1	PEC	3	0	0	3	40	60	100
4.	20IT864	Digital Marketing	S5	PEC	3	0	0	3	40	60	100
5.	20IT865	Wireless Sensor Networks	S3	PEC	3	0	0	3	40	60	100
6.	20IT866	Software Project Management	S2	PEC	3	0	0	3	40	60	100

S1 - Recent Technologies and Computing

S2 - Data and Knowledge Engineering

S3 - Computer Networks and Security

S4 - Systems and Software Engineering

S5 - Entrepreneurship and Managerial Skills

B.E./B.TECH. HONOURS (SPECIALIZATION IN THE SAME DISCIPLINE) : VERTICALS

Emerging Areas: Information Technology

(i) B.E/ B.Tech. Honours (specialization in the same discipline)

- a. The student should have earned additionally a minimum of 18 credits from a specified group of Professional Electives of the same programme.
- b. Should have passed all the courses in the first attempt.
- c. Should have earned a minimum of 7.50 CGPA.

(ii) B.E / B.Tech. Honours

- a. The students should have taken additional courses from more than one vertical of the same Programme and earned a minimum of 18 credits.
- b. Should have passed all the courses in the first attempt.
- c. Should have earned a minimum of 7.50 CGPA.

(iii) B.E. / B.Tech. minor in other specialization.

The student should have earned additionally a minimum of 18 credits in any one of the verticals of other B.E programmes

- Out of these 18 credits students can earn a maximum of 6 credits in online mode (SWAYAM platform), as approved by Centre for Academic Courses.
- B.E./ B. Tech. (Hons) Specialization in the same discipline, B.E / B.Tech. Honors and B.E./ B.Tech. Minor in other specialization degree will be optional for students.
- For the categories (i) to (ii), the students shall be permitted to register for the courses from the V Semester onwards provided the students has earned a minimum CGPA 7.50 of until III Semester and has cleared all the courses in the first attempt.
- For the category (iii), the students will be permitted, to register the courses from Semester V onwards provided the marks earned by the students until Semester III is CGPA 7.50 and above.
- If a student decides not to opt for Honours, after completing certain number of additional courses, the additional courses studied shall be considered instead of the Professional Elective courses, which are part of the curriculum. If the student has studied more number of such courses than the number of Professional Elective courses required as per the curriculum, the courses with higher grades shall be considered for the calculation of CGPA. Remaining courses shall be printed in the mark sheet, however, they will not be considered for calculation of CGPA.

Registration of Professional Elective courses from Verticals:

Professional Elective Courses will be registered in Semesters V to VIII. These courses are listed in groups called verticals that represent a particular area of specialization / diversified group. The student should have earned additionally a minimum of 18 credits in any one of the verticals for obtaining B.E./ B.Tech. Honours with specialization in the same disciplines.

PROFESSIONAL ELECTIVE HONOURS COURSES:VERTICALS

VERTICAL-1: INTERNET OF THINGS											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT567	Technologies Enabling IoT	S1	OEC	3	0	0	3	40	60	100
2.	20IT568	IoT systems design	S1	OEC	3	0	0	3	40	60	100
3.	20IT673	Industrial IoT	S1	OEC	3	0	0	3	40	60	100
4.	20IT767	Privacy and Security in IoT	S3	OEC	3	0	0	3	40	60	100
5.	20IT768	Fog Computing & Energy Management in IoT Devices	S1	OEC	3	0	0	3	40	60	100
6.	20IT867	Robotic Process Automation	S1	OEC	3	0	0	3	40	60	100

VERTICAL-2: DATA SCIENCE											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT569	Linked Open Data And Its Applications	S2	OEC	3	0	0	3	40	60	100
2.	20IT674	Big Data Security	S2	OEC	3	0	0	3	40	60	100
3.	20IT675	Real Time Data Streaming	S2	OEC	3	0	0	3	40	60	100
4.	20IT769	Sentiment Analysis	S2	OEC	3	0	0	3	40	60	100
5.	20IT868	Cognitive Science	S2	OEC	3	0	0	3	40	60	100
6.	20IT869	Text Processing and Mining	S2	OEC	3	0	0	3	40	60	100

S1 - Recent Technologies and Computing

Computer Networks and Security

S5 - Entrepreneurship and Managerial Skills

S2 - Data and Knowledge Engineering S3 -

S4 - Systems and Software Engineering

OPEN ELECTIVE COURSES

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
Automobile Engineering											
1.	20AU901	Basics of Automobile Engineering	AE	OEC	3	0	0	3	40	60	100
2.	20AU902	Automotive Engine Technology	AE	OEC	3	0	0	3	40	60	100
3.	20AU903	Automotive Vehicle Technology	AE	OEC	3	0	0	3	40	60	100
4.	20AU904	Automotive Safety	AE	OEC	3	0	0	3	40	60	100
5.	20AU905	Hybrid Vehicles	AE	OEC	3	0	0	3	40	60	100
6.	20AU906	Off Highway Vehicles	AE	OEC	3	0	0	3	40	60	100
7.	20AU907	Modern and Intelligent Vehicle System	AE	OEC	3	0	0	3	40	60	100
8.	20AU908	Vehicle Maintenance	AE	OEC	3	0	0	3	40	60	100
CIVIL ENGINEERING											
9.	20CE901	Architectural Heritage of India	CE	OEC	3	0	0	3	40	60	100
10.	20CE902	Building Planning and Construction	CE	OEC	3	0	0	3	40	60	100
11.	20CE903	Elementary Civil Engineering	CE	OEC	3	0	0	3	40	60	100
12.	20CE904	Energy and Environment	CE	OEC	3	0	0	3	40	60	100
13.	20CE905	Environmental Laws and Policies	CE	OEC	3	0	0	3	40	60	100
14.	20CE906	Global Warming and Climate Change	CE	OEC	3	0	0	3	40	60	100
15.	20CE907	Introduction to Disaster Management and Mitigation	CE	OEC	3	0	0	3	40	60	100
16.	20CE908	Introduction to Earthquake Engineering	CE	OEC	3	0	0	3	40	60	100
17.	20CE909	Solid Waste Management	CE	OEC	3	0	0	3	40	60	100
18.	20CE910	Water and Air Pollution Management	CE	OEC	3	0	0	3	40	60	100

Computer Science and Engineering											
19.	20CS901	Programming in Java	CSE	OEC	3	0	0	3	40	60	100
20.	20CS902	Basic concepts of Data Structure	CSE	OEC	3	0	0	3	40	60	100
21.	20CS903	Fundamentals of Database Concepts	CSE	OEC	3	0	0	3	40	60	100
22.	20CS904	Internet Programming	CSE	OEC	3	0	0	3	40	60	100
23.	20CS905	Fundamentals of Mobile Application Development	CSE	OEC	3	0	0	3	40	60	100
24.	20CS906	Principles of Ethical Hacking	CSE	OEC	3	0	0	3	40	60	100
25.	20CS907	Green Technology	CSE	OEC	3	0	0	3	40	60	100
26.	20CS908	Artificial Intelligence and Robotics	CSE	OEC	3	0	0	3	40	60	100
27.	20CS909	Big Data and Analytics	CSE	OEC	3	0	0	0	40	60	100
28.	20CS910	Hardware and Trouble Shooting	CSE	OEC	3	0	0	3	40	60	100
Electrical and Electronics Engineering											
29.	20EE901	Electrical Drives and Control	EE	OEC	3	0	0	3	40	60	100
30.	20EE902	Power Semiconductor Devices	EE	OEC	3	0	0	3	40	60	100
31.	20EE903	Electrical Power Generation Systems	EE	OEC	3	0	0	3	40	60	100
32.	20EE904	Control Engineering	EE	OEC	3	0	0	3	40	60	100
33.	20EE905	Industrial Automation	EE	OEC	3	0	0	3	40	60	100
34.	20EE906	Electrical Instruments and Measurements	EE	OEC	3	0	0	3	40	60	100
35.	20EE907	Energy Conservation and Management	EE	OEC	3	0	0	3	40	60	100
36.	20EE908	Electrical Wiring, Estimation and Costing	EE	OEC	3	0	0	3	40	60	100
37.	20EE909	Fundamentals of Electrical Machinery	EE	OEC	3	0	0	3	40	60	100
38.	20EE910	Principles of Soft Computing Techniques	EE	OEC	3	0	0	3	40	60	100
39.	20EE911	Embedded System Technology	EE	OEC	3	0	0	3	40	60	100

Electronics and Communication Engineering											
40.	20EC901	Basics of Medical Electronics	EC	OEC	3	0	0	3	40	60	100
41.	20EC902	NANO Technology	EC	OEC	3	0	0	3	40	60	100
42.	20EC903	Electronics and Microprocessor	EC	OEC	3	0	0	3	40	60	100
43.	20EC904	Analog and Digital Communication	EC	OEC	3	0	0	3	40	60	100
44.	20EC905	Principles of Communication	EC	OEC	3	0	0	3	40	60	100
45.	20EC906	Fundamentals of Robotics	EC	OEC	3	0	0	3	40	60	100
46.	20EC907	Internet of Things Sensing and Actuator Devices	EC	OEC	3	0	0	3	40	60	100
47.	20EC908	Consumer Electronics	EC	OEC	3	0	0	3	40	60	100
Information Technology											
48.	20IT901	Data Science using R	IT	OEC	3	0	0	3	40	60	100
49.	20IT902	Principles of Cyber Security	IT	OEC	3	0	0	3	40	60	100
50.	20IT903	Fundamentals of Business Intelligence	IT	OEC	3	0	0	3	40	60	100
51.	20IT904	Blockchain Technologies	IT	OEC	3	0	0	3	40	60	100
52.	20IT905	Internet of Things and Applications	IT	OEC	3	0	0	3	40	60	100
53.	20IT906	Principles of Software Testing	IT	OEC	3	0	0	3	40	60	100
54.	20IT907	Foundation Skills in Logic Building	IT	OEC	3	0	0	3	40	60	100
55.	20IT908	Principles of Cloud Computing	IT	OEC	3	0	0	3	40	60	100
56.	20IT909	Open Source Technologies	IT	OEC	3	0	0	3	40	60	100
57.	20IT910	Principles of Software Engineering	IT	OEC	3	0	0	3	40	60	100
Mechanical Engineering											
58.	20ME901	Basic Mechanical Engineering	ME	OEC	3	0	0	3	40	60	100
59.	20ME902	Solar Energy Utilization	ME	OEC	3	0	0	3	40	60	100
60.	20ME903	Production Technology of Agriculture Machinery	ME	OEC	3	0	0	3	40	60	100
61.	20ME904	Selection of Materials	ME	OEC	3	0	0	3	40	60	100
62.	20ME905	Marine Vehicles	ME	OEC	3	0	0	3	40	60	100
63.	20ME906	Sensors and Transducers	ME	OEC	3	0	0	3	40	60	100
64.	20ME907	Energy Auditing	ME	OEC	3	0	0	3	40	60	100

65.	20ME908	Fiber Reinforced Plastics	ME	OEC	3	0	0	3	40	60	100
66.	20ME909	Lean Manufacturing	ME	OEC	3	0	0	3	40	60	100
67.	20ME910	Surface Engineering	ME	OEC	3	0	0	3	40	60	100
Safety and Fire Engineering											
68.	20SF901	Occupational Health and Hygiene	SF	OEC	3	0	0	3	40	60	100
69.	20SF902	Construction Safety	SF	OEC	3	0	0	3	40	60	100
70.	20SF903	Building Fire Safety	SF	OEC	3	0	0	3	40	60	100
71.	20SF904	Safety in Electrical Engineering	SF	OEC	3	0	0	3	40	60	100
72.	20SF905	Legal Aspects of Safety	SF	OEC	3	0	0	3	40	60	100
73.	20SF906	Safety in Industries	SF	OEC	3	0	0	3	40	60	100
74.	20SF907	Food Safety	SF	OEC	3	0	0	3	40	60	100
75.	20SF908	Safety Management and its Principles	SF	OEC	3	0	0	3	40	60	100
76.	20SF909	Safety in Automobile Engineering	SF	OEC	3	0	0	3	40	60	100
77.	20SF910	Safety in Transportation	SF	OEC	3	0	0	3	40	60	100
Science and Humanities											
78.	20SH901	Applications of Statistics	FYA	OEC	3	0	0	3	40	60	100
79.	20SH902	Combinatorics and Graph Theory	FYA	OEC	3	0	0	3	40	60	100
80.	20SH903	Optimization Techniques	FYA	OEC	3	0	0	3	40	60	100
81.	20SH904	Basic Military Education and Training	FYA	OEC	3	0	0	3	40	60	100
82.	20SH905	Professional Communication	FYA	OEC	3	0	0	3	40	60	100
83.	20SH906	Fundamentals of Nanoscience and Technology	FYA	OEC	3	0	0	3	40	60	100

LIST OF VALUE ADDED COURSES

Sl. No.	Course Code	Course Name	Number of Hours	Offered by Internal / External
1	20ITV01	PC hardware and Trouble Shooting	15	IT/KSRCE
2	20ITV02	DEVOPS Technologies	15	IT/KSRCE
3	20ITV03	Cyber Security Analytics	15	IT/KSRCE
4	20ITV04	R Programming	15	IT/KSRCE
5	20ITV05	Social Media Manager	15	IT/KSRCE
6	20ITV06	Augmented, virtual, and mixed reality	15	IT/KSRCE
7	20ITV07	Mojo Programming Language	15	IT/KSRCE
8	20ITV08	Life Skill Education	15	External
9	20ITV09	Human Right Education	15	External
10	20ITV10	Yoga Health and Physical Education	15	External
11	20ITV11	Educational psychology	15	External
12	20ITV12	Environmental education	15	External

COURSE COMPONENT SUMMARY

S. No.	Subject Area	Credits Per Semester								Credits Total	Percentage Credits
		I	II	III	IV	V	VI	VII	VIII		
1.	HSMC	3	3	-	3	3	-	-	-	12	7.45
2.	BSC	8	8	4	4	-	-	-	-	24	14.91
3.	ESC	8	1	3	4	3	-	-	-	19	11.80
4.	PCC	-	8	15	11	12	12	15	-	73	45.34
5.	PEC	-	-	-	-	3	6	3	3	15	9.32
6.	OEC	-	-	-	-	-	3	3	3	9	5.59
7.	PROJ	-	-	-	-	-	3	-	6	9	5.59
TOTAL		19	20	22	22	21	24	21	12	161	100

Total No. of Credits = 161

DEPARTMENT OF INFORMATION TECHNOLOGY

B.Tech. – INFORMATION TECHNOLOGY

CURRICULUM & SYLLABI

Regulations 2020

(Applicable to candidates admitted in the academic year 2022 - 2023 onwards)



K.S.R. College of Engineering (Autonomous)

(Approved by AICTE, Accredited by NAAC with A++ grade & Affiliated to Anna University)

K.S.R. Kalvi Nagar, Tiruchengode – 637 215

Namakkal (Dt), Tamilnadu, India

Email: info@ksrce.ac.in

Website: www.ksrce.ac.in

K.S.R. COLLEGE OF ENGINEERING: TIRUCHENGODE - 637 215

(Autonomous)

DEPARTMENT OF INFORMATION TECHNOLOGY

(REGULATIONS 2020)

Vision of the Institution

IV We envision to achieve status as an excellent Educational Institution in the global knowledge hub, making self-learners, experts, ethical and responsible engineers, technologists, scientists, managers, administrators and entrepreneurs who will significantly contribute to research and environment friendly sustainable growth of the nation and the world.

Mission of the Institution

IM 1 To inculcate in the students self-learning abilities that enable them to become competitive and considerate engineers, technologists, scientists, managers, administrators and entrepreneurs by diligently imparting the best of education, nurturing environmental and social needs.

IM 2 To foster and maintain mutually beneficial partnership with global industries and Institutions through knowledge sharing, collaborative research and innovation.

Vision of the Department / Programme: (Information Technology)

DV To produce excellent and competent software professional, researchers and responsible engineers, who can significantly contribute to environment friendly societal industry through quality education.

Mission of the Department / Programme: (Information Technology)

DM 1 To make the students competitive and efficient in technical field through technological transformations in Information Technology, by providing them advanced curriculum, infrastructure and nurturing human values.

DM 2 To provide an excellent forum for higher studies that leads to careers as Computer and IT professionals in the widely diversified domains of industry, government and academia.

Programme Educational Objectives (PEOs): (Information Technology)

The graduates of the programme will be able to

PEO 1 Engineering Acquaintance:Incorporate with necessary background in science and engineering fundamentals to analyze and solve IT problems and prepare them skilled manpower in the field of IT for subsequently generation.

PEO 2 Modern Technical Tools:Enhance in latest programming languages, technologies, software development process and communication technology.

PEO 3 Personality Development:Attain a successful career in industry through effective communication skills, team spirit, learning ethical responsibilities,attitude and adaptation to emerging technologies.

Programme Outcomes (POs) of B.Tech. - Information Technology

Program Outcomes (POs)	
PO1	Engineering Graduates will be able to: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern Tool Usage: Create, select, and apply appropriate techniques, resource, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and Team Work: Function effectively as an individual, and as a member or leader diverse teams, and in multidisciplinary settings..
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadcast context of technological change.
Program Specific Outcomes (PSOs)	
PSO1	Technical competency: Analyze a problem, design algorithm, identify and define the computing requirements appropriate to its solution and implement the same.
PSO2	Professional awareness: Contribute core universal values and social good in the community.

		K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode - 637 215						CURRICULUM UG R - 2020		
Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - I										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20EN151	Technical English - I (Common To All Branches)	HSMC	3	0	0	3	40	60	100
2.	20MA151	Engineering Mathematics - I (Common To All Branches)	BSC	3	1	0	4	40	60	100
3.	20CH051	Engineering Chemistry (Common To All Branches)	BSC	3	0	0	3	40	60	100
4.	20EE041	Basics of Electrical and Electronics Engineering (Common To AU,CE,CS, IT, ME & SF)	ESC	3	0	0	3	40	60	100
5.	20IT111	Programming for Problem Solving using C	ESC	3	0	0	3	40	60	100
MANDATORY COURSES										
6.	20MC151	Induction Programme* (Common To All Branches)	MC	-	0	0	0	-	-	-
PRACTICAL										
7.	20CH028	Chemistry Laboratory (Common To All Branches)	BSC	0	0	3	1	60	40	100
8.	20IT121	Programming for Problem Solving Laboratory	ESC	0	0	3	1	60	40	100
9.	20AU127	Engineering Graphics Laboratory (Common To CE,CS,EC,EE& IT)	ESC	0	0	3	1	60	40	100
Total				17	1	10	19	800		

(* - Induction Program will be conducted for 3 weeks as per AICTE guidelines)

SEMESTER - II										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20EN251	Technical English-II (Common To All Branches)	HSMC	3	0	0	3	40	60	100
2.	20MA232	Discrete Mathematics (Common To CS & IT)	BSC	3	1	0	4	40	60	100
3.	20PH051	Engineering Physics (Common To All Branches)	BSC	3	0	0	3	40	60	100
4.	20IT211	Python Software Foundation	PCC	3	0	0	3	40	60	100
5.	20IT212	IT Essential	PCC	3	0	0	3	40	60	100
MANDATORY COURSES										
6.	20MC052	Environmental Science and Engineering (Common To All Branches)	MC	3	0	0	0	-	-	-
7.	20GE051	Heritage of Tamils - தமிழர் மரபு	MC	1	0	0	1	40	60	100
PRACTICAL										
8.	20PH028	Physics Laboratory (Common To All Branches)	BSC	0	0	3	1	60	40	100
9.	20GE028	Manufacturing Practices Laboratory (Common To All Branches)	PCC	0	0	3	1	60	40	100
10.	20IT221	Python Software Foundation Laboratory	PCC	0	0	3	1	60	40	100
11.	20IT222	IT Essential Laboratory	ESC	0	0	3	1	60	40	100
Total				18	1	13	21	1000		

		K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode - 637 215						CURRICULUM UG R - 2020		
Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - III										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20MA343	Numerical Computational Techniques (Common To CS & IT)	BSC	3	1	0	4	40	60	100
2.	20EC333	Digital Principles and System Design	ESC	3	0	0	3	40	60	100
3.	20IT311	Object Oriented Programming	PCC	3	0	0	3	40	60	100
4.	20IT312	Operating Systems	PCC	3	0	0	3	40	60	100
5.	20IT313	Data Structures	PCC	3	0	0	3	40	60	100
6.	20IT314	Computer Organization	PCC	3	0	0	3	40	60	100
MANDATORY COURSES										
7.	20GE052	Tamils and Technology - தமிழரும் தொழில்நுட்பமும்	MC	1	0	0	1	60	40	100
PRACTICAL										
8.	20IT321	Object Oriented Programming Laboratory	PCC	0	0	3	1	60	40	100
9.	20IT322	Operating Systems Laboratory	PCC	0	0	3	1	60	40	100
10.	20IT323	Data Structures Laboratory	PCC	0	0	3	1	60	40	100
11.	20HR351	Career Development Skills I	EEC	0	2	0	0	60	40	100
Total				19	3	9	23	1100		

SEMESTER - IV										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20MA441	Probability and Decision Models (Common To CS & IT)	BSC	3	1	0	4	40	60	100
2.	20IT411	Database Management Systems	PCC	3	0	0	3	40	60	100
3.	20IT412	Java Programming	PCC	3	0	0	3	40	60	100
4.	20IT413	Design and Analysis of Algorithms	ESC	3	0	0	3	40	60	100
5.	20IT414	Software Engineering Principles and Practices	PCC	3	0	0	3	40	60	100
6.	20HS051	Universal Human Values and Understanding Harmony	HSMC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT421	Database Systems Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT422	Java Programming Laboratory	PCC	0	0	3	1	60	40	100
9.	20IT423	Design and Analysis of Algorithms Laboratory	PCC	0	0	3	1	60	40	100
10.	20HR462	Career Development Skills II	EEC	0	2	0	0	60	40	100
Total				18	3	9	22	1000		

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Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - V										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20EC532	Micro Controller and Embedded Systems	ESC	3	0	0	3	40	60	100
2.	20IT511	Data Analytics	PCC	3	0	0	3	40	60	100
3.	20IT512	Theory of Computation	PCC	3	1	0	4	40	60	100
4.	20IT513	Computer Networks	PCC	3	0	0	3	40	60	100
5.	20HS002	Total Quality Management (Common To AU,CS,EE,IT,ME,SF)	HSMC	3	0	0	3	40	60	100
6.		Professional Elective - I	PEC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT521	Data Analytics Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT522	Computer Networks Laboratory	PCC	0	0	3	1	60	40	100
9.	20HR563	Career Development Skills III	EEC	0	2	0	0	60	40	100
Total				18	3	6	21	900		

SEMESTER - VI										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20IT611	Web Technology	PCC	3	0	0	3	40	60	100
2.	20IT612	Software Testing	PCC	3	0	0	3	40	60	100
3.	20IT613	Principles of Compiler Design	PCC	3	1	0	4	40	60	100
4.		Professional Elective - II	PEC	3	0	0	3	40	60	100
5.		Professional Elective - III	PEC	3	0	0	3	40	60	100
6.		Open Elective - I	OEC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT621	Web Technology Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT622	Compiler Design Laboratory	PCC	0	0	3	1	60	40	100
9.	20IT623	Mini project	PROJ	0	0	6	3	60	40	100
10.	20HR664	Career Development Skills IV	EEC	0	2	0	0	60	40	100
Total				18	3	12	24	1000		

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Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - VII										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit C	Maximum Marks		
				L	T	P		CA	ES	Total
THEORY										
1.	20IT711	Mobile Application Development	PCC	3	0	0	3	40	60	100
2.	20IT712	Computer Graphics and Visualization	PCC	3	0	0	3	40	60	100
3.	20IT713	Cryptography and Network Security	PCC	3	1	0	4	40	60	100
4.	20IT714	Artificial Intelligence	PCC	3	0	0	3	40	60	100
5.		Professional Elective-IV	PEC	3	0	0	3	40	60	100
6.		Open Elective - II	OEC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT721	Mobile Application Development Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT722	Computer Graphics Laboratory	PCC	0	0	3	1	60	40	100
Total				18	1	6	21	800		

SEMESTER - VIII										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit C	Maximum Marks		
				L	T	P		CA	ES	Total
THEORY										
1.		Professional Elective - V	PEC	3	0	0	3	40	60	100
2.		Open Elective - III	OEC	3	0	0	3	40	60	100
PRACTICAL										
3.	20IT821	Project Work	PROJ	0	0	12	6	60	40	100
Total				9	0	12	12	300		

		K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode - 637 215						CURRICULUM UG R - 2020			
Department		Department of Information Technology									
Programme		B.Tech- Information Technology									
List of Electives											
PROFESSIONAL ELECTIVE - I (SEMESTER - V)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT561	Object Oriented Analysis and Design	S2	PEC	3	0	0	3	40	60	100
2.	20IT562	Advanced Computer Architecture	S4	PEC	3	0	0	3	40	60	100
3.	20IT563	Mobile Computing	S3	PEC	3	0	0	3	40	60	100
4.	20IT564	Unix Internals	S4	PEC	3	0	0	3	40	60	100
5.	20IT565	Agile Methodologies	S4	PEC	3	0	0	3	40	60	100
6.	20IT566	Enterprise Resource and Planning	S2	PEC	3	0	0	3	40	60	100
7.	20IE591	Augmented Intelligence Led Managed Services- I [Industry Elective - Virtusa]	S1	PEC	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - II (SEMESTER - VI)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT661	Bioinformatics	S2	PEC	3	0	0	3	40	60	100
2.	20IT662	Cloud Computing	S1	PEC	3	0	0	3	40	60	100
3.	20IT663	Fundamentals of DevOps	S4	PEC	3	0	0	3	40	60	100
4.	20IT664	Augmented and Virtual Reality	S4	PEC	3	0	0	3	40	60	100
5.	20IT665	Functional Programming	S1	PEC	3	0	0	3	40	60	100
6.	20IT666	Internet of Things	S4	PEC	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - III (SEMESTER - VI)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT667	Wireless Communication	S3	PEC	3	0	0	3	40	60	100
2.	20IT668	C# and .Net Technologies	S1	PEC	3	0	0	3	40	60	100
3.	20IT669	Machine Learning Techniques	S2	PEC	3	0	0	3	40	60	100
4.	20IT670	Open Source Software	S1	PEC	3	0	0	3	40	60	100
5.	20IT671	Tele Communication and Switching Techniques	S3	PEC	3	0	0	3	40	60	100
6.	20IE691	Augmented Intelligence Led Managed Services - II [Industry Elective - Virtusa]	S1	PEC	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE – IV (SEMESTER – VII)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT761	Cyber Security	S1	PEC	3	0	0	3	40	60	100
2.	20IT762	Cyber-Physical Systems	S4	PEC	3	0	0	3	40	60	100
3.	20IT763	Digital Image Processing	S2	PEC	3	0	0	3	40	60	100
4.	20IT764	Quantum Computing	S1	PEC	3	0	0	3	40	60	100
5.	20IT765	Video Analytics	S2	PEC	3	0	0	3	40	60	100
6.	20IT766	Business Intelligence and Applications	S2	PEC	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE – V (SEMESTER - VIII)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT861	Pattern Recognition	S2	PEC	3	0	0	3	40	60	100
2.	20IT862	Green Computing	S4	PEC	3	0	0	3	40	60	100
3.	20IT863	Principles of Blockchain Systems	S1	PEC	3	0	0	3	40	60	100
4.	20IT864	Digital Marketing	S5	PEC	3	0	0	3	40	60	100
5.	20IT865	Wireless Sensor Networks	S3	PEC	3	0	0	3	40	60	100
6.	20IT866	Software Project Management	S2	PEC	3	0	0	3	40	60	100

B.E./B.TECH. HONOURS (SPECIALIZATION IN THE SAME DISCIPLINE) : VERTICALS

Emerging Areas: INFORMATION TECHNOLOGY

(i) B.E./B.Tech Honours (specialization in the same discipline)

- a. The student should have earned additionally a minimum of 18 credits from a specified group of Professional Electives of the same programme.
- b. Should have passed all the courses in the first attempt.
- c. Should have earned a minimum of 7.50 CGPA.

(ii) B.E./B.Tech Honours

- a. The students should have taken additional courses from more than one vertical of the same Programme and earned a minimum of 18 credits.
- b. Should have passed all the courses in the first attempt.
- c. Should have earned a minimum of 7.50 CGPA.

(iii) B.E./B.Tech minor in other specialization.

The student should have earned additionally a minimum of 18 credits in any one of the verticals of other B.E programmes

- Out of these 18 credits students can earn a maximum of 6 credits in online mode (SWAYAM platform), as approved by Centre for Academic Courses.
- B.E./ B. Tech. (Hons) Specialization in the same discipline, B.E / B.Tech. Honors and B.E./B.Tech. Minor in other specialization degree will be optional for students.
- For the categories (i) to (ii), the students shall be permitted to register for the courses from the V Semester onwards provided the students has earned a minimum CGPA 7.50 of until III Semester and has cleared all the courses in the first attempt.
- For the category (iii), the students will be permitted, to register the courses from Semester V onwards provided the marks earned by the students until Semester III is CGPA 7.50 and above.
- If a student decides not to opt for Honours, after completing certain number of additional courses, the additional courses studied shall be considered instead of the Professional Elective courses, which are part of the curriculum. If the student has studied more number of such courses than the number of Professional Elective courses required as per the curriculum, the courses with higher grades shall be considered for the calculation of CGPA. Remaining courses shall be printed in the mark sheet, however, they will not be considered for calculation of CGPA.

Registration of Professional Elective courses from Verticals:

Professional Elective Courses will be registered in Semesters V to VIII. These courses are listed in groups called verticals that represent a particular area of specialization / diversified group. The student should have earned additionally a minimum of 18 credits in any one of the verticals for obtaining B.E./B.Tech. Honours with specialization in the same disciplines.

PROFESSIONAL ELECTIVE HONOURS COURSES: VERTICALS

VERTICAL-1: INTERNET OF THINGS											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT567	Technologies Enabling IoT	S1	OEC	3	0	0	3	40	60	100
2.	20IT568	IoT systems design	S1	OEC	3	0	0	3	40	60	100
3.	20IT673	Industrial IoT	S1	OEC	3	0	0	3	40	60	100
4.	20IT767	Privacy and Security in IoT	S3	OEC	3	0	0	3	40	60	100
5.	20IT768	Fog Computing & Energy Management in IoT Devices	S1	OEC	3	0	0	3	40	60	100
6.	20IT867	Robotic Process Automation	S1	OEC	3	0	0	3	40	60	100

VERTICAL-2: DATA SCIENCE											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT569	Linked Open Data And Its Applications	S2	OEC	3	0	0	3	40	60	100
2.	20IT674	Big Data Security	S2	OEC	3	0	0	3	40	60	100
3.	20IT675	Real Time Data Streaming	S2	OEC	3	0	0	3	40	60	100
4.	20IT769	Sentiment Analysis	S2	OEC	3	0	0	3	40	60	100
5.	20IT868	Cognitive Science	S2	OEC	3	0	0	3	40	60	100
6.	20IT869	Text Processing and Mining	S2	OEC	3	0	0	3	40	60	100

S1 - Recent Technologies and Computing

S2 - Data and Knowledge Engineering

S3 - Computer Networks and Security

S4 - Systems and Software Engineering

S5 - Entrepreneurship and Managerial Skills

OPEN ELECTIVE COURSES

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
Automobile Engineering											
1.	20AU901	Basics of Automobile Engineering	AE	OEC	3	0	0	3	40	60	100
2.	20AU902	Automotive Engine Technology	AE	OEC	3	0	0	3	40	60	100
3.	20AU903	Automotive Vehicle Technology	AE	OEC	3	0	0	3	40	60	100
4.	20AU904	Automotive Safety	AE	OEC	3	0	0	3	40	60	100
5.	20AU905	Hybrid Vehicles	AE	OEC	3	0	0	3	40	60	100
6.	20AU906	Off Highway Vehicles	AE	OEC	3	0	0	3	40	60	100
7.	20AU907	Modern and Intelligent Vehicle System	AE	OEC	3	0	0	3	40	60	100
8.	20AU908	Vehicle Maintenance	AE	OEC	3	0	0	3	40	60	100
CIVIL ENGINEERING											
9.	20CE901	Architectural Heritage of India	CE	OEC	3	0	0	3	40	60	100
10.	20CE902	Building Planning and Construction	CE	OEC	3	0	0	3	40	60	100
11.	20CE903	Elementary Civil Engineering	CE	OEC	3	0	0	3	40	60	100
12.	20CE904	Energy and Environment	CE	OEC	3	0	0	3	40	60	100
13.	20CE905	Environmental Laws and Policies	CE	OEC	3	0	0	3	40	60	100
14.	20CE906	Global Warming and Climate Change	CE	OEC	3	0	0	3	40	60	100
15.	20CE907	Introduction to Disaster Management and Mitigation	CE	OEC	3	0	0	3	40	60	100
16.	20CE908	Introduction to Earthquake Engineering	CE	OEC	3	0	0	3	40	60	100
17.	20CE909	Solid Waste Management	CE	OEC	3	0	0	3	40	60	100
18.	20CE910	Water and Air Pollution Management	CE	OEC	3	0	0	3	40	60	100
Computer Science and Engineering											
19.	20CS901	Programming in Java	CSE	OEC	3	0	0	3	40	60	100
20.	20CS902	Basic concepts of Data Structure	CSE	OEC	3	0	0	3	40	60	100
21.	20CS903	Fundamentals of Database Concepts	CSE	OEC	3	0	0	3	40	60	100

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
22.	20CS904	Internet Programming	CSE	OEC	3	0	0	3	40	60	100
23.	20CS905	Fundamentals of Mobile Application Development	CSE	OEC	3	0	0	3	40	60	100
24.	20CS906	Principles of Ethical Hacking	CSE	OEC	3	0	0	3	40	60	100
25.	20CS907	Green Technology	CSE	OEC	3	0	0	3	40	60	100
26.	20CS908	Artificial Intelligence and Robotics	CSE	OEC	3	0	0	3	40	60	100
27.	20CS909	Big Data and Analytics	CSE	OEC	3	0	0	0	40	60	100
28.	20CS910	Hardware and Trouble Shooting	CSE	OEC	3	0	0	3	40	60	100
Electrical and Electronics Engineering											
29.	20EE901	Electrical Drives and Control	EE	OEC	3	0	0	3	40	60	100
30.	20EE902	Power Semiconductor Devices	EE	OEC	3	0	0	3	40	60	100
31.	20EE903	Electrical Power Generation Systems	EE	OEC	3	0	0	3	40	60	100
32.	20EE904	Control Engineering	EE	OEC	3	0	0	3	40	60	100
33.	20EE905	Industrial Automation	EE	OEC	3	0	0	3	40	60	100
34.	20EE906	Electrical Instruments and Measurements	EE	OEC	3	0	0	3	40	60	100
35.	20EE907	Energy Conservation and Management	EE	OEC	3	0	0	3	40	60	100
36.	20EE908	Electrical Wiring, Estimation and Costing	EE	OEC	3	0	0	3	40	60	100
37.	20EE909	Fundamentals of Electrical Machinery	EE	OEC	3	0	0	3	40	60	100
38.	20EE910	Principles of Soft Computing Techniques	EE	OEC	3	0	0	3	40	60	100
39.	20EE911	Embedded System Technology	EE	OEC	3	0	0	3	40	60	100
Electronics and Communication Engineering											
40.	20EC901	Basics of Medical Electronics	EC	OEC	3	0	0	3	40	60	100
41.	20EC902	NANO Technology	EC	OEC	3	0	0	3	40	60	100
42.	20EC903	Electronics and Microprocessor	EC	OEC	3	0	0	3	40	60	100

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
43.	20EC904	Analog and Digital Communication	EC	OEC	3	0	0	3	40	60	100
44.	20EC905	Principles of Communication	EC	OEC	3	0	0	3	40	60	100
45.	20EC906	Fundamentals of Robotics	EC	OEC	3	0	0	3	40	60	100
46.	20EC907	Internet of Things Sensing and Actuator Devices	EC	OEC	3	0	0	3	40	60	100
47.	20EC908	Consumer Electronics	EC	OEC	3	0	0	3	40	60	100
Information Technology											
48.	20IT901	Data Science using R	IT	OEC	3	0	0	3	40	60	100
49.	20IT902	Principles of Cyber Security	IT	OEC	3	0	0	3	40	60	100
50.	20IT903	Fundamentals of Business Intelligenc	IT	OEC	3	0	0	3	40	60	100
51.	20IT904	Blockchain Technologies	IT	OEC	3	0	0	3	40	60	100
52.	20IT905	Internet of Things and Applications	IT	OEC	3	0	0	3	40	60	100
53.	20IT906	Principles of Software Testing	IT	OEC	3	0	0	3	40	60	100
54.	20IT907	Foundation Skills in Logic Building	IT	OEC	3	0	0	3	40	60	100
55.	20IT908	Principles of Cloud Computing	IT	OEC	3	0	0	3	40	60	100
56.	20IT909	Open Source Technologies	IT	OEC	3	0	0	3	40	60	100
57.	20IT910	Principles of Software Engineering	IT	OEC	3	0	0	3	40	60	100
Mechanical Engineering											
58.	20ME901	Basic Mechanical Engineering	ME	OEC	3	0	0	3	40	60	100
59.	20ME902	Solar Energy Utilization	ME	OEC	3	0	0	3	40	60	100
60.	20ME903	Production Technology of Agricultura Machinery	ME	OEC	3	0	0	3	40	60	100
61.	20ME904	Selection of Materials	ME	OEC	3	0	0	3	40	60	100
62.	20ME905	Marine Vehicles	ME	OEC	3	0	0	3	40	60	100
63.	20ME906	Sensors and Transducers	ME	OEC	3	0	0	3	40	60	100
64.	20ME907	Energy Auditing	ME	OEC	3	0	0	3	40	60	100
65.	20ME908	Fiber Reinforced Plastics	ME	OEC	3	0	0	3	40	60	100
66.	20ME909	Lean Manufacturing	ME	OEC	3	0	0	3	40	60	100
67.	20ME910	Surface Engineering	ME	OEC	3	0	0	3	40	60	100

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P	C	CA	ES	Total
Safety and Fire Engineering											
68.	20SF901	Occupational Health and Hygiene	SF	OEC	3	0	0	3	40	60	100
69.	20SF902	Construction Safety	SF	OEC	3	0	0	3	40	60	100
70.	20SF903	Building Fire Safety	SF	OEC	3	0	0	3	40	60	100
71.	20SF904	Safety in Electrical Engineering	SF	OEC	3	0	0	3	40	60	100
72.	20SF905	Legal Aspects of Safety	SF	OEC	3	0	0	3	40	60	100
73.	20SF906	Safety in Industries	SF	OEC	3	0	0	3	40	60	100
74.	20SF907	Food Safety	SF	OEC	3	0	0	3	40	60	100
75.	20SF908	Safety Management and its Principles	SF	OEC	3	0	0	3	40	60	100
76.	20SF909	Safety in Automobile Engineering	SF	OEC	3	0	0	3	40	60	100
77.	20SF910	Safety in Transportation	SF	OEC	3	0	0	3	40	60	100
Science and Humanities											
78.	20SH901	Applications of Statistics	FYA	OEC	3	0	0	3	40	60	100
79.	20SH902	Combinatorics and Graph Theory	FYA	OEC	3	0	0	3	40	60	100
80.	20SH903	Optimization Techniques	FYA	OEC	3	0	0	3	40	60	100
81.	20SH904	Basic Military Education and Training	FYA	OEC	3	0	0	3	40	60	100
82.	20SH905	Professional Communication	FYA	OEC	3	0	0	3	40	60	100
83.	20SH906	Fundamentals of Nanoscience and Technology	FYA	OEC	3	0	0	3	40	60	100

LIST OF VALUE ADDED COURSES

Sl. No.	Course Code	Course Name	Number of Hours	Offered by Internal / External
1	20ITV01	PC hardware and Trouble Shooting	15	IT/KSRCE
2	20ITV02	DEVOPS Technologies	15	IT/KSRCE
3	20ITV03	Cyber Security Analytics	15	IT/KSRCE
4	20ITV04	R Programming	15	IT/KSRCE
5	20ITV05	Social Media Manager	15	IT/KSRCE
6	20ITV06	Augmented, virtual, and mixed reality	15	IT/KSRCE
7	20ITV07	Mojo Programming Language	15	IT/KSRCE
8	20ITV08	Life Skill Education	15	External
9	20ITV09	Human Right Education	15	External
10	20ITV10	Yoga Health and Physical Education	15	External
11	20ITV11	Educational psychology	15	External
12	20ITV12	Environmental education	15	External

COURSE COMPONENT SUMMARY

S. No.	Subject Area	Credits Per Semester								Credits Total	Percentage Credits
		I	II	III	IV	V	VI	VII	VIII		
1.	HSMC	3	3	-	3	3	-	-	-	12	7.45
2.	BSC	8	8	4	4	-	-	-	-	24	14.91
3.	ESC	8	1	3	4	3	-	-	-	19	11.80
4.	PCC	-	8	15	11	12	12	15	-	73	45.34
5.	PEC	-	-	-	-	3	6	3	3	15	9.32
6.	OEC	-	-	-	-	-	3	3	3	9	5.59
7.	PROJ	-	-	-	-	-	3	-	6	9	5.59
TOTAL		19	20	22	22	21	24	21	12	161	100

Total No. of Credits = 161

DEPARTMENT OF INFORMATION TECHNOLOGY

B.Tech. – INFORMATION TECHNOLOGY

CURRICULUM & SYLLABI

Regulations 2020

(Applicable to candidates admitted in the academic year 2023 - 2024 onwards)



K.S.R. College of Engineering (Autonomous)

(Approved by AICTE, Accredited by NAAC with A++ grade & Affiliated to Anna University)

K.S.R. Kalvi Nagar, Tiruchengode – 637 215

Namakkal (Dt), Tamilnadu, India

Email: info@ksrce.ac.in

Website: www.ksrce.ac.in

K.S.R. COLLEGE OF ENGINEERING: TIRUCHENGODE - 637 215

(Autonomous)

DEPARTMENT OF INFORMATION TECHNOLOGY

(REGULATIONS 2020)

Vision of the Institution

IV We envision to achieve status as an excellent Educational Institution in the global knowledge hub, making self-learners, experts, ethical and responsible engineers, technologists, scientists, managers, administrators and entrepreneurs who will significantly contribute to research and environment friendly sustainable growth of the nation and the world.

Mission of the Institution

IM 1 To inculcate in the students self-learning abilities that enable them to become competitive and considerate engineers, technologists, scientists, managers, administrators and entrepreneurs by diligently imparting the best of education, nurturing environmental and social needs.

IM 2 To foster and maintain mutually beneficial partnership with global industries and Institutions through knowledge sharing, collaborative research and innovation.

Vision of the Department / Programme: (Information Technology)

DV To produce excellent and competent software professional, researchers and responsible engineers, who can significantly contribute to environment friendly societal industry through quality education.

Mission of the Department / Programme: (Information Technology)

DM 1 To make the students competitive and efficient in technical field through technological transformations in Information Technology, by providing them advanced curriculum, infrastructure and nurturing human values.

DM 2 To provide an excellent forum for higher studies that leads to careers as Computer and IT professionals in the widely diversified domains of industry, government and academia.

Programme Educational Objectives (PEOs): (Information Technology)

The graduates of the programme will be able to

PEO 1 Engineering Acquaintance:Incorporate with necessary background in science and engineering fundamentals to analyze and solve IT problems and prepare them skilled manpower in the field of IT for subsequently generation.

PEO 2 Modern Technical Tools:Enhance in latest programming languages, technologies, software development process and communication technology.

PEO 3 Personality Development:Attain a successful career in industry through effective communication skills, team spirit, learning ethical responsibilities,attitude and adaptation to emerging technologies.

Programme Outcomes (POs) of B.Tech. - Information Technology

Program Outcomes (POs)	
PO1	Engineering Graduates will be able to: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern Tool Usage: Create, select, and apply appropriate techniques, resource, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and Team Work: Function effectively as an individual, and as a member or leader diverse teams, and in multidisciplinary settings..
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadcast context of technological change.
Program Specific Outcomes (PSOs)	
PSO1	Technical competency: Analyze a problem, design algorithm, identify and define the computing requirements appropriate to its solution and implement the same.
PSO2	Professional awareness: Contribute core universal values and social good in the community.

		K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode - 637 215						CURRICULUM UG R - 2020		
Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - I										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20EN151	Technical English - I (Common To All Branches)	HSMC	3	0	0	3	40	60	100
2.	20MA151	Engineering Mathematics - I (Common To All Branches)	BSC	3	1	0	4	40	60	100
3.	20CH051	Engineering Chemistry (Common To All Branches)	BSC	3	0	0	3	40	60	100
4.	20EE041	Basics of Electrical and Electronics Engineering (Common To AU,CE,CS,CSD,IoT,IT, ME&SF)	ESC	3	0	0	3	40	60	100
5.	20IT111	Programming for Problem Solving using C	ESC	3	0	0	3	40	60	100
MANDATORY COURSES										
6.	20MC151	Induction Programme* (Common To All Branches)	MC	-	0	0	0	-	-	-
7.	20GE051	Heritage of Tamils - தமிழர் மரபு	MC	1	0	0	1	40	60	100
PRACTICAL										
8.	20CH028	Chemistry Laboratory (Common To All Branches)	BSC	0	0	3	1	60	40	100
9.	20IT121	Programming for Problem Solving Laboratory	ESC	0	0	3	1	60	40	100
10.	20AU127	Engineering Graphics Laboratory (Common To CE,CS,CSD,IoT,EC,EE& IT)	ESC	0	0	3	1	60	40	100
Total				15	1	10	20	900		
(* - Induction Program will be conducted for 3 weeks as per AICTE guidelines)										
SEMESTER - II										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20EN251	Technical English-II (Common To All Branches)	HSMC	3	0	0	3	40	60	100
2.	20MA232	Discrete Mathematics (Common To CS & IT)	BSC	3	1	0	4	40	60	100
3.	20PH051	Engineering Physics (Common To All Branches)	BSC	3	0	0	3	40	60	100
4.	20IT211	Python Software Foundation	PCC	3	0	0	3	40	60	100
5.	20IT212	IT Essential	PCC	3	0	0	3	40	60	100
MANDATORY COURSES										
6.	20MC052	Environmental Science and Engineering (Common To All Branches)	MC	3	0	0	0	-	-	-
7.	20GE052	Tamils and Technology - தமிழ்நாடு தொழில்நுட்பம்	MC	1	0	0	1	60	40	100
PRACTICAL										
8.	20PH028	Physics Laboratory (Common To All Branches)	BSC	0	0	3	1	60	40	100
9.	20GE028	Manufacturing Practices Laboratory (Common To All Branches)	PCC	0	0	3	1	60	40	100
10.	20IT221	Python Software Foundation Laborator	PCC	0	0	3	1	60	40	100
11.	20IT222	IT Essential Laboratory	ESC	0	0	3	1	60	40	100
Total				18	1	13	21	1000		

		K.S.R. COLLEGE OF ENGINEERING (Autonomous) (Approved by AICTE & Affiliated to Anna University) K.S.R. Kalvi Nagar, Tiruchengode - 637 215						CURRICULUM UG R - 2020		
Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - III										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	20MA343	Numerical Computational Techniques (Common To CS & IT)	BSC	3	1	0	4	40	60	100
2.	20EC333	Digital Principles and System Design	ESC	3	0	0	3	40	60	100
3.	20IT311	Object Oriented Programming	PCC	3	0	0	3	40	60	100
4.	20IT312	Operating Systems	PCC	3	0	0	3	40	60	100
5.	20IT313	Data Structures	PCC	3	0	0	3	40	60	100
6.	20IT314	Computer Organization	PCC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT321	Object Oriented Programming Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT322	Operating Systems Laboratory	PCC	0	0	3	1	60	40	100
9.	20IT323	Data Structures Laboratory	PCC	0	0	3	1	60	40	100
10.	20HR351	Career Development Skills I	EEC	0	2	0	0	60	40	100
Total				18	3	9	22	1000		

SEMESTER - IV										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P	C	CA	ES	Total
THEORY										
1.	20MA441	Probability and Decision Models (Common To CS & IT)	BSC	3	1	0	4	40	60	100
2.	20IT411	Database Management Systems	PCC	3	0	0	3	40	60	100
3.	20IT412	Java Programming	PCC	3	0	0	3	40	60	100
4.	20IT413	Design and Analysis of Algorithms	ESC	3	0	0	3	40	60	100
5.	20IT414	Software Engineering Principles and Practices	PCC	3	0	0	3	40	60	100
6.	20HS051	Universal Human Values and Understanding Harmony	HSMC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT421	Database Systems Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT422	Java Programming Laboratory	PCC	0	0	3	1	60	40	100
9.	20IT423	Design and Analysis of Algorithms Laboratory	PCC	0	0	3	1	60	40	100
10.	20HR462	Career Development Skills II	EEC	0	2	0	0	60	40	100
Total				18	3	9	22	1000		

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Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - V										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20EC532	Micro Controller and Embedded Systems	ESC	3	0	0	3	40	60	100
2.	20IT511	Data Analytics	PCC	3	0	0	3	40	60	100
3.	20IT512	Theory of Computation	PCC	3	1	0	4	40	60	100
4.	20IT513	Computer Networks	PCC	3	0	0	3	40	60	100
5.	20HS002	Total Quality Management (Common To AU,CS,EE,IT,ME,SF)	HSMC	3	0	0	3	40	60	100
6.		Professional Elective - I	PEC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT521	Data Analytics Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT522	Computer Networks Laboratory	PCC	0	0	3	1	60	40	100
9.	20HR563	Career Development Skills III	EEC	0	2	0	0	60	40	100
Total				18	3	6	21	900		

SEMESTER - VI										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20IT611	Web Technology	PCC	3	0	0	3	40	60	100
2.	20IT612	Software Testing	PCC	3	0	0	3	40	60	100
3.	20IT613	Principles of Compiler Design	PCC	3	1	0	4	40	60	100
4.		Professional Elective - II	PEC	3	0	0	3	40	60	100
5.		Professional Elective - III	PEC	3	0	0	3	40	60	100
6.		Open Elective - I	OEC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT621	Web Technology Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT622	Compiler Design Laboratory	PCC	0	0	3	1	60	40	100
9.	20IT623	Mini project	PROJ	0	0	6	3	60	40	100
10.	20HR664	Career Development Skills IV	EEC	0	2	0	0	60	40	100
Total				18	3	12	24	1000		

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Department		Department of Information Technology								
Programme		B.Tech-Information Technology								
SEMESTER - VII										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.	20IT711	Mobile Application Development	PCC	3	0	0	3	40	60	100
2.	20IT712	Computer Graphics and Visualization	PCC	3	0	0	3	40	60	100
3.	20IT713	Cryptography and Network Security	PCC	3	1	0	4	40	60	100
4.	20IT714	Artificial Intelligence	PCC	3	0	0	3	40	60	100
5.		Professional Elective-IV	PEC	3	0	0	3	40	60	100
6.		Open Elective - II	OEC	3	0	0	3	40	60	100
PRACTICAL										
7.	20IT721	Mobile Application Development Laboratory	PCC	0	0	3	1	60	40	100
8.	20IT722	Computer Graphics Laboratory	PCC	0	0	3	1	60	40	100
Total				18	1	6	21	800		

SEMESTER - VIII										
Sl.No.	Course Code	Course Name	Category	Hours/ Week			Credit	Maximum Marks		
				L	T	P		C	CA	ES
THEORY										
1.		Professional Elective - V	PEC	3	0	0	3	40	60	100
2.		Open Elective - III	OEC	3	0	0	3	40	60	100
PRACTICAL										
3.	20IT821	Project Work	PROJ	0	0	12	6	60	40	100
Total				9	0	12	12	300		

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Department		Department of Information Technology									
Programme		B.Tech- Information Technology									
List of Electives											
PROFESSIONAL ELECTIVE - I (SEMESTER - V)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT561	Object Oriented Analysis and Design	S2	PEC	3	0	0	3	40	60	100
2.	20IT562	Advanced Computer Architecture	S4	PEC	3	0	0	3	40	60	100
3.	20IT563	Mobile Computing	S3	PEC	3	0	0	3	40	60	100
4.	20IT564	Unix Internals	S4	PEC	3	0	0	3	40	60	100
5.	20IT565	Agile Methodologies	S4	PEC	3	0	0	3	40	60	100
6.	20IT566	Enterprise Resource and Planning	S2	PEC	3	0	0	3	40	60	100
7.	20IE591	Augmented Intelligence Led Managed Services- I [Industry Elective - Virtusa]	S1	PEC	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - II (SEMESTER - VI)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT661	Bioinformatics	S2	PEC	3	0	0	3	40	60	100
2.	20IT662	Cloud Computing	S1	PEC	3	0	0	3	40	60	100
3.	20IT663	Fundamentals of DevOps	S4	PEC	3	0	0	3	40	60	100
4.	20IT664	Augmented and Virtual Reality	S4	PEC	3	0	0	3	40	60	100
5.	20IT665	Functional Programming	S1	PEC	3	0	0	3	40	60	100
6.	20IT666	Internet of Things	S4	PEC	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - III (SEMESTER - VI)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
1.	20IT667	Wireless Communication	S3	PEC	3	0	0	3	40	60	100
2.	20IT668	C# and .Net Technologies	S1	PEC	3	0	0	3	40	60	100
3.	20IT669	Machine Learning Techniques	S2	PEC	3	0	0	3	40	60	100
4.	20IT670	Open Source Software	S1	PEC	3	0	0	3	40	60	100
5.	20IT671	Tele Communication and Switching Techniques	S3	PEC	3	0	0	3	40	60	100
6.	20IE691	Augmented Intelligence Led Managed Services - II [Industry Elective - Virtusa]	S1	PEC	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE – IV (SEMESTER – VII)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P	C	CA	ES	Total
1.	20IT761	Cyber Security	S1	PEC	3	0	0	3	40	60	100
2.	20IT762	Cyber-Physical Systems	S4	PEC	3	0	0	3	40	60	100
3.	20IT763	Digital Image Processing	S2	PEC	3	0	0	3	40	60	100
4.	20IT764	Quantum Computing	S1	PEC	3	0	0	3	40	60	100
5.	20IT765	Video Analytics	S2	PEC	3	0	0	3	40	60	100
6.	20IT766	Business Intelligence and Applications	S2	PEC	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE – V (SEMESTER - VIII)											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P	C	CA	ES	Total
1.	20IT861	Pattern Recognition	S2	PEC	3	0	0	3	40	60	100
2.	20IT862	Green Computing	S4	PEC	3	0	0	3	40	60	100
3.	20IT863	Principles of Blockchain Systems	S1	PEC	3	0	0	3	40	60	100
4.	20IT864	Digital Marketing	S5	PEC	3	0	0	3	40	60	100
5.	20IT865	Wireless Sensor Networks	S3	PEC	3	0	0	3	40	60	100
6.	20IT866	Software Project Management	S2	PEC	3	0	0	3	40	60	100

B.E./B.TECH. HONOURS (SPECIALIZATION IN THE SAME DISCIPLINE) : VERTICALS

Emerging Areas: INFORMATION TECHNOLOGY

(iv) B.E./B.Tech Honours (specialization in the same discipline)

- a. The student should have earned additionally a minimum of 18 credits from a specified group of Professional Electives of the same programme.
- b. Should have passed all the courses in the first attempt.
- c. Should have earned a minimum of 7.50 CGPA.

(v) B.E./B.Tech Honours

- d. The students should have taken additional courses from more than one vertical of the same Programme and earned a minimum of 18 credits.
- e. Should have passed all the courses in the first attempt.
- f. Should have earned a minimum of 7.50 CGPA.

(vi) B.E./B.Tech minor in other specialization.

The student should have earned additionally a minimum of 18 credits in any one of the verticals of other B.E programmes

- Out of these 18 credits students can earn a maximum of 6 credits in online mode (SWAYAM platform), as approved by Centre for Academic Courses.
- B.E./ B. Tech. (Hons) Specialization in the same discipline, B.E / B.Tech. Honors and B.E./B.Tech. Minor in other specialization degree will be optional for students.
- For the categories (i) to (ii), the students shall be permitted to register for the courses from the V Semester onwards provided the students has earned a minimum CGPA 7.50 of until III Semester and has cleared all the courses in the first attempt.
- For the category (iii), the students will be permitted, to register the courses from Semester V onwards provided the marks earned by the students until Semester III is CGPA 7.50 and above.
- If a student decides not to opt for Honours, after completing certain number of additional courses, the additional courses studied shall be considered instead of the Professional Elective courses, which are part of the curriculum. If the student has studied more number of such courses than the number of Professional Elective courses required as per the curriculum, the courses with higher grades shall be considered for the calculation of CGPA. Remaining courses shall be printed in the mark sheet, however, they will not be considered for calculation of CGPA.

Registration of Professional Elective courses from Verticals:

Professional Elective Courses will be registered in Semesters V to VIII. These courses are listed in groups called verticals that represent a particular area of specialization / diversified group. The student should have earned additionally a minimum of 18 credits in any one of the verticals for obtaining B.E./B.Tech. Honours with specialization in the same disciplines.

PROFESSIONAL ELECTIVE HONOURS COURSES: VERTICALS

VERTICAL-1: INTERNET OF THINGS											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
7.	20IT567	Technologies Enabling IoT	S1	OEC	3	0	0	3	40	60	100
8.	20IT568	IoT systems design	S1	OEC	3	0	0	3	40	60	100
9.	20IT673	Industrial IoT	S1	OEC	3	0	0	3	40	60	100
10.	20IT767	Privacy and Security in IoT	S3	OEC	3	0	0	3	40	60	100
11.	20IT768	Fog Computing & Energy Management in IoT Devices	S1	OEC	3	0	0	3	40	60	100
12.	20IT867	Robotic Process Automation	S1	OEC	3	0	0	3	40	60	100

VERTICAL-2: DATA SCIENCE											
Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
7.	20IT569	Linked Open Data And Its Applications	S2	OEC	3	0	0	3	40	60	100
8.	20IT674	Big Data Security	S2	OEC	3	0	0	3	40	60	100
9.	20IT675	Real Time Data Streaming	S2	OEC	3	0	0	3	40	60	100
10.	20IT769	Sentiment Analysis	S2	OEC	3	0	0	3	40	60	100
11.	20IT868	Cognitive Science	S2	OEC	3	0	0	3	40	60	100
12.	20IT869	Text Processing and Mining	S2	OEC	3	0	0	3	40	60	100

S1 - Recent Technologies and Computing

S2 - Data and Knowledge Engineering

S3 - Computer Networks and Security

S4 - Systems and Software Engineering

S5 - Entrepreneurship and Managerial Skills

OPEN ELECTIVE COURSES

Sl.No.	Course Code	Course Name	Specialization	Category	Hours/ Week			Credit	Maximum Marks		
					L	T	P		C	CA	ES
Automobile Engineering											
1.	20AU901	Basics of Automobile Engineering	AE	OEC	3	0	0	3	40	60	100
2.	20AU902	Automotive Engine Technology	AE	OEC	3	0	0	3	40	60	100
3.	20AU903	Automotive Vehicle Technology	AE	OEC	3	0	0	3	40	60	100
4.	20AU904	Automotive Safety	AE	OEC	3	0	0	3	40	60	100
5.	20AU905	Hybrid Vehicles	AE	OEC	3	0	0	3	40	60	100
6.	20AU906	Off Highway Vehicles	AE	OEC	3	0	0	3	40	60	100
7.	20AU907	Modern and Intelligent Vehicle System	AE	OEC	3	0	0	3	40	60	100
8.	20AU908	Vehicle Maintenance	AE	OEC	3	0	0	3	40	60	100
CIVIL ENGINEERING											
9.	20CE901	Architectural Heritage of India	CE	OEC	3	0	0	3	40	60	100
10.	20CE902	Building Planning and Construction	CE	OEC	3	0	0	3	40	60	100
11.	20CE903	Elementary Civil Engineering	CE	OEC	3	0	0	3	40	60	100
12.	20CE904	Energy and Environment	CE	OEC	3	0	0	3	40	60	100
13.	20CE905	Environmental Laws and Policies	CE	OEC	3	0	0	3	40	60	100
14.	20CE906	Global Warming and Climate Change	CE	OEC	3	0	0	3	40	60	100
15.	20CE907	Introduction to Disaster Management and Mitigation	CE	OEC	3	0	0	3	40	60	100
16.	20CE908	Introduction to Earthquake Engineering	CE	OEC	3	0	0	3	40	60	100
17.	20CE909	Solid Waste Management	CE	OEC	3	0	0	3	40	60	100
18.	20CE910	Water and Air Pollution Management	CE	OEC	3	0	0	3	40	60	100

Computer Science and Engineering											
19.	20CS901	Programming in Java	CSE	OEC	3	0	0	3	40	60	100
20.	20CS902	Basic concepts of Data Structure	CSE	OEC	3	0	0	3	40	60	100
21.	20CS903	Fundamentals of Database Concepts	CSE	OEC	3	0	0	3	40	60	100
22.	20CS904	Internet Programming	CSE	OEC	3	0	0	3	40	60	100
23.	20CS905	Fundamentals of Mobile Application Development	CSE	OEC	3	0	0	3	40	60	100
24.	20CS906	Principles of Ethical Hacking	CSE	OEC	3	0	0	3	40	60	100
25.	20CS907	Green Technology	CSE	OEC	3	0	0	3	40	60	100
26.	20CS908	Artificial Intelligence and Robotics	CSE	OEC	3	0	0	3	40	60	100
27.	20CS909	Big Data and Analytics	CSE	OEC	3	0	0	0	40	60	100
28.	20CS910	Hardware and Trouble Shooting	CSE	OEC	3	0	0	3	40	60	100
Electrical and Electronics Engineering											
29.	20EE901	Electrical Drives and Control	EE	OEC	3	0	0	3	40	60	100
30.	20EE902	Power Semiconductor Devices	EE	OEC	3	0	0	3	40	60	100
31.	20EE903	Electrical Power Generation Systems	EE	OEC	3	0	0	3	40	60	100
32.	20EE904	Control Engineering	EE	OEC	3	0	0	3	40	60	100
33.	20EE905	Industrial Automation	EE	OEC	3	0	0	3	40	60	100
34.	20EE906	Electrical Instruments and Measurements	EE	OEC	3	0	0	3	40	60	100
35.	20EE907	Energy Conservation and Management	EE	OEC	3	0	0	3	40	60	100
36.	20EE908	Electrical Wiring, Estimation and Costing	EE	OEC	3	0	0	3	40	60	100
37.	20EE909	Fundamentals of Electrical Machinery	EE	OEC	3	0	0	3	40	60	100
38.	20EE910	Principles of Soft Computing Techniques	EE	OEC	3	0	0	3	40	60	100
39.	20EE911	Embedded System Technology	EE	OEC	3	0	0	3	40	60	100

Electronics and Communication Engineering											
40.	20EC901	Basics of Medical Electronics	EC	OEC	3	0	0	3	40	60	100
41.	20EC902	NANO Technology	EC	OEC	3	0	0	3	40	60	100
42.	20EC903	Electronics and Microprocessor	EC	OEC	3	0	0	3	40	60	100
43.	20EC904	Analog and Digital Communication	EC	OEC	3	0	0	3	40	60	100
44.	20EC905	Principles of Communication	EC	OEC	3	0	0	3	40	60	100
45.	20EC906	Fundamentals of Robotics	EC	OEC	3	0	0	3	40	60	100
46.	20EC907	Internet of Things Sensing and Actuator Devices	EC	OEC	3	0	0	3	40	60	100
47.	20EC908	Consumer Electronics	EC	OEC	3	0	0	3	40	60	100
Information Technology											
48.	20IT901	Data Science using R	IT	OEC	3	0	0	3	40	60	100
49.	20IT902	Principles of Cyber Security	IT	OEC	3	0	0	3	40	60	100
50.	20IT903	Fundamentals of Business Intelligenc	IT	OEC	3	0	0	3	40	60	100
51.	20IT904	Blockchain Technologies	IT	OEC	3	0	0	3	40	60	100
52.	20IT905	Internet of Things and Applications	IT	OEC	3	0	0	3	40	60	100
53.	20IT906	Principles of Software Testing	IT	OEC	3	0	0	3	40	60	100
54.	20IT907	Foundation Skills in Logic Building	IT	OEC	3	0	0	3	40	60	100
55.	20IT908	Principles of Cloud Computing	IT	OEC	3	0	0	3	40	60	100
56.	20IT909	Open Source Technologies	IT	OEC	3	0	0	3	40	60	100
57.	20IT910	Principles of Software Engineering	IT	OEC	3	0	0	3	40	60	100
Mechanical Engineering											
58.	20ME901	Basic Mechanical Engineering	ME	OEC	3	0	0	3	40	60	100
59.	20ME902	Solar Energy Utilization	ME	OEC	3	0	0	3	40	60	100
60.	20ME903	Production Technology of Agricultura Machinery	ME	OEC	3	0	0	3	40	60	100
61.	20ME904	Selection of Materials	ME	OEC	3	0	0	3	40	60	100
62.	20ME905	Marine Vehicles	ME	OEC	3	0	0	3	40	60	100
63.	20ME906	Sensors and Transducers	ME	OEC	3	0	0	3	40	60	100
64.	20ME907	Energy Auditing	ME	OEC	3	0	0	3	40	60	100
65.	20ME908	Fiber Reinforced Plastics	ME	OEC	3	0	0	3	40	60	100

66.	20ME909	Lean Manufacturing	ME	OEC	3	0	0	3	40	60	100
67.	20ME910	Surface Engineering	ME	OEC	3	0	0	3	40	60	100
Safety and Fire Engineering											
68.	20SF901	Occupational Health and Hygiene	SF	OEC	3	0	0	3	40	60	100
69.	20SF902	Construction Safety	SF	OEC	3	0	0	3	40	60	100
70.	20SF903	Building Fire Safety	SF	OEC	3	0	0	3	40	60	100
71.	20SF904	Safety in Electrical Engineering	SF	OEC	3	0	0	3	40	60	100
72.	20SF905	Legal Aspects of Safety	SF	OEC	3	0	0	3	40	60	100
73.	20SF906	Safety in Industries	SF	OEC	3	0	0	3	40	60	100
74.	20SF907	Food Safety	SF	OEC	3	0	0	3	40	60	100
75.	20SF908	Safety Management and its Principles	SF	OEC	3	0	0	3	40	60	100
76.	20SF909	Safety in Automobile Engineering	SF	OEC	3	0	0	3	40	60	100
77.	20SF910	Safety in Transportation	SF	OEC	3	0	0	3	40	60	100
Science and Humanities											
78.	20SH901	Applications of Statistics	FYA	OEC	3	0	0	3	40	60	100
79.	20SH902	Combinatorics and Graph Theory	FYA	OEC	3	0	0	3	40	60	100
80.	20SH903	Optimization Techniques	FYA	OEC	3	0	0	3	40	60	100
81.	20SH904	Basic Military Education and Training	FYA	OEC	3	0	0	3	40	60	100
82.	20SH905	Professional Communication	FYA	OEC	3	0	0	3	40	60	100
83.	20SH906	Fundamentals of Nanoscience and Technology	FYA	OEC	3	0	0	3	40	60	100

LIST OF VALUE ADDED COURSES

Sl. No.	Course Code	Course Name	Number of Hours	Offered by Internal / External
1	20ITV01	PC hardware and Trouble Shooting	15	IT/KSRCE
2	20ITV02	DEVOPS Technologies	15	IT/KSRCE
3	20ITV03	Cyber Security Analytics	15	IT/KSRCE
4	20ITV04	R Programming	15	IT/KSRCE
5	20ITV05	Social Media Manager	15	IT/KSRCE
6	20ITV06	Augmented, virtual, and mixed reality	15	IT/KSRCE
7	20ITV07	Mojo Programming Language	15	IT/KSRCE
8	20ITV08	Life Skill Education	15	External
9	20ITV09	Human Right Education	15	External
10	20ITV10	Yoga Health and Physical Education	15	External
11	20ITV11	Educational psychology	15	External
12	20ITV12	Environmental education	15	External

COURSE COMPONENT SUMMARY

S. No.	Subject Area	Credits Per Semester								Credits Total	Percentage Credits
		I	II	III	IV	V	VI	VII	VIII		
1.	HSMC	3	3	-	3	3	-	-	-	12	7.45
2.	BSC	8	8	4	4	-	-	-	-	24	14.91
3.	ESC	8	1	3	4	3	-	-	-	19	11.80
4.	PCC	-	8	15	11	12	12	15	-	73	45.34
5.	PEC	-	-	-	-	3	6	3	3	15	9.32
6.	OEC	-	-	-	-	-	3	3	3	9	5.59
7.	PROJ	-	-	-	-	-	3	-	6	9	5.59
TOTAL		19	20	22	22	21	24	21	12	161	100

Total No. of Credits = 161

SEMESTER - I

20EN151	TECHNICAL ENGLISH – I (Common to All Branches)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Objectives : On successful completion of the course, the student will be able to **Cognitive Level**

CO1: Comprehend and apply Grammar in context for professional communication	Understand
CO2: Infer the gist and specific information	Apply
CO3: Discuss, express and interact in the society and place of study	Create
CO4: Critically interpret and comprehend a given text	Evaluate
CO5: Prioritize the listening skills for academic and professional purposes	Apply

UNIT - I [9]

Synonyms & Antonyms -- Use of Modal Auxiliaries - Infinitive and Gerund --Parts of Speech -Intensive Reading - Predicting Content - Interpretation - Active Listening - Listening for the main idea - Need based Correspondence (request for joining hostel, bonafide certificate)-Self Introduction- Introducing others

UNIT - II [9]

British & American Terminology – Tenses (Simple Present, Present Continuous, Present Perfect, Simple Past, and Simple Future) -Predicting Content - Drawing inferences - Listening for specific details - Listening to News - Job Application and Resume - Writing Instructions- Delivering Welcome Address

UNIT - III [9]

Standard Abbreviations and Acronyms -Preposition of Time, Place and Movement - Active Voice & Passive Voice - Consonant Sounds - Pronunciation guidelines related to Vowels and Consonant - Skimming & Scanning - Inference - Context Based Meaning - Recommendation Writing - Proposing Vote of Thanks.

UNIT - IV [9]

Vocabulary Building - Phrasal Verbs (Put, Give, Look, Take, Get, Call)- Impersonal passive -Newspaper Reading – Note making - Listening to Dialogues - E Mail Etiquettes & E-mail Writing - MoC - Anchoring - Role play in academic context

UNIT - V [9]

Homonyms - Concord (Subject & Verb Agreement)- Rearranging the jumbled sentences - Listening to Telephonic Conversation - Letter of Invitation (inviting, accepting and declining) - Paragraph writing - Letter to the Editor of a News paper - Drills using Minimal pairs - Presentation Skills.

Total = 45 Periods

Text Books :

- 1 Meenakshi Raman, Technical Communication, Oxford University Press, New Delhi, First Edition, 2017
- 2 S.Sumant, Technical English - I, Vijay Nicole, Chennai, Second Edition, 2018

Reference Books :

- 1 Dr.P.Rathna, English Work Book - I, VRB Publishers Pvt. Ltd., Chennai, Second Edition,2018
- 2 Seely, The Oxford Guide to Writing and Speaking, Oxford University Press, New Delhi, First Edition, 2016
- 3 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition,2005
- 4 P.Kiranmani Dutt, A course in Communication Skills,Cambridge University Press, New Delhi, First Edition, 2014

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20EN151**

Regulations:

R 2020

Course Name:

TECHNICAL ENGLISH – I

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Comprehend and apply Grammar in context for professional communication.</i>	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO2	<i>Infer the gist and specific information.</i>	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO3	<i>Discuss, express and interact in the society and place of study</i>	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO4	<i>Critically interpret and comprehend a given text.</i>	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO5	<i>Prioritize the listening skills for academic and professional purposes.</i>	-	-	-	-	-	-	-	-	2	3	-	1	-	-
Average		-	-	-	-	-	-	-	-	2	3	-	1	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – I

20MA151	ENGINEERING MATHEMATICS – I (Common to All Branches)	L 3	T 1	P 0	C 4
Prerequisite: No prerequisites are needed for enrolling into the course					
Course Outcomes : On Completion of this course, the student will be able to					Cognitive Level
CO1	Interpret the concepts of Matrix applications in the field of engineering.	Understand			
CO2	Acquire knowledge in solving ordinary differential equations.	Evaluate			
CO3	Extend and apply the concepts of differential calculus problems.	Apply			
CO4	Develop the skills in solving the functions of several variables.	Remember			
CO5	Applying the concepts and solving the Vector Calculus problems.	Apply			
UNIT - I	LINEAR ALGEBRA	[12]			
Characteristic equation - Eigen values and Eigen vectors of a real matrix - Properties of Eigen values and Eigen vectors (Excluding proof) - Cayley Hamilton theorem (excluding proof) - Quadratic forms - Reduction of quadratic form to canonical form by orthogonal transformation.					
UNIT - II	ORDINARY DIFFERENTIAL EQUATIONS	[12]			
Linear differential equations of second and higher order with constant coefficients - Differential equations with variable coefficients - Cauchy's and Legendre's linear equations - Method of variation of parameters.					
UNIT - III	DIFFERENTIAL CALCULUS	[12]			
Curvature - Radius of curvature (Cartesian co-ordinates only) - Centre of curvature and Circle of curvature - Involutives and Evolutes.					
UNIT - IV	FUNCTIONS OF SEVERAL VARIABLES	[12]			
Partial derivatives - Total derivatives - Euler's theorem for homogenous functions - Taylor's series expansion - Maxima and Minima for functions of two variables - Method of Lagrangian multipliers.					
UNIT - V	VECTOR CALCULUS	[12]			
Gradient, Divergence and Curl - Directional derivative - Irrotational and solenoidal vector fields - Green's theorem in plane, Gauss divergence theorem and Stoke's theorem - Problems in Cube, Cuboid and Rectangular parallelepiped only.					

Total (L: 45 T:15) = 60 Periods**Text Books :**

- 1 Ravish R Singh and Mukul Bhatt, Engineering Mathematics - I, McGraw Hill Publications, Fourth Edition, New Delhi 2016
- 2 Grewal B.S, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, Forty Third Edition, New Delhi, 2015

Reference Books :

- 1 Bali N. P and Manish Goyal, Textbook on Engineering Mathematics, Laxmi Publications (p) Ltd., Seventh Edition, 2016
- 2 H.K. Dass, Advance Engineering Mathematics, S. Chand and company, Eleventh Edition, 2015
- 3 Jain R.K. and Iyengar S.R.K., - Advanced Engineering Mathematics, Narosa Publications, Eighth Edition, 2012
- 4 Narayanan.S and Manicavachagom Pillai. T.K. - Calculasvol I and Vol II, S.Chand & Co. Sixth Edition, 2014.

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20MA151**

Regulations:

R 2020

Course Name:

ENGINEERING MATHEMATICS – I

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Interpret the concepts of Matrix applications in the field of engineering.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO2	<i>Acquire knowledge in solving ordinary differential equations.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO3	<i>Extend and apply the concepts of differential calculus problems.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	<i>Develop the skills in solving the functions of several variables.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO5	<i>Applying the concepts and solving the Vector Calculus problems.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
Average		3	3	3	3	-	-	-	-	-	-	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

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SEMESTER – I**20CH051****ENGINEERING CHEMISTRY**

(Common to All Branches)

L	T	P	C
3	0	0	3

*Prerequisite: No prerequisites are needed for enrolling into the course.***Course Outcomes : On Completion of this course, the student will be able to****Cognitive Level**

CO1	Make use of the manufacture, properties and uses of advanced engineering materials.	Understand
CO2	Explain the concept of corrosion and its control.	Understand
CO3	Use the concept of thermodynamics in engineering applications.	Understand
CO4	Recall the periodic properties such as ionization energy, electron affinity and electro negativity.	Remember
CO5	Analyze the usage of various spectroscopic techniques.	Understand

UNIT-I ADVANCED ENGINEERING MATERIALS [9]

Abrasives - Moh's scale of hardness - types - natural [Diamond] - synthetic [SiC]; Refractories - characteristics - classifications [Acidic, basic and neutral refractories] - properties - refractoriness - RUL - porosity - thermal spalling; Lubricants - definition - function - characteristics - properties - viscosity index, flash and fire points, cloud and pour points, oiliness; Solid lubricants - graphite and MoS₂; Nano materials - CNT- synthesis [CVD, laser evaporation, pyrolysis] - applications - medicine, electronics, biomaterials and environment.

UNIT-II ELECTROCHEMISTRY AND CORROSION [9]

Introduction - electrode potential - Nernst equation - EMF series and its significance - types of cells (Electrolytic & electrochemical); Corrosion - causes, consequences - classification - chemical corrosion - electro chemical corrosion - mechanism; Galvanic & differential aeration corrosion - factors influencing corrosion - corrosion control - corrosion inhibitors.

UNIT-III CHEMICAL THERMODYNAMICS [9]

Terminology of thermodynamics - second law; Entropy - entropy change for an ideal gas - reversible and irreversible processes - entropy of phase transition - Clausius inequality; Free energy and work function - Helmholtz and Gibb's free energy functions - criteria of spontaneity; Gibb's - Helmholtz equation (Problems); Maxwell's relations - Van't Hoff isotherm and isochore.

UNIT-IV ATOMIC STRUCTURE AND CHEMICAL BONDING [9]

Effective nuclear charge - orbitals - variations of s, p, d and f orbital - electronic configurations - ionization energy - electron affinity and electro negativity; Types of bonding - ionic, covalent and coordination bonding - hydrogen bonding and its types; Crystal field theory - the energy level diagram for transition metal complexes ([Fe(CN)₆]³⁻, [Ni(CN)₄]²⁻ and [CoCl₄]²⁻ only); Role of transition metal ions in biological system; Band theory of solids.

UNIT - V PHOTOCHEMISTRY AND SPECTROSCOPIC TECHNIQUES [9]

Laws of photochemistry - Grotthuss Draper law - Stark-Einstein law - Beer-Lambert law - phosphorescence - fluorescence and it's applications in medicine - chemiluminescence; Colorimetry - principle - instrumentation (block diagram only) - estimation of iron by colorimetry; principles of spectroscopy - selection rules - vibrational and rotational spectroscopy - applications; Flame photometry - principle - instrumentation (block diagram only) - estimation of sodium; Atomic absorption spectroscopy - principle - instrumentation (block diagram only) - estimation of nickel.

Total = 45 Periods**Text Books :**

- 1 Dr. A.Ravikrishnan, Engineering Chemistry, Srikrishna Hi-tech Publishing Company Private Limited, Chennai, Seventeenth Edition, 2016.
- 2 P.C. Jain and Monica Jain, Engineering Chemistry, Dhanpat Rai Publishing company, New Delhi, Seventeenth Edition, 2015.

Reference Books :

- 1 S S. Dara and S. S. Umare, A Text book of Engineering Chemistry, S.Chand &Company Limited, New Delhi, Fifth Edition, 2015.
- 2 N. Krishnamurthy, P. Vallinayagam and D. Madhavan, Engineering Chemistry, PHI Learning Private Limited, New Delhi, Third Edition, 2014.
- 3 S. Vairam, P. Kalyani and Suba Ramesh, Engineering Chemistry, Wiley India Private Limited, New Delhi, First Edition, 2013.
- 4 B. Sivasankar, Engineering Chemistry, Tata McGraw - Hill Education Private Limited, New Delhi, First Edition, 2008.

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20CH051**

Regulations:

R 2020

Course Name:

ENGINEERING CHEMISTRY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Make use of the manufacture, properties and uses of advanced engineering materials.</i>	3	3	2	-	-	-	2	-	-	-	-	1	-	-
CO2	<i>Explain the concept of corrosion and its control.</i>	3	3	2	-	-	-	3	-	-	-	-	2	-	-
CO3	<i>Use the concept of thermodynamics in engineering applications.</i>	3	3	2	-	-	-	2	-	-	-	-	2	-	-
CO4	<i>Recall the periodic properties such as ionization energy, electron affinity and electro negativity.</i>	3	3	2	-	-	-	2	-	-	-	-	1	-	-
CO5	<i>Analyze the usage of various spectroscopic techniques.</i>	3	3	2	-	-	-	3	-	-	-	-	1	-	-
Average		3	3	2	-	-	-	2	-	-	-	-	1	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

SEMESTER – I

20EE041	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING (Common To AU,CE,CS,IT,ME&SF)	L	T	P	C
		3	0	0	3

Prerequisite: Engineering Mathematics, Engineering Physics

Course Outcomes : On Completion of this course, the student will be able to		Cognitive Level
CO1	Solve the electric circuits by applying basic circuital laws for various combinations of circuit elements.	Apply
CO2	Explain the construction, operating principle and application of DC motor and transformers.	Understand
CO3	Enlighten the construction, operating principle and application of AC motors and Special Machines.	Understand
CO4	Illustrate the function of various measuring instruments.	Understand
CO5	Discuss the characteristics of Diodes, BJT and Digital systems.	Understand

UNIT - I ELECTRICAL CIRCUITS [9]

Structural of Electrical Power System - Ohm's Law - Kirchhoff's Laws - Circuit Analysis - Introduction to AC Circuits: R, RL & RLC series circuits, Average and RMS Value - Power and Power factor for single phase Circuits - Three Phase Star and Delta Connections-Electrical safety.

UNIT -II DC MOTOR AND TRANSFORMERS [9]

Faraday's Law - Lenz's Law - Fleming's left hand and right hand rule, DC Motor: Construction -Operation-series and shunt motor CharacteristicsApplications. Single Phase Transformer: Construction - Operation - EMF Equation - Types - Applications.

UNIT -III AC MOTORS & SPECIAL MACHINES [9]

Single Phase Induction Motor: Construction - Operation - Split Phase Induction Motor and Capacitor Start Induction Run Motor - Applications, Three Phase Induction Motor: Construction - Operation - Types - Applications. Special Machines: Stepper Motor.

UNIT-IV MEASURING INSTRUMENTS [9]

Basic Methods of Measurements: Direct and Indirect, Functional elements of an instrument - Errors in measurements- Analog and Digital Instruments - Basic Principle of Indicating Instruments - Moving Coil and Moving Iron Ammeter and Voltmeter. Dynamometer type Wattmeter - Induction type Energy Meter - Cathode Ray Oscilloscope.

UNIT - V ANALOG AND DIGITAL ELECTRONICS [9]

Semiconductor devices: PN Junction Diode, Zener diode: Operation and Characteristics- Bipolar Junction Transistor - CE Configurations and its Characteristics. Review of number systems - Digital logic gates - Introduction to Microprocessors.

Total = 45 Periods**Text Books :**

- 1 SmarajitGhosh, Fundamentals of Electrical and Electronics Engineering, PHI Learning Private Limited, New Delhi, Second Edition, 2007.
- 2 Jegathesan,V.,VinothKumar, K.,Saravanakumar,R.,Basic Electrical and Electronics Engineering, Wiley India,New Delhi,First Edition, 2012.

Reference Books :

- 1 Muthusubramanian,R., Salivahanan, S., and Muraleedharan, K.A., Basic Electrical, Electronics and Computer Engineering,Tata McGraw Hill,New Delhi,Second Edition, 2006.
- 2 Nagsarkar, T.K., and Sukhija M.S.,Basics of Electrical Engineering, Oxford University press,New Delhi,Ninth Edition, 2005.
- 3 Mehta, V.K and Rohit Mehta, Principle of Electrical Engineering, S Chand & Company,New Delhi,Second Edition, 2008.
- 4 MahmoodNahvi and Joseph A. Edminister, Electric Circuits, Schaum Outline Series, McGraw Hill,New Delhi, Fifth Edition, 2002.

CO-PO MAPPING

Course Code: 20EE041

Regulations:

R 2020

Course Name:

BASICS OF ELECTRICAL AND
ELECTRONICS ENGINEERING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Solve the electric circuits by applying basic circuital laws for various combinations of circuit elements.</i>	3	2	2	-	-	-	-	-	-	-	-	1	-	-
CO2:	<i>Explain the construction, operating principle and application of DC motor and transformers.</i>	3	3	2	-	-	2	1	1	-	-	-	1	-	-
CO3:	<i>Enlighten the construction, operating principle and application of AC motors and Special Machines.</i>	3	2	2	-	-	2	1	1	-	-	-	1	-	-
CO4:	<i>Illustrate the function of various measuring instruments.</i>	3	3	2	-	-	2	1	1	-	-	-	1	-	-
CO5:	<i>Discuss the characteristics of Diodes, BJT and Digital systems.</i>	3	3	2	-	-	2	1	1	-	-	-	1	-	-
Average		3	3	2	-	-	2	1	1				1	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - I

20IT111	PROGRAMMING FOR PROBLEM SOLVING USING C	L	T	P	C
		3	0	0	3

Prerequisite: NO PREREQUISITE NEEDED FOR ENROLLING INTO THE COURSE.

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

CO1: Discuss the fundamentals of problem solving

Create

CO2: Design efficient algorithms for basic operations

Create

CO3: Explain the concept of Loops, Array and Strings to solve different problems.

Understand

CO4: Apply the concepts of Function modules, its usage and memory allocation using Pointers

Apply

CO5: Apply the concepts of structures and unions: declaration, initialization and implementation.

Apply

UNIT - I INTRODUCTION TO COMPUTER PROBLEM SOLVING [9]

Overview of computers- Applications - Characteristics - Basic computer organization - Number System - Problem solving -Algorithm - Flowchart - Pseudo code- Examples : Exchanging values of two variables - Find largest number - Summation of a set of numbers- Reversing digits of an integer - Factorial computation- Fibonacci sequence - Reversing the numbers

UNIT - II INTRODUCTION TO C LANGUAGE [9]

C Program Structure- Keywords- Data Types and Sizes- Constants- Variables- Operators- User defined data types (Typedef) - Input and Output Statements- Conditional Expression - If-Else - Nested If - Switch Case Statements

UNIT - III LOOPS , ARRAYS AND STRINGS [9]

Looping: While - Do-While- For- Nested Control Structures- Break- Continue- Goto Statement - Single Dimensional Array - Multidimensional Array- Strings - String Manipulation - Scope of the Variables : auto, extern, register and static

UNIT - IV FUNCTIONS AND POINTERS [9]

Function- Function Prototypes- Calling Function: Call by Value- Call by Reference - Recursion- Command Line Argument- Pointers: Declaration- Pointer Manipulations - Array of Pointers- Function Pointers - Dynamic Memory Allocation : malloc , calloc and dealloc

UNIT -V STRUCTURES, UNIONS AND FILES [9]

Defining a Structure- Structures and Functions- Array of structures- Unions - Files: Opening and Closing a File- Reading and Writing a file

Total = 45 Periods

Text Books :

- 1 Byron S Gottfried and Jitendar Kumar Chhabra, Programming with C, Tata McGraw Hill Publishing Company, Third Edition, 2011.
- 2 PradipDey and ManasGhosh , Programming in C, Second Edition, Oxford University Press, 2011.

Reference Books :

- 1 Ashok N.Kamathane, Computer Programming, Pearson Education, 2014.
- 2 Maureen Sprankle , Problem Solving and Programming Concepts ,Pearson 7th Edition, 2011.
- 3 Dennis M.Ritche, C Programming Language, Pearson Education,,2017
- 4 K.N.King, C Programming: Modern Approach, Second Edition,2017

CO-PO MAPPINGCourse Code: **20IT111**

Regulations:

R 2020

Course Name:

**PROGRAMMING FOR PROBLEM SOLVING
USING C**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Discuss the fundamentals of problem solving</i>	2	2	2	2	2	1	-	-	-	-	-	2	2	2
CO2	<i>Design efficient algorithms for basic operations</i>	2	2	2	2	2	1	-	-	-	-	-	2	2	2
CO3	<i>Explain the concept of Loops, Array and Strings to solve different problems.</i>	2	2	2	2	2	1	-	-	-	-	-	2	2	2
CO4	<i>Apply the concepts of Function modules, its usage and memory allocation using Pointers</i>	2	2	2	2	2	1	-	-	-	-	-	2	2	2
CO5	<i>Apply the concepts of structures and unions: declaration, initialization and implementation.</i>	2	2	2	2	2	1	-	-	-	-	-	2	2	2
Average		2	2	2	2	2	1	-	-	-	-	-	2	2	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER- I

20MC151

**INDUCTION PROGRAMME
(Common To All Branches)**

L	T	P	C
0	0	0	0

Course Outcomes: On Completion of this course, the student will be able to

- CO1 *Involve in physical activity, creative arts and culture and feel comfortable in the new environment.*
- CO2 *Build relationship between teachers and students and make familiarizing with departments.*
- CO3 *Concentrate on literary activities.*
- CO4 *Develop the required skills through lectures and workshops.*
- CO5 *Acquire skills in extracurricular activities.*

Cognitive Level
*Understand**Understand**Apply*
Remember
*Analyze***3 weeks****List of activities during the three weeks Students Induction Programme (SIP):**

MODULE I: PHYSICAL ACTIVITY

- This would involve a daily routine of physical activity with games and sports. There would be games in the evening. These would help develop team work besides health.

MODULE II: CREATIVE ARTS & CULTURE

- Every student would choose one skill related to the arts whether visual arts or performing arts such as painting, music, dance, pottery, sculpture etc. The student would pursue it every day for the duration of the program.
- These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would help in engineering design later.

MODULE III: MENTORING AND CONNECTING THE STUDENTS WITH FACULTY

- Mentoring takes place in the context and setting of *Universal Human Values*. It gets the student to explore oneself and experience the joy of learning, prepares one to stand up to peer and take decisions with courage, be aware of relationships and be sensitive to others.
- Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It is to open thinking towards the self. Universal Human Values discussions could even continue for rest of the semester as a normal course, and not stop with the induction program.

MODULE IV: FAMILIRIZATION WITH COLLEGE/DEPARTMENTS & BRANCHES

- They should be shown their department, and told what it means to get into the branch or department. Describe what role the technology related to their department plays in society and after graduation what role the student would play in society as an engineer in that branch. A lecture by an alumnus of the Dept. would be very helpful in this regard. They should also be shown the laboratories, workshops and other facilities.

MODULE V: LITERARY ACTIVITIES

- Literary activity would encompass reading a book, writing a summary, debating, enacting a play etc.

MODULE VI: PROFICIENCY MODULES:

- The induction program period can be used to overcome some critical lacunas that students might have difficulties in communication skills. These should run like crash courses, so that when normal courses start after the induction program, the student has overcome the lacunas substantially.

MODULE VII: LECTURES & WORKSHOPS

- Lectures by eminent people to be organized, say, once a week. It would give the students exposure to people who are eminent, in industry or engineering, in social service, or in public life. Alumni could be invited as well.
- Motivational lectures about life, meditation, etc. by Ramakrishna Mission, Art of Living, Vivekanand Kendras, S-VYASA, etc. may be organized. (3 sessions, 9 hours).

MODULE VIII: EXTRA CURRICULAR ACTIVITIES

- The new students should be introduced to the extra-curricular activities at the college.
- They should be shown the facilities and informed about activities related to different clubs etc. This is when selected senior students involved in or leading these activities can give presentations, under faculty supervision.

MODULE IX: FEED BACK & REPORT ON THE PROGRAMMES:

- Students should be asked to give their mid-program feedback. They should be asked to write their opinions about the program at the end of the first week.
- Finally, at the end of the program, each group (of 20 students) should be asked to prepare a single report on their experiences of the program. On the second last day, each group should present their report in front of other groups. Immediately after their presentation, they should submit their written report. This will also serve as a *closure* to the program.
- Finally, a formal written or online anonymous feedback should be collected at the end of the program.

CO-PO MAPPINGCourse Code: **20MC151**

Regulations:

R 2020

Course Name:

INDUCTION PROGRAMME

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Involve in physical activity, creative arts and culture and feel comfortable in the new environment.</i>	3	-	-	-	-	3	3	2	3	2	-	3	-	-
CO2	<i>Build relationship between teachers and students and make familiarizing with departments.</i>	3	-	-	-	-	3	3	3	1	3	-	3	-	-
CO3	<i>Concentrate on literary activities.</i>	3	-	-	-	-	2	3	3	3	3	-	3	-	-
CO4	<i>Develop the required skills through lectures and workshops</i>	3	-	-	-	-	3	3	3	2	3	-	3	-	-
CO5	<i>Acquire skills in extracurricular activities.</i>	3	-	-	-	-	3	3	3	3	3	-	3	-	-
Average		3	-		-	-	3	3	3	2	3	-	3	-	-

SEMESTER - I

20GE051	HERITAGE OF TAMILS (common to all branches)	L	T	P	C
		1	0	0	1

Prerequisite(s): No prerequisites are needed for enrolling into the course

Course Outcomes : On successful completion of the course, the student will be able to

	Cognitive Level
CO1: Recognize the extensive literature of Tamil and its classical nature.	Understand
CO2: Apprehend the heritage of sculpture, painting and musical instruments of ancient people.	Understand
CO3: Review on folk and martial arts of tamil people.	Understand
CO4: Insight thinai concepts, trade and victory of Chozha dynasty.	Understand
CO5: Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine.	Understand

UNIT - I LANGUAGE AND LITERATURE [03]

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT - II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE [03]

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT - III FOLK AND MARTIAL ARTS [03]

Therukoothu, Karagattam, VilluPattu, KaniyanKoothu, Oyilattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT - IV THINAI CONCEPT OF TAMILS [03]

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT - V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE [03]

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

Total (L= 15, T = 0) = 15 Periods

Text Books :

- 1 Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
- 2 Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies)

Reference Books :

- 1 Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).
- 2 The Contribution of the Tamil to Indian Culture (Dr.M.Valarmathi) (Puplished by International Institute of Tamil Studies).
- 3 Keeladi – 'Sangam City Civilization on the banks of river Vaigai; (Jointly Published by: Department of Archaeology & Tamilnadu Text Book and Educational Services Corporation, Tamilnadu)
- 4 Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF AUTOMOBILE ENGINEERING
CO-PO MAPPING

Semester : I
Course code : 20GE051

Regulation : R2020
Course name : HERITAGE OF TAMILS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Recognize the extensive literature of Tamil and its classical nature.	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	Apprehend the heritage of sculpture, painting and musical instruments of ancient people.	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	Review on folk and martial arts of tamil people.	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	Insight thinai concepts, trade and victory of Chozha dynasty.	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine.	-	-	-	-	-	-	3	3	-	2	-	3	-	-
Average		-	-	-	-	-	-	3	3	-	2	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - I

20GE051

தமிழர்மரபு

L T P C

(அனைத்து துறைகளுக்கும் பொதுவானது)

1 0 0 1

முன்கூட்டிய துறைசார் அறிவு : தேவை இல்லை

பாடம் கற்றத்தின் விளைவுகள் : பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்

அறிவாற்றல் நிலை

- C01: தமிழ்மொழியின் செந்தன்மை மற்றும் இலக்கியம் குறித்த தெரிதல் புரிதல்
- C02: தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக் கருவிகள் குறித்த தெளிவு புரிதல்
- C03: தமிழர்களின் நாட்டுப் புரைக் கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்த தெளிவு புரிதல்
- C04: தமிழர்களின் திணைக் கோட்பாடுகள், சங்ககாலவணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள். புரிதல்
- C05: இந்திய தேசிய இயக்கம், சுயமரியாதை இயக்கம் மற்றும் சித்த மருத்தவம் பற்றிய புரிதல். புரிதல்

அலகு - I மொழி மற்றும் இலக்கியம்

[03]

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலயக்கியங்கள் - சங்க இலக்கியத்தின் சமயச்சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ் காப்பியங்கள், தமிழகத்தில் சமணபௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலகியங்கள் தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கியவளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு - II மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை

[03]

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனியில் திருவள்ளவர் சிலை - இசை கருவிகள் - மிருதங்கம், பறை. வீணை. யாழ். நாத்தஸ்வரம் - தமிழர்களின் சமூகபொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு - III நாட்டுப் புறக் கலைகள் மற்றும் வீர விளையாட்டுக்கள்

[03]

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு - IV தமிழர்களின் திணைக் கோட்பாடுகள்

[03]

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்கக்காலத்தில் தமிழகத்தில் எழுத்தறிவும் கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு - V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு

[03]

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிற்பகுதிகளில் தமிழ் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்தமருத்துவத்தின் பங்கு கல்வெட்டுகள் கையெழுத்துப்படிக்கள் - தமிழ்ப் புத்தகங்கள்களின் அச்ச வரலாறு.

Total (L = 15, T = 0) = 15 Periods**Text Books :**

- 1 தமிழகவரலாறு-மக்களும்பண்பாடும்-கேகேபிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்), [உலகத் தமிழாராய்ச்சி நிறுவனம்](#), சென்னை, 2002
- 2 கணினித்தமிழ்முனைவர் இல. சுந்தரம், விகடன் பிரசுரம், 2016

Reference Books :

- 1 கீழடி-வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம்.(தொல்லியல்துறைவெளியீடு)
- 2 பொருறை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
- 3 Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL - (in print)
- 4 Social Life of the Tamils - The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Semester : I
 Course code : 20GE051

Regulation : R2020
 Course name : தமிழர்மரபு

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	தமிழ் மொழியின் செந்ததன்மை மற்றும் இலக்கியம் குறித்ததெரிதல்	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக் கருவிகள் குறித்த தெளிவு	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	தமிழர்களின் நாட்டுப்புரைக் கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்த தெளிவு	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	தமிழர்களின் திணைக் கோட்பாடுகள், சங்ககால வணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள்.	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	இந்திய தேசிய இயக்கம், சுயமரியாதை இயக்கம் மற்றும் சித்த மருத்தவம் பற்றிய புரிதல்.	-	-	-	-	-	-	3	3	-	2	-	3	-	-
Average		-	-	-	-	-	-	3	3	-	2	-	3	-	-

1. சிறிது (குறைந்த) 2. மிதமான (நடுத்தர) 3. கணிசமான (உயர்)

SEMESTER – I**20CH028****CHEMISTRY LABORATORY**
(Common To All Branches)

L	T	P	C
0	0	3	1

Prerequisite: NO PREREQUISITE NEEDED FOR ENROLLING INTO THE COURSE.**Course Outcomes: On Completion of this course, the student will be able to**

CO1 Apply the principle of conductometric titration.

CO2 Relate the role of pH in quantitative analysis of a solution.

CO3 Perceive the knowledge of the concentration of Iron by electrochemical methods.

CO4 Analyze the application of water in various fields.

CO5 Recall the nature of corrosion process.

Cognitive level

Understand

Understand

Understand

Understand

Remember

LIST OF EXPERIMENTS:

1. Conductometric Titration - Strong Acid Vs. Strong Base.
2. Conductometric Titration - Mixture of Weak and Strong Acids Vs. Strong Base.
3. Conductometric Titration - Precipitation, BaCl₂ Vs. Na₂SO₄.
4. Estimation of Ferrous ion by Potentiometry - Fe²⁺ Vs K₂Cr₂O₇.
5. Estimation of Hydrochloric Acid by pH metry.
6. Estimation of Iron by Spectrophotometry.
7. Estimation of hardness in water by EDTA method.
8. Estimation of chloride in water sample by Argentometry.
9. Estimation of dissolved oxygen (DO) in water by Winkler's method.
10. Determination of rate of corrosion of mild steel by weight loss method.

Total = 30 Periods**Text Books:**

- 1 Department of Chemistry Staff members, Chemistry Laboratory Manual, K.S.R. College of Engineering, Tiruchengode, Fourth Edition, 2020.
- 2 I. Vogel, Vogel's Textbook of Quantitative Chemical Analysis, John Wiley & sons, Newyork, Eighth Edition, 2014.

Reference Books :

- 1 S. K. Bhasin and Sudha Rani, Laboratory Manual of Engineering Chemistry, Dhanpat Rai Publishing Company Private Limited, New Delhi, Third Edition, 2012.
- 2 I. Vogel and J. Mendham, Vogel's Textbook of Quantitative Chemical Analysis, Harlow, Prentice Hall, Sixth Edition, 2000.
- 3 G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denny, Vogel's Text book of quantitative analysis chemical analysis, Longman, Singapore publishers, Singapore, ELBS Fifth Edition, 1996.
- 4 B.S. Furniss, A.J. Hannaford, P.W.G. Smith and A.R. Tatchel, Vogels Textbook of practical Organic Chemistry, John Wiley & sons, New York, Fifth Edition, 1989.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20CH028**

Regulations:

R 2020

Course Name:

CHEMISTRY LABORATORY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Apply the principle of conductometric titration.	3	3	3	-	-	2	-	1	2	-	-	1	-	-
CO2	Relate the role of pH in quantitative analysis of a solution.	3	2	3	-	-	1	-	1	2	-	-	1	-	-
CO3	Perceive the knowledge of the concentration of Iron by electrochemical methods.	3	1	3	-	-	1	-	1	2	-	-	1	-	-
CO4	Analyze the application of water in various fields.	3	2	2	-	-	1	-	1	2	-	-	1	-	-
CO5	Recall the nature of corrosion process.	3	2	3	-	-	1	-	1	2	-	-	1	-	-
Average		3	2	3	-	-	1	-	1	2	-	-	1	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – I

20IT121	PROGRAMMING FOR PROBLEM SOLVING LABORATORY	L	T	P	C
		0	0	3	1

Prerequisite: NO PREREQUISITE NEEDED FOR ENROLLING INTO THE COURSE.

Course Outcomes:

CO1: Interpret the basic concept of C programming

Cognitive Level

Understand

CO2: Develop the program using the concept of Structured Programming

Create

CO3: Identify suitable data structure for solving a problem

Apply

CO4: Demonstrate the use of conditional statement

Understand

CO5: Construct the program using structures and unions

Create

List of Experiments:

1. Design an algorithm for exchanging the Values.
2. Design an algorithm and Draw a flowchart for Factorial Computation.
3. Design an algorithm and Draw a flowchart for check whether the given number is a prime number.
4. To write a program for finding the roots of a quadratic equation.
5. To Write a Program using Decision Making statements.
6. To write a program for finding the given year is leap year or not.
7. To design a calculator to perform the operations namely addition, subtraction, multiplication and division.
8. To generate the internal marks of students for five different subjects using structures.
9. To check whether the given string is palindrome or not without using string handling functions.
10. To write a program for calculating factorial using recursion and non recursive functions.
11. To swap the values of two variables using pointers.

Total = 45 Periods

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Interpret the basic concept of C programming	3	3	3	3	3	-	-	-	-	3	-	3	3	3
CO2	Develop the program using the concept of Structured Programming	3	3	3	3	3	-	-	-	-	3	-	3	3	3
CO3	Identify suitable data structure for solving a problem	3	3	3	3	3	-	-	-	-	3	-	3	3	3
CO4	Demonstrate the use of conditional statement	3	3	3	3	3	-	-	-	-	3	-	3	3	3
CO5	Construct the program using structures and unions	3	3	3	3	3	-	-	-	-	3	-	3	3	3
Average		3	3	3	3	3	-	-	-	-	3	-	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - I**20AU127****ENGINEERING GRAPHICS LABORATORY**
(Common To CE,CS,EC,EE, & IT)L T P C
0 0 3 1**Prerequisite: -****Course Outcomes: On Completion of this course , the student will be able to****Cognitive level**

CO1	Create and modify two-dimensional drawings using AutoCAD software	Understand
CO2	Construct various planes and do orthographic projection of lines and plane surfaces.	Remember
CO3	Draw projections of solids and development of surfaces.	Understand
CO4	Create the sections of solids and surfaces.	Understand
CO5	Sketch two dimensional isometric projections of simple solids.	Understand

List of Experiments:

- Study of basic tools, commands and coordinate system (absolute, relative, polar, etc.) used in 2D software.
- Draw the conic curves and special curves by using AutoCAD.
- Draw the front view, top view, side view of objects from the given pictorial view.
- Draw the projections of straight lines.
- Draw the projections of polygonal surface.
- Draw the projections of simple solid objects.
- Draw the sectional view and the true shape of the given section.
- Draw the development of surfaces like prism, pyramids, cylinders and cone.
- Draw the isometric projections of simple solids, truncated prism and pyramids.
- Draw the isometric projections of cylinder and cone.

Total = 45 Periods**CO-PO MAPPING**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	Create and modify two-dimensional drawings using AutoCAD software	3	3	3	2	2	-	-	-	-	-	-	-	-	-
CO2	Construct various planes and do orthographic projection of lines and plane surfaces.	3	3	3	2	2	-	-	-	-	-	-	-	-	-
CO3	Draw projections of solids and development of surfaces.	3	3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	Create the sections of solids and surfaces.	3	3	3	2	2	-	-	-	-	-	-	-	-	-
CO5	Sketch two dimensional isometric projections of simple solids.	3	3	3	2	2	-	-	-	-	-	-	-	-	-
Average		3	3	3	2	2	-								

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - II**20EN251****TECHNICAL ENGLISH – II**
(Common To All Branches)

L	T	P	C
3	0	0	3

*Prerequisite: No prerequisites are needed for enrolling into the course***Course Objectives : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Infer and apply the enriched vocabulary, by knowing the basic grammatical structure, in academic and professional contexts.

Understand

CO2: Identify and use Standard English in diverse situations.

Apply

CO3: Interpret by reading a text and comprehend a given text.

Create

CO4: Organize and compose business letters.

Evaluate

CO5: Prioritize the listening skill for academic and personal development purposes.

Apply

UNIT - I**[9]**

Technical Vocabulary - Changing words from one form to another - Articles - Compound Nouns - Introducing Oneself - Biased Listening- Critical reading - Need based Correspondence (In plant training & Industrial Visit) - Context based meaning - Writing short Essays.

UNIT - II**[9]**

Prefixes & Suffixes - Numerical Adjectives - If Conditionals - Making Requests - Seeking Information - Listening for main ideas -Intensive Reading - E-mail Writing- Describing Likes & Dislikes - Report Writing.

UNIT - III**[9]**

Types of Collocations - Framing Questions - 'Wh' Question - Yes / No Question -Cause and Effect Expression - Greetings and Introductions – Inviting People - Listening and Note taking - Critical reading- Making inference - Transcoding (Interpretation of Charts).

UNIT - IV**[9]**

Common English idioms and phrases - Expression of Purpose - Editing text for Spelling and Punctuation - Oral Presentation - Extensive Listening - Short Comprehension Passages - Business Correspondence - Calling for Quotations, Seeking Clarification, placing order and Complaint .

UNIT - V**[9]**

Confused and misused words - Discourse markers - Redundancies - Instructions - Describing - Listening to fill up forms and gapped texts - Reading Short texts from Journals and Newspapers - Telephone Etiquette - Check list - Essay Writing.

Total = 45 Periods**Text Books :**

- 1 Dr.S.Sumant, Technical English II, Tata McGraw Hill, New Delhi, Second Edition, 2016
- 2 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition, 2004.

Reference Books :

- 1 Michael Swan, Practical English Usage, Oxford University Press, New Delhi, First Edition, 2015.
- 2 Dept. of Humanities and social sciences, Anna University, Chennai, English for Engineers and Technologists, Orient Longman, First Edition, 2014
- 3 Hory Sankar Mukerjee, Business Communication, Oxford University Press, New Delhi, First Edition, 2013.
- 4 Department of English, English for Technologists and Engineers, Orient Black Swan, Chennai, First Edition, 2016

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20EN251**Regulations:
Course Name:R 2020
TECHNICAL ENGLISH – II

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Infer and apply the enriched vocabulary, by knowing the basic grammatical structure, in academic and professional contexts.</i>	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO2	<i>Identify and use Standard English in diverse situations.</i>	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO3	<i>Interpret by reading a text and comprehend a given text.</i>	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO4	<i>Organize and compose business letters.</i>	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO5	<i>Prioritize the listening skill for academic and personal development purposes.</i>	-	-	-	-	-	-	-	-	2	3	-	1	-	-
Average		-	-	-	-	-	-	-	-	2	3	-	1	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

SEMESTER – II

20MA232

DISCRETE MATHEMATICS

(Common To CS & IT)

L	T	P	C
3	1	0	4

Prerequisite: No prerequisites are needed for enrolling into the course.**Course Outcomes: On Completion of this course , the student will be able to**

CO1: Solve logical problems.

CO2: Construct algorithms and derive complexities.

CO3: Acquire the knowledge of sets that are required for developing computational models.

CO4: Solving computational operations associated with functions.

CO5: Apply the concepts of Graph theory and Combinatory in network algorithms.

Cognitive level

Understand

Understand

Remember

Understand

Apply

UNIT – I**PROPOSITIONAL CALCULUS****[12]**

Propositions - Logical connectives - Compound propositions - Conditional and biconditional propositions - Truth tables- Tautologies and contradictions - Contra positive - Logical equivalences and implications - Normal forms - Principal conjunctive and disjunctive normal forms - Rules of inference Theory.

UNIT – II**PREDICATE CALCULUS****[12]**

Predicates - Statement functions - Variables-Free and bound variables - Quantifiers - Universe of discourse - Logical equivalences and implications for quantified statements - Theory of inference -The rules of universal specification and generalization.

UNIT – III**SET THEORY****[12]**

Cartesian product of sets -Relation on sets - Types of relations and their properties - Relational matrix and the graph of a relation - Equivalence relations - Partial ordering - Poset - Hasse diagram.

UNIT – IV**FUNCTIONS****[12]**

Definition - Classification of functions-Composition of functions - Inverse functions - Binary and n-ary operations - Characteristic function of set - Permutation functions.

UNIT – V**GRAPH THEORY AND COMBINATORICS****[12]**

Graphs: Graph terminology and special types of graphs - Representing graphs and graph isomorphism - connectivity - Euler and Hamilton paths - Matching. Combinatorics: Mathematical Induction - The Basics of Counting - Pigeonhole Principle - Recurrence Relations - Generating Functions.

Total (L: 45 T: 15) = 60 Periods**Text Books :**

- 1 Trembly J.P, and Manohar R, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill Publishing Co. Ltd, New Delhi, Forty third Re-print ,2014.
- 2 Venkatraman M.K, Sridharan. N and Chandrasekaran N. Discrete Mathematics, The National Publishing Company, Chennai, Fourth edition, 2014.

Reference Books :

- 1 Kenneth. H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill P.Co, New Delhi , Seventh Edition. 2014.
- 2 Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, Discrete Mathematical Structures, Pearson Education Pvt Ltd ,New Delhi, Sixth Indian reprint, 2013.
- 3 Seymour Lipschutz, Discrete Mathematics, Schaum's outlines series, Tata McGraw Hill P.Co, New Delhi , Second Edition. 2012.
- 4 N. Subramanian, Discrete Mathematics, SCM Publications, Erode, First Edition, 2010.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20MA232**

Regulations:

R 2020

Course Name:

DISCRETE MATHEMATICS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Solve logical problems.	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO2	Construct algorithms and derive complexities.	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO3	Developing computational models.	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	Solving computational operations associated with functions.	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO5	Apply the concepts of Graph theory and Combinatory in network algorithms.	3	3	3	3	-	-	-	-	-	-	-	-	-	-
Average		3	3	3	3	-	-	-	-	-	-	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – II

20PH051	ENGINEERING PHYSICS	L	T	P	C
	(Common to All Branches)	3	0	0	3

Prerequisite: NO PREREQUISITE NEEDED FOR ENROLLING INTO THE COURSE.

Course Outcomes: On Completion of this course , the student will be able to **Cognitive level**

CO1	Describe the impact of engineering solutions in the constructional and designing environment.	Remember
CO2	Categorize the types of laser and utilize it for specific application based on their desirable requisite.	Analyze
CO3	Utilize the conceived concepts and techniques for synthesizing novel crystals with enhanced multifunctional properties.	Apply
CO4	Enumerate the preambles of quantum physics and implement its concepts to tackle the cumbersome engineering problems.	Apply
CO5	Comprehend the fundamental ideas of optoelectronic materials and to fabricate it for the potential applications	Understand

UNIT – I **ACOUSTICS AND ULTRASONICS** **[9]**

Acoustics-Introduction - Classification of sound - Characteristics of musical sound - Loudness - Weber - Fechner law - Decibel - Absorption coefficient - Reverberation - Reverberation time - Sabine's formula: growth and decay (derivation) - Factors affecting acoustics of buildings and their remedies. Ultrasonics - Production -piezoelectric method - Properties - Velocity measurement: acoustical grating -Engineering applications- SONAR.

UNIT – II **LASER TECHNOLOGY** **[9]**

Introduction - Principle of Spontaneous emission and stimulated emission - Population inversion, pumping - Einstein's A and B coefficients (derivation). Types of lasers - Nd-YAG, CO₂ and Semiconductor lasers (homo-junction and hetero-junction) - Qualitative Industrial Applications: Lasers in welding, heat treatment and cutting - Medical applications - Holography (construction and reconstruction of images).

UNIT – III **CRYSTAL PHYSICS** **[9]**

Introduction to crystalline and amorphous solids - lattice and unit cell - seven crystal system and Bravais lattices - Miller indices(hkl) -d-spacing in cubic lattice - atomic radius - coordination number - packing factor calculation for sc, bcc, fcc and hcp- crystal defects - point, line and surface defects.

UNIT – IV **QUANTUM PHYSICS** **[9]**

Black body radiation - Planck's theory (derivation) - Deduction of Wien's displacement law and Rayleigh - Jeans' Law from Planck's theory - Compton effect - Theory and experimental verification - Matter waves - Schrödinger's wave equation - Time independent and time dependent equations - Physical significance of wave function - Particle in a one dimensional box.

UNIT – V **OPTOELECTRONIC DEVICES** **[9]**

Photoconductive materials - Light Dependent Resistor (LDR) - Working - Applications - Photovoltaic materials - Solar cell - Construction, working and applications - Light Emitting Diode (LED) - Principle, construction and working - Liquid crystal Display (LCD) - Types and applications.

Total = 45 Periods

Text Books :

- 1 M.N. Avadhanulu and P.G. Kshirsagar, A text book of Engineering Physics, S. Chand and Company, New Delhi, seventh Edition, 2014.
- 2 R.K.Gaur&S.L.Gupta, Engineering Physics, Dhanpat Rai Publication, New Delhi, seventh Edition, 2014.

Reference Books :

- 1 D. Halliday, R. Resnick and J. Walker, Fundamentals of Physics, John Wiley & sons, USA, Ninth Edition, 2011.
- 2 V. Rajendran, Engineering Physics, Tata McGraw Hill, New Delhi, first Edition, 2011.
- 3 R. A. Serway and J. W. Jewett, Physics for Scientists and Engineers with Modern Physics, Ninth edition, Cengage Learning, USA, 2013.
- 4 Arthur Beiser, Concepts of Modern Physics, Tata McGraw Hill, New Delhi, sixth Edition, 2010.

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20PH051**

Regulations:

R 2020

Course Name:

ENGINEERING PHYSICS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Describe the impact of engineering solutions in the constructional and designing environment.</i>	3	3	-	-	2	-	-	1	-	2	-	2	-	-
CO2	<i>Categorize the types of laser and utilize it for specific application based on their desirable requisite.</i>	3	3	-	-	2	-	-	1	-	2	-	2	-	-
CO3	<i>Utilize the conceived concepts and techniques for synthesizing novel crystals with enhanced multifunctional properties.</i>	3	3	-	-	2	-	-	1	-	2	-	2	-	-
CO4	<i>Enumerate the preambles of quantum physics and implement its concepts to tackle the cumbersome engineering problems.</i>	3	3	-	-	2	-	-	1	-	2	-	2	-	-
CO5	<i>Comprehend the fundamental ideas of optoelectronic materials and to fabricate it for the potential applications</i>	3	3	-	-	2	-	-	1	-	2	-	2	-	-
Average		3	3	-	-	2	-	-	1	-	2	-	2	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - II

20IT211	PYTHON SOFTWARE FOUNDATION	L	T	P	C
		3	0	0	3

Prerequisite: Fundamental knowledge in C programming

Course Outcomes : On successful completion of the course, the student will be able to

CO1: Summarize the fundamentals of Data Expression.

CO2: Construct an efficient algorithms for Control Flow functions

CO3: Analyze programs using Strings and Lists

CO4: Interpret the knowledge in Tuples and Dictionary

CO5: Explain the concept of reading and writing on files.

Cognitive Level

Understand

Apply

Analyze

Understand

Understand

UNIT - I INTRODUCTION [9]

Introduction - Literal Constants - Variables and Identifiers - Data Types - Input Operation - Comments - Reserved Words - Indentation - Operators and Expressions - Expressions- Operations on Strings - Other Data Types - Type Conversion - Decision Control Statements - Functions and Modules - Case Study: Tower of Hanoi

UNIT - II STRINGS AND LISTS [9]

Strings: String slices -Immutability -String functions and methods -String module - Lists as arrays. Illustrative programs: Square root - gcd -Exponentiation -Sum of array of numbers -Linear search -Binary search. Lists: List operations -List slices - List methods -List loop -Mutability -Aliasing -Cloning lists -List parameters.

UNIT - III TUPLES AND DICTIONARIES [9]

Tuples: Tuple assignment -Tuple as return value. Dictionaries: operations and methods. Advanced list processing - List comprehension. Illustrative programs: Selection sort-Insertion sort-Merge sort-Histogram

UNIT – IV FILES AND PACKAGES [9]

Files and exception: Text files -Reading and writing files - format operator- command line arguments- errors and exceptions -Handling exceptions -Modules -Packages - Illustrative programs: word count -Copy file.

UNIT - V OBJECT ORIENTED PROGRAMMING [9]

Classes and Objects - Classes and Functions - Classes and methods - Constructor - Static Methods - Inheritance - Types of Inheritance - Composition or Containership or Complex Objects - Abstract Classes and Interfaces - Operator Overloading - Polymorphism - Error and Exception Handling, Case Study: Compressing String and Files

Total = 45 Periods

Text Books :

- 1 Mark Lutz, , Programming Python, O'Reilly,4th Edition , 2013
- 2 Mark Lutz, Python Pocket Reference, O'Reilly Media, 5th Edition, 2014

Reference Books :

- 1 Alex Martelli,Python in a Nutshell, O'Reilly.3rd Edition,2017
- 2 Guido van Rossum and Jr. Fred L. Drake, An Introduction to Python, Network Theory Ltd ,5th Edition,2011
- 3 Bill Lubanovic,Introducing Python Modern Computing in Simple Packages, O'Reilly Media, 1st Edition 2014
- 4 David Beazley, Brian K. Jones, Python Cookbook, O'Reilly Media, 3rd Edition, 2013
- 5 <https://www.python.org>

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT211**

Regulations:

R 2020

Course Name:

PYTHON SOFTWARE FOUNDATION

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Summarize the fundamentals of Data Expression.	3	3	3	3	-	-	-	-	2	2	-	3	3	3
CO2	Construct an efficient algorithms for Control Flow functions	3	3	3	3	-	-	-	-	2	2	-	3	3	3
CO3	Analyze programs using Strings and Lists	3	3	3	3	-	-	-	-	2	2	-	3	3	3
CO4	Interpret the knowledge in Tuples and Dictionary	3	3	3	3	-	-	-	-	2	2	-	3	3	3
CO5	Explain the concept of reading and writing on files	3	3	3	3	-	-	-	-	2	2	-	3	3	3
Average		3	3	3	3	-	-	-	-	2	2	-	3	3	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - II**20IT212****IT ESSENTIAL**

L	T	P	C
3	0	0	3

Prerequisite: Fundamental knowledge in C programming**Course Outcomes :** On successful completion of the course, the student will be able to**Cognitive Level**

CO1: Classify the types and fundamentals of servers

Analyze

CO2: Develop scripting using PHP

Apply

CO3: Explain the basics of networking and Internet.

Evaluate

CO4: Summarize the fundamentals and components of mobile communication

Understand

CO5: Explain the architectures and features of current trends in information Technology

Understand

UNIT – I**WEB ESSENTIALS****[9]**

Website Essentials : Client-Server Paradigm - Browser Fundamentals - Authoring tools - Types of Servers: Application Server - Web Server - Database Server

UNIT – II**SCRIPTING ESSENTIALS****[9]**

Need for Scripting languages - Types of scripting languages - Working Principle - Client Side scripting - Server Side scripting - PHP : Variables and Constants - Flow Control and Looping - Functions - PHP and MySQL - PHP and HTML - Cookies - Simple PHP scripts

UNIT – III**NETWORKING ESSENTIALS****[9]**

Fundamental computer network concepts - Types of computer networks - Network layers - TCP/IP model - Wireless Local Area Network - Ethernet - WiFi - Network Routing - Switching - Network components

UNIT – IV**MOBILE COMMUNICATION ESSENTIALS****[9]**

Cell phone working fundamentals - Cell phone frequencies & channels - Digital cell phone components - Generations of cellular networks - Cell phone network technologies / architecture - Voice calls & SMS

UNIT – V**RECENT TRENDS IN IT****[9]**

Cloud Computing: Architecture - Deployment models - Service models - Big Data: Sources - Characteristics and Benefits - Tools. Internet of Things: Features - Hardware and Software - Applications - Block Chain - Cyber Security

Total = 45 Periods**Text Books :**

- 1 Pelin Aksoy, Laura DeNardis, Introduction to Information Technology, Cengage Learning, Fourth Indian Reprint 2010.
- 2 Deitel & Deitel, Internet & World Wide Web How To Program, Pearson International Edition Education, Fourth Edition, 2009.

Reference Books :

- 1 Brian.K.Williams, Stacey.C.Sawyer, Using Information Technology - A Practical Introduction to Computers and Communication, Tata McGraw Hill Publishing Company Ltd., New Delhi, 11th Edition, 2015.
- 2 V.Rajaraman, Introduction to Information Technology, PHI Learning, Second Edition, 2013.
- 3 Introduction to Information Technology, Pearson Education, IITL Education Solutions Ltd., 2012.
- 4 Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, Third Edition, O'REILLY, 2014.

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT212**

Regulations: **R 2020**

Course Name: **IT ESSENTIAL**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Classify the types and fundamentals of servers</i>	3	3	3	3	-	-	-	-	2	2	-	3	3	3
CO2	<i>Develop scripting using PHP.</i>	3	3	3	3	-	-	-	-	2	2	-	3	3	3
CO3	<i>Explain the basics of networking and Internet.</i>	3	3	3	3	-	-	-	-	2	2	-	3	3	3
CO4	<i>Summarize the fundamentals and components of mobile communication</i>	3	3	3	3	-	-	-	-	2	2	-	3	3	3
CO5	<i>Explain the architectures and features of current trends in information Technology</i>	3	3	3	3	-	-	-	-	2	2	-	3	3	3
Average		3	3	3	3	-	-	-	-	2	2	-	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER –II

20MC052	ENVIRONMENTAL SCIENCE AND ENGINEERING (Common to All Branches)	L	T	P	C
		3	0	0	0

Prerequisite: NO PREREQUISITE NEEDED FOR ENROLLING INTO THE COURSE.

Course Outcomes: On Completion of this course , the student will be able to **Cognitive level**

CO1	Interpret the importance in conservation of resources for future generation.	Understand
CO2	Relate the importance of ecosystem and biodiversity.	Remember
CO3	Analyze the impact of pollution and hazardous waste in a global and societal context.	Understand
CO4	Identify the contemporary issues that result in environmental degradation that would attempt to provide solutions to overcome the problems.	Understand
CO5	Predict the concept of Sustainability and Green Chemistry.	Understand

UNIT – I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES [9]

Environment - definition - scope and importance - need for public awareness; Forest resources - use - over exploitation - deforestation; Water resources - over-utilization of surface and ground water; Mineral resources - environmental effects of extracting and using mineral resources; Food resources - overgrazing - effects of modern agriculture - fertilizer-pesticide problems - water logging - salinity; Role of an individual in conservation of natural resources. **Activity:** Slogan making event on conserving natural resources or plantation of trees.

UNIT – II ECOSYSTEM AND BIODIVERSITY [9]

Concept of an ecosystem - structure and function of an ecosystem - producers - consumers and decomposers - Food chain - food web - energy flow in the ecosystem - ecological pyramids - Ecological succession; Forest ecosystem and Aquatic ecosystems (Estuary and marine ecosystem); Biodiversity - introduction - definition - Values of biodiversity; Hot-spots of biodiversity; Endangered and Endemic Species of India. **Activity:** Arrange a trip to visit different varieties of plants.

UNIT- III ENVIRONMENTAL POLLUTION [9]

Pollution - introduction and different types of pollution; Causes - effects and control measures of air pollution and water pollution - water quality parameters - hardness - definition - types; Alkalinity - definition - types; BOD and COD (definition and significance); Noise pollution - solid waste management - hazardous waste - medical and e-wastes; Role of an individual in prevention of pollution. **Activity:** Drive for segregation of waste or cleanliness drive.

UNIT- IV SOCIAL ISSUES AND ENVIRONMENT [9]

Water conservation - rain water harvesting and watershed management; Environmental ethics - Issues and possible solutions; Climate change - global warming and its effects on flora and fauna - acid rain - ozone layer depletion; Disaster Management - earth quake - cyclone - tsunami - disaster preparedness - response and recovery from disaster. **Activity:** Poster making event on water management or Climate change.

UNIT- V SUSTAINABILITY AND GREEN CHEMISTRY [9]

Sustainable development - from unsustainable to sustainable development - Environmental Impact Assessment (EIA); Human rights; Value education; HIV/AIDS; Role of information technology in environment and human health; 12 Principles of Green Chemistry. **Activity:** Group discussion on Sustainability or Lecture from an expert on Green chemistry.

Total = 45 Periods

Text Book :

- 1 Dr. T. Arun Luiz, Environmental Science and Engineering, S.Chand & Company Private Limited, New Delhi, First Edition, 2016.
- 2 Anubha Kaushik and C. P. Kaushik, Environmental Science and Engineering, New Age International Publishers, Chennai, Fifth Edition, 2016.

Reference Books :

- 1 G. Tyler Miller and Scott E. Spoolman, Environmental Science, Cengage Learning India Private Limited, New Delhi, Fourteenth Edition, 2014.
- 2 Dr. A. Ravikrishnan, Environmental Science and Engineering, Sri Krishna Hi-tech Publishing Company Private Limited, Chennai, Tenth Edition, 2014.
- 3 Raman Sivakumar, Introduction to Environmental Science and Engineering, Tata McGraw Hill Education Private Limited, Fourth Edition, 2012.
- 4 S S. Dara, A Text book of Environmental Chemistry and pollution control, S. Chand & Company Limited, New Delhi, Tenth Edition, 2005.

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20MC052**

Regulations:

R 2020

Course Name:

**ENVIRONMENTAL SCIENCE AND
ENGINEERING**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Interpret the importance in conservation of resources for future generation.</i>	3	2	2	-	-	3	3	2	-	-	-	1	-	-
CO2	<i>Relate the importance of ecosystem and biodiversity.</i>	3	2	2	-	-	3	3	2	-	-	-	1	-	-
CO3	<i>Analyze the impact of pollution and hazardous waste in a global and societal context.</i>	3	2	2	-	-	3	3	2	-	-	-	1	-	-
CO4	<i>Identify the contemporary issues that result in environmental degradation that would attempt to provide solutions to overcome the problems.</i>	3	2	2	-	-	3	3	2	-	-	-	1	-	-
CO5	<i>Predict the concept of Sustainability and Green Chemistry.</i>	3	2	2	-	-	3	3	2	-	-	-	1	-	-
Average		3	2	2	-	-	3	3	2	-	-	-	1	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - II

20GE052	TAMILS AND TECHNOLOGY (Common to All Branches)	L	T	P	C
		1	0	0	1

Prerequisite(s): No prerequisites are needed for enrolling into the course

Course Outcomes : On successful completion of the course, the student will be able to **Cognitive Level**

CO1:	Understand the weaving and ceramic technology of ancient Tamil People nature.	Understand
CO2:	Comprehend the construction technology, building materials in sangam Period and case studies.	Understand
CO3:	Infer the metal process, coin and beads manufacturing with relevant archeological evidence	Understand
CO4:	Realize the agriculture methods, irrigation technology and pearl diving.	Understand
CO5:	Apply the knowledge of scientific Tamil and Tamil computing.	Apply

UNIT - I WEAVING AND CERAMIC TECHNOLOGY [03]

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT - II DESIGN AND CONSTRUCTION TECHNOLOGY [03]

Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram – Sculptures and Temples of Mamallapuram – Great Temples of Cholas and other worship places – Temples of Nayaka Period – Type study (Madurai Meenakshi Temple) – ThirumalaiNayakar Mahal – Chetti Nadu Houses, Indo –Saracenic architecture at Madras during British Period.

UNIT - III MANUFACTURING TECHNOLOGY [03]

Art of Ship Building – Metallurgical studies – Iron industry – Iron smelting, steel – Copper and gold – Coins as source of history – Minting of Coins – Beads making – industries Stone beads – Glass beads –Terracotta beads –Shell beads / bone beads – Archeological evidences – Gem stone types described in Silappathikaram.

UNIT - IV AGRICULTURE AND IRRIGATION TECHNOLOGY [03]

Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu of Chola Period, Animal Husbandry – Wells designed for cattle use – Agriculture and Agro Processing – Knowledge of Sea – Fisheries – Pearl – Conche diving – Ancient Knowledge of Ocean – Knowledge Specific Society.

UNIT - V SCIENTIFIC TAMIL & TAMIL COMPUTING [03]

Development of Scientific Tamil – Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

Total (L= 15, T = 0) = 15 Periods

Text Books :

- 1 Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
- 2 Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).

Reference Books :

- 1 Historical Heritage of the Tamils (Dr.S.V.Subatamian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies)
- 2 The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi)(Puplished by International Institute of Tamil Studies).
- 3 Keeladi – 'Sangam City Civilization on the banks of river Vaigai; (Jointly Published by: Department of Archaeology &Tamilnadu Text Book and Educational Services Corporation, Tamilnadu)
- 4 Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by : The Author)

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF AUTOMOBILE ENGINEERING
CO-PO MAPPING

Semester : II
Course code : 20GE052

Regulation : R2020
Course name : TAMILS AND TECHNOLOGY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the weaving and ceramic technology of ancient Tamil People nature.	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	Comprehend the construction technology, building materials in sangam Period and case studies.	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	Infer the metal process, coin and beads manufacturing with relevant archeological evidence	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	Realize the agriculture methods, irrigation technology and pearl diving.	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	Apply the knowledge of scientific Tamil and Tamil computing.	-	-	-	-	-	-	3	3	-	2	-	3	-	-
Average		-	-	-	-	-	-	3	3	-	2	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - II

20GE052

தமிழரும் தொழில் நுட்பமும்
(அனைத்து துறைகளுக்கும் பொதுவானது)

L	T	P	C
1	0	0	1

முன் கூட்டிய துறைசார் அறிவு : தேவை இல்லை

பாடம் கற்றத்தின் விளைவுகள் : பாடத்தை வெற்றிகரமாக கற்று அறிவாற்றல்
முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள் நிலை

CO1: சங்ககாலத் தமிழிர்களின் நெசவு மற்றும் பானைவனைதல் புரிதல்
தொழில் நுட்பம் குறித்து கற்றுணர்ந்தல்

CO2: சங்ககாலத் தமிழிர்களின் கட்டிட தொழில் நுட்பம் கட்டுமான புரிதல்
பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்து அறிவு

CO3: சங்ககாலத் தமிழிர்களின் உலோகத் தொழில், நாணயங்கள் புரிதல்
மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு

CO4: சங்ககாலத் தமிழிர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் புரிதல்
மற்றும் முத்து குளித்தல் குறித்த தெளிவு

CO5: நவீன அறிவியல் தமிழ் மற்றும் கன்னி தமிழ் குறித்த பகுப்பாய்வு
புரிந்துகொள்ளும் மற்றும் பயன்படுத்தும்

அலகு - I நெசவு மற்றும் பானைத் தொழில்நுட்பம் [03]

சங்ககாலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் கருப்பு சிவப்பு பாண்டங்கள்-
பாண்டுகளில் கீறல் குறியீடுகள்

அலகு - II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் [03]

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில்
வடிவமைப்பு - சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும்-சிலப்பதிகாரத்தில்
மேடை அமைப்பு பற்றிய விவரங்கள்-மாமல்லபுரச் சிற்பங்களும், கோவில்களும்-
சோழர்காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள்-நாயக்கர்
காலக்கோயில்கள்-மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன்ஆலயம்
மற்றும் திருமலைநாயக்கர்மஹால் - செட்டிநாட்டுவீடுகள்-பிரிட்டிஷ்காலத்தில் சென்னை
இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

அலகு - III உற்பத்தித் தொழில்நுட்பம் [03]

கப்பல் கட்டும் கலை-உலோகவியல்-இரும்புத்தொழிற்சாலை-இரும்பை உருக்குதல், எஃகு-
வரலாற்றுச்சான்றுகளாக செம்பு மற்றும் தங்கநாணயங்கள்-நாணயங்கள் அச்சடித்தல்-மணி
உருவாக்கும் தொழிற்சாலைகள்-கல் மணிகள்-கண்ணாடி மணிகள்-சுடு மண்மணிகள்-
சங்குமணிகள்-எலும்புத்துண்டுகள்-தொல்லியல் சான்றுகள்-சிலப்பதிகாரத்தில் மணிகளின்
வகைகள்.

அலகு - IV வேளாண்மை மற்றும் நீர்ப் பாசனத் தொழில்நுட்பம் [03]

அணை, ஏரி, குளங்கள், மதகு-சோழர்காலகுமிழித்தாம்பின் முக்கியத்துவம்-கால்நடை
பராமரிப்பு-கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள்-வேளாண்மை மற்றும்
வேளாண்மை சார்ந்த செயல்பாடுகள்-கடல்சார் அறிவு - மீன் வளம்-முத்து மற்றும் முத்துக்
குளித்தல்-பெருங்கடல் குறித்த பண்டைய அறிவு-அறிவுசார் சமூகம்.

அலகு - V அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் [03]

அறிவியல் தமிழின் வளர்ச்சி- கணினித்தமிழ் வளர்ச்சி-தமிழ் நூல்களை மின்பதிப்பு செய்தல்-
தமிழ் மென் பொருட்கள் உருவாக்கம்-தமிழ் இணையக்கல்விக் கழகம்-தமிழ் மின்நூலகம்-
இணையத்தில் தமிழ் அகராதிகள் சொற்குவைத் திட்டம்.

Total (L = 15, T = 0) = 15 Periods

Text Books :

- 1 தமிழகவரலாறு- மக்களும் பண்பாடும்- கேகேபிள்ளை (வெளியீடு தமிழ்நாடு
பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்)
- 2 கணினித்தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)

Reference Books :

- 1 கீழடி- வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம்.(தொல்லியல் துறை
வெளியீடு)
- 2 பொருறை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
- 3 Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by : The Author)
- 4 Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Semester : II
Course code : 20GE052

Regulation : R2020
Course name : தமிழரும் தொழில் நுட்பமும்

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	சங்ககாலத் தமிழர்களின் நெசவு மற்றும் பானைவனைதல் தொழில்நுட்பம் குறித்து கற்றுணர்தல்	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	சங்ககாலத் தமிழர்களின் கட்டிட தொழில்நுட்பம் கட்டுமான பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்து அறிவு	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	சங்ககாலத் தமிழர்களின் உலோகத் தொழில், நாணயங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	சங்ககாலத் தமிழர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் குறித்த தெளிவு	-	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	நவீன அறிவியல் தமிழ் மற்றும் கன்னி தமிழ் குறித்த புரிந்து கொள்ளலும் மற்றும் பயன்படுத்தலும்	-	-	-	-	-	-	3	3	-	2	-	3	-	-
Average		-	-	-	-	-	-	3	3	-	2	-	3	-	-

1. சிறிது (குறைந்த) 2. மிதமான (நடுத்தர) 3. கணிசமான (உயர்)

SEMESTER – II

20PH028	PHYSICS LABORATORY (Common to All Branches)	L	T	P	C
		0	0	3	1

Prerequisite: NO PREREQUISITE NEEDED FOR ENROLLING INTO THE COURSE.

Course Outcomes: On Completion of this course , the student will be able to

		Cognitive level
CO1	Comprehend the different physical parameters of optics.	Analyze
CO2	Perceive the production of ultrasonic waves through inverse piezoelectric effect and to determine the velocity of sound waves in the given liquid.	Remember
CO3	Explore the principle of thermal conductivity thereby to calculate the thermal conductivity of various bad conductors like cardboard, mica, etc.	Apply
CO4	Confer the experimental counterparts of materials properties such as modulus, solar cell, and energy gap.	Understand
CO5	Imbibe the concept of capillary action in fluid dynamics and to compare the coefficient of viscosity of the given liquid.	Analyze

List of Experiments in Physics Laboratory

1. Determination of wavelength of Laser using grating and the Size of the Particles.
2. Determination of thickness of the given material by Air - wedge method.
3. Determination of velocity of Ultrasonic waves and compressibility using Ultrasonic interferometer.
4. Spectrometer grating - Determination of wavelength of mercury spectrum.
5. Determination of thermal conductivity of a bad conductor by Lee's disc method.
6. Determination of Young's modulus of the material of a uniform bar by Non - Uniform bending method.
7. Determination of Band gap energy of a semiconductor.
8. Determination of Viscosity of a given liquid by Poiseuille's method.
9. Torsional pendulum - Determination of rigidity modulus of a given wire.
10. V-I Characteristics of Solar Cell .

Total = 30 Periods

Text Books:

1. Faculty Members of Physics, Physics Lab manual, Department of Physics, K.S.R. College of Engineering, Namakkal, seventeenth Edition, 2018.
2. Dr. P. Mani, Physics Lab Manual & Observation Book, Dhanam Publications, Twelfth Edition Chennai 2017.

References:

1. Dr. G. Senthilkumar, Physics Lab manual, VRB Publications Pvt. Ltd., Chennai, tenth Edition, 2006.
2. R Suresh & Dr. C. Kalyanasundaram, Physics Laboratory, Sri Krishna Hi-Tech Publishing Company Pvt. Ltd., Chennai, fifth Edition, 2017.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20PH028**

Regulations:

R 2020

Course Name:

PHYSICS LABORATORY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Comprehend the different physical parameters of optics.	3	3	-	-	2	-	-	1	-	2	-	2	-	-
CO2	Perceive the production of ultrasonic waves through inverse piezoelectric effect and to determine the velocity of sound waves in the given liquid	3	3	-	-	2	-	-	1	-	2	-	2	-	-
CO3	Explore the principle of thermal conductivity thereby to calculate the thermal conductivity of various bad conductors like cardboard, mica, etc.	3	3	-	-	2	-	-	1	-	2	-	2	-	-
CO4	Confer the experimental counterparts of materials properties such as modulus, solar cell, and energy gap.	3	3	-	-	2	-	-	1	-	2	-	2	-	-
CO5	Imbibe the concept of capillary action in fluid dynamics and to compare the coefficient of viscosity of the given liquid.	3	3	-	-	2	-	-	1	-	2	-	2	-	-
Average		3	3	-	-	2	-	-	1	-	2	-	2	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – II**20GE028****MANUFACTURING PRACTICES LABORATORY**
(Common to All Branches)L T P C
0 0 3 1**Prerequisite:** No Prerequisites are needed for enrolling into the course.**GROUP A (CIVIL & MECHANICAL)****Course Outcomes: On Completion of this course , the student will be able to****Cognitive level**

CO1: Prepare green sand mould for simple patterns and carpentry components with simple joints.

Create

CO2: Perform welding practice to join simple structures.

Create

CO3: Practice simple operations in lathe and drilling machine.

Create

LIST OF EXPERIMENTS

1. Study of fitting, smithy, plastic molding, and glass cutting.
2. Prepare a mould using solid/split patterns in Foundry.
3. Make Lap joint / Butt joint / T joint from the given wooden pieces using carpentry tools.
4. Make a Butt joint / Lap joint / Tee joints using arc / gas welding equipment.
5. Perform simple Facing and Turning operation using Centre Lathe.
6. Make holes as per the given dimensions using drilling machine.

LIST OF EQUIPMENTS

- | | | |
|---|-------|---------|
| 1. Fitting tools and its accessories | - | 15 Sets |
| 2. Smithy tools and Open hearth furnace setup | - | 2 Sets |
| 3. Foundry tools and its accessories | - | 5 Sets |
| 4. Carpentry tools and its accessories | - | 15 Sets |
| 5. Arc Welding equipments and its accessories | - | 5 Sets |
| 6. Oxy Acetylene welding setup and its accessories- | 1 Set | |
| 7. Centre Lathe with its accessories | - | 2 Nos. |
| 8. Pillar type drilling machine | - | 1 No. |

CO-PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Prepare green sand mould for simple patterns and carpentry components with simple joints.	2	-	-	3	-	-	-	3	1	-	-	3	3	1
CO2	Perform welding practice to join simple structures.	2	-	-	3	-	-	-	3	1	-	-	3	3	1
CO3	Practice simple operations in lathe and drilling machine.	2	-	-	3	-	-	-	3	1	-	-	3	3	1
Average		2	-	-	3	-	-	-	3	1			3	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

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SEMESTER – II

20GE028

GROUP B (ELECTRICAL & ELECTRONICS)

(Common to all Branches)

L	T	P	C
0	0	3	1

Prerequisite: No prerequisites are needed for enrolling into the course**Course Outcomes: On Completion of this course , the student will be able to**

CO1 Construct different types of wiring used in house.

CO2 Calibrate single phase Energy meter.

CO3 Demonstrate different electronic components, logic gates and CRO.

Cognitive level

Understand

Understand

Understand

List of Experiments:**ELECTRICAL ENGINEERING**

1. Fluorescent lamp wiring & Stair-case wiring.
2. Residential house wiring using switches, fuse, indicator, lamp and fan.
3. Calibration of Single phase Energy meter

ELECTRONICS ENGINEERING

1. Study of Electronic components and Soldering practice.
2. Study of logic gates AND, OR, EX-OR, NOT, Half and Full Adder.
3. Study of CRO

Total : 45 PeriodsCO-PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Construct different types of wiring used in house	3	2	3	-	-	-	-	1	1	-	-	3	-	-
CO2	Calibrate single phase Energy meter	3	1	2	-	-	-	-	1	1	-	-	3	-	-
CO3	Demonstrate different electronic components, logic gates and CRO	3	2	3	-	-	-	-	1	1	-	-	3	-	-
Average		3	2	3	-	-	-	-	1	1	-	-	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – II**20IT221****PYTHON SOFTWARE FOUNDATION LABORATORY**

L	T	P	C
0	0	3	1

Prerequisite: No prerequisites are needed for enrolling into the course**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Construct the code segments using Python

CO2: Show the solutions for real world problems using Structured Programming

CO3: Identify suitable data structure for solving a problem

CO4: Design and implement sorting and searching algorithms

CO5: Evaluate Pygame to design simple applications

Cognitive Level

Apply

Understand

Apply

Create

Evaluate

List of Experiments:

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Write a program for Exponentiation (power of a number)
4. Illustrate the program for finding the maximum of a list of numbers
5. Write a program for Linear search and Binary search
6. Write a program for Selection sort and Insertion sort
7. Write a coding for Merge sort
8. Find the First n prime numbers
9. Write a coding for Multiplication of two matrices
10. Write a program for taking the command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame.
13. Simulate bouncing ball in Pygame.

Total = 45 Periods**CO-PO MAPPING**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Construct the code segments using Python	3	3	3	1	3	-	-	-	-	-	-	-	3	1
CO2	Show the solutions for real world problems using Structured Programming	3	3	3	1	3	-	-	-	-	-	-	-	3	1
CO3	Identify suitable data structure for solving a problem	3	3	3	1	3	-	-	-	-	-	-	-	3	1
CO4	Design and implement sorting and searching algorithms	3	3	3	1	3	-	-	-	-	-	-	-	3	1
CO5	Evaluate Pygame to design simple applications	3	2	2	1	3	-	-	-	-	-	-	-	3	1
Average		3	3	3	1	3	-	3	1						

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – II**20IT222****IT ESSENTIAL LABORATORY**

L	T	P	C
0	0	3	1

Prerequisite: No prerequisites are needed for enrolling into the course**Course Outcomes: On Completion of this course, the student will be able to**

CO1: Create the professional looking documents and presentations.

CO2: Build device drivers and configure operating systems

CO3: Build the code segments using PHP, HTML and CSS

CO4: Identify the network communication components

CO5: Design simple applications using JavaScript

Cognitive Level

Create

Apply

Apply

Apply

Create

List of Experiments:

1. Prepare a Bio-data using MS Word with appropriate page, text and table formatting options and send the same too many recipients using mail merge.
2. Prepare a mark sheet with five subjects for five students in MS Excel File using Formulas, Functions and Charts.
3. i). Prepare a Power Point presentation for your organization with varying animation effects using timer.
ii). Prepare a Student Database in MS Access, manipulate the data and generate report.
4. Install and configuration of windows operating system, device drivers
5. Study of computer networking components.
6. Develop a PHP code to print alphabet triangle pattern
7. Write a PHP code to create, retrieve and delete cookie.
8. Develop a code segment to turn on or off bulb using JavaScript
9. Create a simple web page using HTML and CSS.
10. Create a Google Form with controls like check box, radio button and file upload option to collect details from the students.

Total = 45 Periods**CO-PO MAPPING**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Create the professional looking documents and presentations.	3	3	3	1	3	-	-	-	-	-	-	-	3	1
CO2	Build device drivers and configure operating systems	3	3	3	1	3	-	-	-	-	-	-	-	3	1
CO3	Build the code segments using PHP, HTML and CSS	3	3	3	1	3	-	-	-	-	-	-	-	3	1
CO4	Identify the network communication components	3	3	3	1	3	-	-	-	-	-	-	-	3	1
CO5	Design simple applications using JavaScript	3	2	2	1	3	-	-	-	-	-	-	-	3	1
Average		3	3	3	1	3	-	3	1						

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – III

20MA343	NUMERICAL COMPUTATIONAL TECHNIQUES (Common To CS & IT)	L	T	P	C
		3	1	0	4

Prerequisite: No prerequisites are needed for enrolling into the course.

Course Outcomes: On Completion of this course , the student will be able to		Cognitive level
CO1	Solve polynomial, transcendental equations, simultaneous linear equations numerically.	Understand
CO2	Predict the unknown values by using Interpolation techniques.	Apply
CO3	Evaluate the problems in differentiation and integration by using numerical techniques.	Evaluate
CO4	Solving the initial value problems for ordinary differential equations.	Remember
CO5	Determine the numerical solutions to boundary value problems.	Remember

UNIT – I SOLUTIONS OF EQUATIONS AND EIGEN VALUE PROBLEMS [12]

Solutions to polynomial and transcendental equations – Newton Raphson Method – Solutions to simultaneous linear system of equations by Gauss Elimination Method – Gauss Seidel Method-Inverse of a matrix by Gauss Jordan Method– Eigen value of a matrix by power method.

UNIT – II INTERPOLATION AND APPROXIMATION [12]

Interpolation– Newton’s Forward and Backward difference interpolation Techniques– Newton’s divided difference method–Lagrange’s interpolation and Inverse Lagrange’s interpolation methods.

UNIT – III NUMERICAL DIFFERENTIATION AND INTEGRATION [12]

Numerical differentiation using Newton’s Forward and Backward difference interpolation methods –Numerical integration by Trapezoidal rule– Simpson’s 1/3rd rule and 3/8th rule –Double integration using Trapezoidal and Simpson’s rules.

UNIT – IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS [12]

Solving ODE by Taylor’s Series Method–Euler’s Method for first order equation–Modified Euler’s Method for first order equation–Fourth order Runge-Kutta method for solving first order equations - Adams and Milne’s Predictor and Corrector Method.

UNIT – V BOUNDARY VALUE PROBLEMS IN PARTIAL DIFFERENTIAL EQUATIONS [12]

Classification of PDE–One dimension heat equation by Crank Nicolson method–One dimensional wave equation–Two Dimensional Laplace and Poisson equations.

Total (L: 45 T:15) =60 Periods

Text Books :

- 1 Dr. B. S Grewal, Numerical Methods in Engineering and Science, Khanna Publishers, New Delhi, 12th edition, 2016.
- 2 Dr. M.K. Venkataraman, Numerical Methods in Science and Engineering, National Publishing Company, Chennai, 4th edition, 2012.

References :

- 1 Sukhendu Dey and Shishir Gupta, Numerical Methods , Tata McGraw Hill Publishing Company, New Delhi, First Edition 2013.
- 2 Gerald.V, Applied Numerical Analysis, Pearson Education, New Delhi, 6th edition, 2013.
- 3 P. Kandasamy, K. Thilagavathy, K. Gunavathy Numerical Methods , S. Chand Company, New Delhi, 5th edition, 2016.
- 4 S.R.K. Iyengar, R.K.Jain, Numerical Methods, New Age International Publishers, New Delhi, 1st Edition , 2014.

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20MA343**

Regulations:

R 2020

Course Name:

**NUMERICAL COMPUTATIONAL
TECHNIQUES**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Solve polynomial, transcendental equations, simultaneous linear equations numerically.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO2	<i>Predict the unknown values by using Interpolation techniques.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO3	<i>Evaluate the problems in differentiation and integration by using numerical techniques.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	<i>Solving the initial value problems for ordinary differential equations.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	--
CO5	<i>Determine the numerical solutions to boundary value problems.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
Average		3	3	3	3	-	-	-	-	-	-	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - III**20EC333****DIGITAL PRINCIPLES AND SYSTEM DESIGN**

L	T	P	C
3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course.**Course Outcomes :** On successful completion of the course, the student will be able to**Cognitive Level**

CO1: Analyze different methods used for simplification of Boolean expressions.

Analyze

CO2: Design and implement Combinational circuits and develop their HDL models

Apply

CO3: Formulate a procedure for analyze and design of synchronous sequential circuits and develop their HDL models

Apply

CO4: Analyze and design asynchronous sequential digital circuits

Analyze

CO5: Acquire knowledge of the nomenclature and technology in the area of memory devices: ROM, RAM, PROM and PLD

Understand

UNIT - I BOOLEAN ALGEBRA AND LOGIC GATES**[9]**

Review of Number systems - Arithmetic operations - Binary codes - Boolean Algebra and Theorems - Boolean functions - Simplification of Boolean functions using Karnaugh Map and Tabulation methods - Logic gates - Implementation of logic functions using basic gates, NAND-NOR implementations.

UNIT - II COMBINATIONAL LOGIC**[9]**

Combinational circuit - Analysis and design procedure - Circuits for arithmetic operation : Half adder, full adder, Half subtractor, full subtract or , parallel adder, carry look ahead adder & binary adder - 2 bit Magnitude comparator, Code converters - Decoders and Encoders - Multiplexers and Demultiplexers - Introduction to HDL - HDL models of Combinational circuits.

UNIT - III SYNCHRONOUS SEQUENTIAL LOGIC**[9]**

Latches and Flip Flops - Analysis and design procedure - State assignment and State reduction - Shift registers - Counters - HDL for sequential logic circuits

UNIT - IV ASYNCHRONOUS SEQUENTIAL LOGIC**[9]**

Analysis and design of asynchronous sequential circuits - Reduction of state and flow table - Race-free state assignment - Hazards

UNIT - V MEMORY AND PROGRAMMABLE LOGIC**[9]**

Classification of memories - ROM: ROM organization, PROM, EPROM, EEPROM, EAPROM, RAM: RAM organization - Memory expansion - Static RAM cell - Dynamic RAM cell - Programmable Logic Devices: Programmable Logic Array - Programmable Array Logic - Field Programmable Gate Arrays - Implementation of combinational logic circuits using ROM, PLA and PAL.

Total = 45 Periods**Text Books :**

- 1 Donald P. Leach, Albert Paul Malvino and Goutam Saha, Digital Principles and Applications, McGraw Hill Education, USA, Eighth Edition, 2015.
- 2 M.Morris Mano, Digital Design, Prentice Hall of India Pvt.Ltd, Noida, Fourth Edition, 2012.

Reference Books :

- 1 Soumitra Kumar Mandal, Digital Electronics Principles and Applications, McGraw Hill, USA, Seventh Reprint, 2014.
- 2 John.M Yarbrough, Digital Logic Applications and Design, Thomson Learning, Ninth Reprint, 2012.
- 3 Donald D.Givone, Digital Principles and Design, Tata McGraw, New Delhi, Twenty First Reprint 2012.
- 4 John F. Wakerly, Digital Design Principles and Practices, Pearson Education, Ninth Impression, 2013.
- 5 Stephen Brown, Zvonko Vranesic, "Fundamentals of Digital Logic with VHDL Design", TMH, New Delhi, Third Edition 2012

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CO-PO MAPPING

Course Code: **20EC333**

Regulations:

R 2020

Course Name:

**DIGITAL PRINCIPLES AND SYSTEM
DESIGN**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	Analyze different methods used for simplification of Boolean expressions.	3	2	3	2	1	-	-	-	-	-	-	2	3	1
2	Design and implement Combinational circuits and develop their HDL models	3	3	3	2	3	-	-	-	-	-	-	2	3	2
3	Formulate a procedure for analyze and design of synchronous sequential circuits and develop their HDL models	3	3	3	2	3	-	-	-	-	-	-	2	3	2
4	Analyze and design asynchronous sequential digital circuits	3	3	3	2	3	-	-	-	-	-	-	2	3	2
5	Acquire knowledge of the nomenclature and technology in the area of memory devices: ROM, RAM, PROM and PLD	3	3	3	2	3	-	-	-	-	-	-	2	3	2
Average		3	3	3	2	3	-	-	-	-	-	-	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - III

20IT311

OBJECT ORIENTED PROGRAMMING

L	T	P	C
3	0	0	3

*Prerequisite: Programming for Problem Solving using C***Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Design class and objects for real world scenario

Create

CO2: Apply polymorphism concepts to obtain build generic frameworks

Apply

CO3: Apply inheritance concepts to obtain code reusability

Apply

CO4: Create application to manipulate data from files using pointers and file concepts

Create

CO5: Explain the concept of exceptions

Evaluate

UNIT - I OBJECT ORIENTED PROGRAMMING**[9]**

Evolution of Object Oriented Programming - Procedural Vs OOPs - Characteristics of OOPs - Classes and Objects - Data Members and Member functions - Access Specifiers - Objects and Functions.

UNIT - II POLYMORPHISM**[9]**

Constructors: Types of Constructor - Copy Constructor - Destructors - Static keyword - Friend and Inline functions - Polymorphism : Function Overloading - Operator Overloading - Virtual Function

UNIT - III INHERITANCE**[9]**

Inheritance: Advantages - Base and Derived Class - Visibility of Inherited Members : Types of Inheritance: Multiple - Multilevel - Hierarchical - Hybrid - Derived Class Constructors - Overriding Member Functions - Virtual Base Classes - Abstract Classes.

UNIT - IV POINTERS , STREAMS AND FILES**[9]**

Pointers : this Pointer - Pointers to Objects and Derived Classes - Streams: Stream Classes - Unformatted I/O Operations - Formatted Console I/O Operations - File Stream Operations - File Pointers Manipulation

UNIT - V TEMPLATES AND EXCEPTION HANDLING**[9]**

Templates: Function and Class Templates - Standard Template Library: Algorithms - Containers - Functions - Iterators - Exception Handling Mechanism - Exception Classes - try, throw and catch.

Total = 45 Periods**Text Books :**

- 1 Robert Lafore, Object Oriented Programming In C++ , Pearson Education Limited , Fourth Edition , 2017
- 2 Herbert Schildt, C++: The Complete Reference, Fifth Edition, Tata McGraw-Hill, 2017

Reference Books :

- 1 E Balagurusamy, Object Oriented Programming with C++, McGrawHill, Eighth Edition, 2020
- 2 Deitel Paul , Deitel Harvey, C++ How to Program, Tenth Edition, Pearson, 2017.
- 3 K.R. Venugopal, Rajkumar and T.Ravishankar, Mastering C++, Tata McGraw Hill Publishing, 2015
- 4 Programming in C++ : <https://nptel.ac.in/courses/106/105/106105151/>

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT311**

Regulations:

R 2020

Course Name:

OBJECT ORIENTED PROGRAMMING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Design class and objects for real world scenario</i>	3	2	2	-	2	-	-	-	-	-	-	-	2	2
CO2:	<i>Apply polymorphism concepts to obtain generic frameworks</i>	3	2	2	-	2	-	-	-	-	-	-	-	2	2
CO3:	<i>Apply inheritance concepts to obtain code reusability</i>	3	2	2	-	2	-	-	-	-	-	-	-	2	2
CO4:	<i>Create application to manipulate data from files using pointers and file concepts</i>	3	1	1	-	2	-	-	-	-	-	-	-	2	2
CO5:	<i>Explain the concept of exceptions</i>	3	1	2	-	2	-	-	-	-	-	-	-	1	1
Average		3	3	2	-	2	-	2	2						

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - III**20IT312****OPERATING SYSTEMS**

L	T	P	C
3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course.**Course Outcomes :** On successful completion of the course, the student will be able to

CO1: Interpret the basic concept of Operating System

CO2: Analyze process management deadlock prevention and avoidance algorithms

CO3: Compare and contrast various memory management schemes

CO4: Apply the principles of file and I/O management

CO5: Examine about various advanced operating systems

Cognitive Level

Understand

Analyze

Understand

Apply

Analyze

UNIT-I**INTRODUCTION****[9]**

Basics of Operating Systems: Definition - Generations of Operating Systems - Types of Operating Systems: Mainframe - Desktop - Multiprocessor - Distributed - Clustered - Multiprogramming - Real Time - Embedded and Time sharing. Operating System Components - Operating System Services - System Calls - System Call Execution

UNIT-II**PROCESS MANAGEMENT****[9]**

Process: Process Concept - Process Control Block - Context Switches - Threads - System Calls - Process Scheduling: Types of Schedulers - Scheduling Criteria - Scheduling Algorithms - Inter process Communication and Synchronization: Shared Memory System - Message Passing - Critical Section - Mutual Exclusion - Semaphores. Deadlocks: Deadlock Characteristics - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection and Recovery

UNIT-III**MEMORY MANAGEMENT****[9]**

Swapping - Memory Allocation - Contiguous Memory Allocation - Paging - Segmentation - Segmentation with Paging. Virtual Memory - Demand Paging - Page Replacement Policies : Optimal (OPT) - First In First Out (FIFO) - Not Recently Used (NRU) and Least Recently Used (LRU)

UNIT-IV**FILE AND I/O MANAGEMENT****[9]**

File Concepts - Access methods - Directory Structure - File sharing - Protection - Access Rights - File System Structure - Byte Sequence - Record Sequence and Tree - based - Recovery - Disk formatting - I/O Management : I/O Buffering - Single and Double Buffer Schemes - Disk Organization - Secondary Storage Management - File Allocation Methods : Free Space Management - Disk Scheduling - Disk Cache

UNIT-V**ADVANCED OS AND CASE STUDY****[9]**

Microsoft Windows - Apple macOS - Android and Apple's iOS - Linux System - System Administration - Requirements for Linux System Administrator - Setting up a LINUX Multifunction Server - Domain Name System - Setting Up Local Network Services - Virtualization- Setting Up Xen - VMware on Linux Host and Adding Guest OS

Total = 45 Periods**Text Books :**

- 1 Abraham Silberschatz, Operating System Concepts, John Wiley & Sons, 10th Edition, 2018
- 2 William Stallings, Operating Systems - Internals and Design Principles, 9th Edition, Prentice Hall, 2018

Reference Books :

- 1 Andrew S. Tanenbaum, Operating Systems - Design and Implementation, Pearson Education, 2015
- 2 D.M. Dhamdhere, Operating Systems - A Concept Based Approach, TMGH, 2010
- 3 Harvey M. Deitel, Paul Deitel, David R. Choffnes, Operating Systems, Prentice Hall, 3rd Edition, 2004
- 4 Operating System Fundamentals : <https://nptel.ac.in/courses/106/105/106105214/>

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT312**

Regulations:

R 2020

Course Name:

OPERATING SYSTEMS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Interpret the basic concept of Operating System</i>	3	2	2	2	2	-	-	-	-	-	-	-	3	1
CO2	<i>Analyze process management deadlock prevention and avoidance algorithms</i>	3	2	2	2	2	-	-	-	-	-	-	-	3	1
CO3	<i>Compare and contrast various memory management schemes</i>	3	2	2	2	2	-	-	-	-	-	-	-	3	1
CO4	<i>Apply the principles of file and I/O management</i>	3	2	2	2	2	-	-	-	-	-	-	-	3	1
CO5	<i>Examine about various advanced operating systems</i>	3	2	2	2	2	-	-	-	-	-	-	-	3	1
Average		3	2	2	2	2	-	3	1						

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - III

20IT313	DATA STRUCTURES	L	T	P	C
		3	0	0	3

Prerequisite: Programming for Problem solving Using C

Course Outcomes : On successful completion of the course, the student will be able to **Cognitive Level**

CO1: Apply various linear data structures in real time applications and projects	Apply
CO2: Solve the real world problems using stack and queue techniques	Apply
CO3: Construct and solve problems using non linear data structures	Apply
CO4: Design algorithms to solve common sorting and searching problems	Create
CO5: Identify the algorithms that are used to solve various problems using graph	Apply

UNIT-I LINEAR DATA STRUCTURES – LIST [9]

Abstract Data Types (ADTs) - List ADT - Array based implementation - Linked list implementation - Singly linked list - Circularly linked list - Doubly linked list - Applications of list

UNIT-II LINEAR DATA STRUCTURES – STACK AND QUEUES [9]

Stack ADT : Operations - Evaluating arithmetic expressions - Conversion of Infix to postfix expression - Queue ADT : Operations - Circular Queue - Priority Queue - Dequeue - Applications of queue.

UNIT-III NON- LINEAR DATA STRUCTURES – TREES [9]

Tree ADT: Tree Traversals - Binary Tree ADT - Expression trees - Applications of trees - Binary Search Tree ADT - Threaded Binary Trees - AVL Trees - B Tree - B+ Tree - Heap - Applications of heap.

UNIT-IV SEARCHING AND SORTING [9]

Searching: Linear Search - Binary Search - Sorting : Bubble Sort - Selection Sort - Insertion Sort - Shell Sort - Radix Sort - Hashing: Hash Functions - Separate Chaining - Open Addressing - Rehashing - Extendible Hashing.

UNIT-V GRAPHS [9]

Basic Concepts of Graphs: Operations - Depth First Traversal - Breath First Traversal - Minimum Spanning Trees: Kruskal's and Prim's Algorithm - Shortest Path Algorithm - Dijkstra's Algorithm - Bellman Ford Algorithm.

Total = 45 Periods

Text Books :

- 1 M.A.Weiss, Data Structures and Algorithm Analysis in C, Second Edition, Pearson Education, 2015
- 2 Reema Thareja, Data Structures Using C, Second Edition, Oxford University Press, 2011

Reference Books :

- 1 Richard F.Gilberg & Behrouz A. Forouzan, Data Structures : A Pseudocode Approach with C, Second Edition, Cengage Learning India Pvt. Ltd, 2005
- 2 Seymour Lipschutz, Data Structures with C (Schaum's Outline Series), McGraw Hill, 2014
- 3 Kruse R.L. Tondo C.L and Leung B.P, Data Structure and Program Design in C, Second Edition, Pearson Education India, 2007
- 4 A.V. Aho, J.E. Hopcraft, and J.D Ullman, Data structures and algorithms, Pearson Education, Reprint 2001

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT313**

Regulations:

R 2020

Course Name:

DATA STRUCTURES

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Apply various linear data structures in real time applications and projects</i>	3	3	3	2	1	-	-	-	-	-	-	-	3	3
CO2	<i>Solve the real world problems using stack and queue techniques</i>	3	3	2	2	1	-	-	-	-	-	-	-	2	3
CO3	<i>Construct and solve problems using non linear data structures</i>	3	3	2	1	-	-	-	-	-	-	-	-	3	2
CO4	<i>Design algorithms to solve common sorting and searching problems</i>	3	3	2	1	-	-	-	-	-	-	-	-	3	3
CO5	<i>Identify the algorithms that are used to solve various problems using graph</i>	3	3	1	1	-	-	-	-	-	-	-	-	3	2
Average		3	3	2	1	1	-	3	3						

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER –III

20IT314

COMPUTER ORGANIZATION

L	T	P	C
3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course.**Course Outcomes :** On successful completion of the course, the student will be able to

CO1: Demonstrate the operational concepts of computers and classify instruction set architectures

CO2: Apply the various arithmetic operations and discuss the design of ALU

CO3: Evaluate the performance of a pipelined processor

CO4: Design the memory and I/O system requirements for any commercial processor

CO5: Discuss the concepts of parallelism and multi core processors

Cognitive Level

Understand

Apply

Understand

Analyze

Analyze

UNIT-I BASIC STRUCTURE OF COMPUTERS [9]

Functional units -Operational concepts - Bus structures - Instructions and instruction sequencing - Hardware and Software Interface -Instruction set architecture – Addressing modes - RISC and CISC - Amdahl's law - Performance and metrics

UNIT-II ARITHMETIC FOR COMPUTERS [9]

Addition and Subtraction - Fast Adders- Multiplication - Division - Floating Point Representation - Floating Point Operations - Sub word Parallelism

UNIT-III PIPELINING [9]

Basic concepts - Data hazards - Instruction hazards - Influence on instruction sets - Data path and control considerations - Performance considerations

UNIT-IV MEMORY & I/O SYSTEM [9]

Memory Hierarchy - Memory Technologies - Cache Memory - Measuring and Improving Cache Performance - Virtual Memory, TLB's - Accessing I/O Devices - Interrupts - Direct Memory Access(DMA) - Bus structure and operation - Arbitration - Interface circuits - USB

UNIT-V ADVANCED ARCHITECTURE TITLE [9]

Current Trends - Multi core Processors and other Shared Memory Multiprocessors - Graphics and Computing-Graphics Processing Units - Clusters - Warehouse Scale Computers and other Message - Passing Multiprocessors GPUs - Case Study: Pentium Processor

Total = 45 Periods**Text Books :**

- 1 Carl Hamacher, Zvonko Vranesic and Safwat Zaky, Computer Organization, Fifth Edition, Tata McGraw Hill, 2011.
- 2 M.Morris Mano, Computer System Architecture, Third Edition, Pearson Education, 2017.

Reference Books :

- 1 David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software interface', Fifth Edition, Elsevier, 2013.
- 2 William Stallings, Computer Organization and Architecture - Designing for Performance, Ninth Edition, Pearson Education, 2012.
- 3 John P.Hayes, Computer Architecture and Organization, McGraw Hill, 3rd edition, 2012.
- 4 Computer Architecture and Organization : <https://nptel.ac.in/courses/106/105/106105163/>

CO-PO MAPPING

Course Code: 20IT314

Regulations

R 2020

Course Name:

COMPUTER ORGANIZATION

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Demonstrate the operational concepts of computers and classify instruction set architectures</i>	3	2	2	2	1	-	-	-	-	-	-	-	2	2
CO2	<i>Apply the various arithmetic operations and discuss the design of ALU</i>	3	2	3	3	3	-	-	-	-	-	-	-	2	2
CO3	<i>Evaluate the performance of a pipelined processor</i>	3	3	2	3	2	-	-	-	-	-	-	-	2	2
CO4	<i>Design the memory and I/O system requirements for any commercial processor</i>	3	1	3	1	2	-	-	-	-	-	-	-	2	2
CO5	<i>Discuss the concepts of parallelism and multi core processors</i>	3	2	3	3	2	-	-	-	-	-	-	-	2	2
Average		3	2	3	3	2	-	-	-	-	-	-	-	2	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – III**20IT321****OBJECT ORIENTED PROGRAMMING LABORATORY**

L	T	P	C
0	0	3	1

Prerequisite: Programming for problem solving using C**Course Outcomes :** On successful completion of the course, the student will be able to

CO1 : Create the programs using principles of object oriented language

CO2: Apply the concept of static , friend and inline function to solve problem

CO3: Create code segments using polymorphism and inheritance

CO4: Develop programs using file, streams and template

CO5: Explain about exception handling mechanism

Cognitive Level

Create

Apply

Apply

Create

Understand

List of Experiments:

Implementation of the following concepts:

1. Class and Objects
2. static , friend and inline function
3. Constructors and destructors
4. Inheritance
5. function overloading and operator overloading
6. virtual functions
7. Pointers and Type conversion
8. Files and Streams
9. Templates
10. Exception Handling

Total = 45 Periods**CO-PO MAPPING**

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	Create the programs using principles of object oriented language	3	2	2	-	2	-	-	-	-	-	-	-	-	3	2
CO2	Apply the concept of static , friend and inline function to solve problem	3	2	2	-	2	-	-	-	-	-	-	-	-	3	2
CO3	Create code segments using polymorphism and inheritance	3	2	2	-	2	-	-	-	-	-	-	-	-	3	2
CO4	Develop programs using file, streams and template	3	2	2	-	2	-	-	-	-	-	-	-	-	3	2
CO5	Explore about exception handling mechanism	3	2	2	-	2	-	-	-	-	-	-	-	-	3	2
Average		3	2	2	-	2	-	3	2							

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – III

20IT322	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	3	1

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes: On Completion of this course the student will be able to

Cognitive Level

CO1: Make use of LINUX utilities, LINUX file system, file access control and perform basic shell control of the utilities

Apply

CO2: Construct process scheduling & synchronization algorithms, deadlock avoidance and detection Algorithms

Create

CO3: Compare the performance of various CPU Scheduling Algorithm

Evaluate

CO4: Analyze the performance of the various page replacement algorithms

Analyze

CO5: Create processes and implement IPC

Create

List of Experiments:

1. Write programs using the following system calls of LINUX operating system like fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
2. Write programs using the I/O system calls of LINUX operating system (open, read, write etc.)
3. Write C programs to simulate LINUX commands like ls, grep etc.
4. Recall Shell programming with some simple examples.
5. Implement the following CPU scheduling algorithms
 - a) Round Robin
 - b) SJF
 - c) FCFS
 - d) Priority
6. Implementation of File Allocation Strategies (like Sequential, Indexed, Linked)
7. Implementation of Producer and Consumer problem using Semaphores.
8. Implementation of Files Organization Techniques (like Single level directory, Two levels hierarchica(IDAG))
9. Implementation of Banker's algorithm for Dead Locks Avoidance.
10. Implementation of Dead Lock Detection methods.
11. Implementation of Page Replacement Algorithms (like FIFO, LRU and LFU).
12. Implementation of Shared Memory and IPC.
13. Implementation of Paging Technique in Memory Management.
14. Implementation of Threading and Synchronization Applications.

Total = 45 Periods

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: 20IT322

Regulations:

R 2020

Course Name:

OPERATING SYSTEMS LABORATORY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Make use of LINUX utilities, LINUX file system, file access control and perform basic shell control of the utilities	3	2	2	1	2	-	-	-	-	-	-	-	3	1
CO2	Construct process scheduling & synchronization algorithms, deadlock avoidance and detection Algorithms	3	2	2	2	2	-	-	-	-	-	-	-	3	1
CO3	Compare the performance of various CPU Scheduling Algorithm	3	2	2	1	2	-	-	-	-	-	-	-	3	1
CO4	Analyze the performance of the various page replacement algorithms	3	2	2	2	2	-	-	-	-	-	-	-	3	1
CO5	Create processes and implement IPC	3	2	2	1	2	-	-	-	-	-	-	-	3	1
Average		3	2	2	1	2	-	3	1						

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – III

20IT323

DATA STRUCTURES LABORATORY

L	T	P	C
0	0	3	1

Prerequisite: Programming for Problem solving Laboratory**Course Outcomes: On Completion of this course the student will be able to****Cognitive Level**

CO1 :Build elementary data structures such as list, stack, queue, linked list and tree

Apply

CO2:Identify the appropriate data structure for a given problem

Apply

CO3:Construct recursive programs using trees, Heaps and graphs in C

Create

CO4:Construct non-linear data structures for various real time applications in C

Create

CO5:Design programs for finding minimum spanning tree using Prim's and Kruskal's algorithms

Create

List of Experiments:

1. Array implementation of List, Stack and Queue ADTs.
2. Linked List implementation of List, Stack and Queue ADTs.
3. Evaluation of Expression.
4. Implementation of Array based Circular Queue.
5. Creation of Binary Trees and Implementation of its operation.
6. Implementation of Binary Tree and its Traversals:pre- order, in- order, post- order.
7. Implementation of Binary Search Trees.
8. Implementation of Priority Queues using Heaps.
9. Implementation of Searching and Sorting Algorithms.
10. Implementation of Hashing Techniques.
11. Implementation of Dijkstra's Algorithm.
12. Implementation of minimum spanning tree using Kruskal's Algorithm.
13. Implementation of minimum spanning tree using Prim's Algorithm.

Total = 45 Periods

CO-PO MAPPING

Course Code: 20IT323

Regulations:

R 2020

Course Name:

DATA STRUCTURES LABORATORY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Build elementary data structures such as list, stack, queue, linked list and tree	3	2	2	1	-	-	-	-	2	-	1	2	3	2
CO2	Identify the appropriate data structure for a given problem	3	2	2	1	-	-	-	-	2	-	1	2	3	2
CO3	Construct recursive programs using trees, Heaps and graphs in C	3	2	3	1	-	-	-	-	2	-	1	2	3	2
CO4	Construct non-linear data structures for various real time applications in C	3	3	2	1	-	-	-	-	2	-	1	2	3	2
CO5	Design programs for finding minimum spanning tree using Prim's and Kruskal's algorithms	3	2	2	1	-	-	-	-	2	-	1	2	3	2
Average		3	2	2	1	-	-	-	-	2	-	1	2	3	2

SEMESTER - III

	L	T	P	C
20HR351	0	2	0	0

CAREER DEVELOPMENT SKILLS I

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes : On successful completion of the course, the student will be able to

- CO1: Have competent knowledge on grammar with an understanding of its basic rules.
 CO2: Communicate effectively and enhance interpersonal skills with renewed self – confidence
 CO3: Construct sentence in English and make correction
 CO4: Perform oral communication in any formal situation
 CO5: Develop their LSRW skills

Cognitive Level

Understand

Apply

Apply

Create

Understand

UNIT - I EFFECTIVE ENGLISH – SPOKEN ENGLISH [6]

Basic Rules of Grammar - Parts of Speech - Tenses - Verbs - Sentences construction - Vocabulary - idioms & phrases - Synonyms - Antonyms - Dialogues and conversation - Exercise(Speaking).

UNIT - II ESSENTIAL COMMUNICATION [6]

Verbal communication - Effective communication - Active Listening - Paraphrasing - Feedback, Non Verbal Communication - Body language of self and Others, Important of feelings in communication - Dealing with feelings in communication practice - Exercise.

UNIT - III WRITTEN COMMUNICATION – PART 1 [6]

Usage of noun, pronoun, adjective (Comparative Forms), Verb, Adjectives, Adverb, Tenses, Articles and Preposition - Change of Voice - Change of Speech - One word Substitution - Using the same word as different parts of speech - Odd Man Out - Spelling & Punctuation (Editing).

UNIT - IV WRITTEN COMMUNICATION – PART – 2 [6]

Analogies - Sentences Formation - Sentence Completion - Sentence Correction - idioms & Phrases - Jumbled Sentences, Letter Drafting (Formal Letters) - Reading Comprehension (Level 1) - Contextual Usage - Foreign Languages Words used in English - Exercise.

UNIT - V ORAL COMMUNICATION – PART – 1 [6]

Self-introduction - Situational Dialogues / Role Play (Telephonic Skills) - Oral Presentations - Prepared -‘Just A Minute’ Sessions (JAM) - Presentation Skills - Exercise.

Total = 30 Periods

Text Books :

- 1 Anne Laws, Writing Skills, Orient Black Swan., Hyderabad, 2011.
- 2 Sarah Freeman, Written Communication in English, Orient Black Swan, Hyderabad, First Edition, 2015

Reference Books :

- 1 Raj N Bakshmi, English Grammar Practice, Orient Black Swan, Hyderabad, First Edition, 2009.
- 2 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition, 2005.
- 3 Thakur K B Sinha, Enrich Your English, Vijay Nicole, Chennai, First Edition, 2005.
- 4 Norman Lewis. W.R., “Word Power Made Easy”, Goyal Publications

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CO-PO MAPPING

Course Code: **20HR351**

Regulations:

R 2020

Course Name:

CAREER DEVELOPMENT SKILLS I

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Have competent knowledge on grammar with an understanding of its basic rules.</i>	-	-	-	-	1	-	-	-	3	3	-	3	-	-
CO2	<i>Communicate effectively and enhance interpersonal skills with renewed self – confidence</i>	-	-	-	-	1	-	-	-	3	3	-	3	-	-
CO3	<i>Construct sentence in English and make correction</i>	-	-	-	-	1	-	-	-	3	3	-	3	-	-
CO4	<i>Perform oral communication in any formal situation</i>	-	-	-	-	1	-	-	-	3	3	-	3	-	-
CO5	<i>Develop their LSRW skills</i>	-	-	-	-	1	-	-	-	3	3	-	3	-	-
Average		-	-	-	-	1	-	-	-	3	3	-	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – IV

20MA441	PROBABILITY AND DECISION MODELS (Common To CS & IT)	L	T	P	C
		3	1	0	4

Prerequisite: No prerequisites are needed for enrolling into the course.

Course Outcomes :	On successful completion of the course , the student will be able to	Cognitive Level
CO1:	Explain the importance of one dimensional random variables discrete and continuous distribution.	Understand
CO2:	Develop their skills in joint, marginal and conditional distributions and knowing the concept of covariance correlation & regression	Apply
CO3:	Analyze the theory of stationary process, Markov Process and transition probabilities, and Poisson Process	Analyze
CO4:	Illustrate the basic concept of single server and multi-server queuing models	Understand
CO5:	Estimate Critical Path in PERT and CPM	Evaluate
UNIT – I	ONE DIMENSIONAL RANDOM VARIABLE	[12]
Discrete and Continuous Random Variable - Moments - Moment Generating Functions and their Properties- Standard Distributions: Binomial, Poisson, Exponential and Normal Distributions.		
UNIT – II	TWO DIMENSIONAL RANDOM VARIABLES	[12]
Joint Distributions - Marginal and Conditional Distributions - Covariance - Correlation and Regression analysis and their Properties.		
UNIT – III	RANDOM PROCESSES	[12]
Classification - Stationary Process - Markov Process - Markov Chain - Transition Probabilities - Limiting Distributions - Poisson Process and their Properties.		
UNIT – IV	QUEUEING MODELS	[12]
Markovian Queues - Little's formula - Single Server Models : (M/M/1):(∞/FIFO) and (M/M/1):(N/FIFO) - Multi Server Models : (M/M/C):(∞/FIFO) and (M/M/C):(N/FIFO).		
UNIT – V	NETWORK MODELS	[12]
Network Construction - Critical Path Method (CPM) - Computations of total, free and independent floats -PERT Analysis- Computation of expected time and standard deviation.		
Total (L: 45 T:15) =60 Periods		

Text Books :

- 1 P.Kandasamy, K.Thilagavathi and K.Gunavathi, Probability and Queueing Theory, S. Chand Publishers, New Delhi , Third Edition , 2016.
- 2 Hamdy. A.Taha, Operations Research, Pearson Education, New Delhi, Tenth Edition, 2015.

Reference Books :

- 1 Oliver C. Ibe, Fundamentals of Applied Probability and Random Processes, Elsevier, Third Indian Reprint, 2016.
- 2 M.B.K.Moorthy, K.Subramani and A. Santha, Probability and Queueing Theory, Scitech Publishers, Chennai, Fifth Edition, 2015.
- 3 Veerarajan. T., Probability, Statistics and Random Processes, Tata McGraw-Hill, New Delhi, Tenth Edition, 2015,
- 4 https://www.youtube.com/watch?v=J70dP_AECzQ

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20MA441**

Regulations:

R 2020

Course Name:

PROBABILITY AND DECISION MODELS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	<i>Explain the importance of one dimensional random variables discrete and continuous distribution.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO 2	<i>Develop their skills in joint, marginal and conditional distributions and knowing the concept of covariance correlation & regression.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO 3	<i>Analyze the theory of stationary process, Markov Process and transition probabilities, and Poisson Process.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO 4	<i>Illustrate the basic concept of single server and multi-server queuing models.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO 5	<i>Estimate Critical Path in PERT and CPM.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
Average		3	3	3	3	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - IV

20IT411	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

Prerequisite:

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

CO1: Demonstrate the need, background, architecture and evolution of database management system and to introduce the concepts of ER model	Apply
CO2: Design and develop relational models with an emphasis on how to organize, maintain, retrieve and secure information efficiently and effectively from a RDBMS	Create
CO3: Design and evaluate the normality of a logical data model, and correct any anomalies and identify the requirements of data storage and indexing techniques	Apply
CO4: Implement query processing methodologies using various operators	Apply
CO5: Design and develop methods for multiple transactions are managed concurrently and recovered efficiently during failures	Apply

UNIT - I INTRODUCTION [9]

Database and Database Users: Characteristics of database approach - Advantages of using the DBMS Approach - Database Applications. Database system concepts and architecture: Data models - Schemas - Instance -Three schema architecture and data independence - DBMS languages and interfaces -Database system EnvironmentER model

UNIT - II RELATIONAL MODEL [9]

Relational data model - Relational constraints: Relational model concepts - Relational constraints and Relational data base schema -Update operations -Basic Relational algebra operations -Additional relational operations. SQL: Data definition and Data type -Specifying SQL constraints - Basic queries- Insert - Delete -Updatecomplex queries - views -Assertions and triggers - Dynamic SQL. Database security and Authorization: Security issues -Grant/revoke privileges - SQL injections

UNIT - III RELATIONAL DATABASE DESIGN [9]

Functional dependencies and normalization: Functional dependencies - Normal forms: 1NF- 2NF- 3NF- Boyce Codd NF -Decomposition - Multivalued dependencies and 4NF-join dependencies and 5NF

UNIT - IV DATA STORAGE AND QUERY PROCESSING [9]

Disk Storage - Basic File Structures and Hashing: Secondary Storage Device - RAID - Operations on Files - Heap Files - Sorted Files - Hashing Techniques. Indexing Structures for Files: Types of Single - Level Ordered Indexes -Multilevel Indexes - Dynamic Multilevel Indexes Using B-Trees and B+Trees. Query Processing: Translating SQL Queries into Relational Algebra - Algorithms for External Sorting - Algorithms for SELECT and JOIN Operations-Algorithms for PROJECT and Set Operations

UNIT - V TRANSACTION MANAGEMENT [9]

Transaction Processing: Introduction - Transaction and System Concepts -Desirable Properties of Transactions - Schedules based on Recoverability - Schedules based on Serializability. Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control- Timestamp Ordering. Database Recovery Techniques: Recovery Concepts - Deferred Update - Immediate Update - Shadow Paging - ARIES recovery algorithm

Total = 45 Periods

Text Books :

- 1 Abraham Silberschatz, Henry F. Korth and S. Sudharshan, Database System Concepts, Tata McGraw Hill, 7th Edition, 2019.
- 2 Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education, 7th Edition, 2016.

Reference Books :

- 1 S.K.Singh, Database Systems Concepts, Design and Applications, Pearson Education, 2nd Edition, 2011.
- 2 C.J.Date, A.Kannan and S.Swamynathan, An Introduction to Database Systems, Pearson Education, 8th Edition, 2006.
- 3 Raghu Ramakrishnan, Database Management Systems, Tata McGraw Hill, 4th Edition, 2010.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT411**

Regulations:

R 2020

Course Name:

DATABASE MANAGEMENT SYSTEMS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Demonstrate the need, background, architecture and evolution of database management system and to introduce the concepts of ER model</i>	3	3	3	3	2	-	-	-	2	-	-	2	3	3
CO2	<i>Design and develop relational models with an emphasis on how to organize, maintain, retrieve and secure information efficiently and effectively from a RDBMS</i>	3	3	3	3	2	-	-	-	2	-	-	2	3	3
CO3	<i>Design and evaluate the normality of a logical data model, and correct any anomalies and identify the requirements of data storage and indexing techniques</i>	3	3	3	3	2	-	-	-	2	-	-	2	3	3
CO4	<i>Implement query processing methodologies using various operators</i>	3	3	3	3	2	-	-	-	2	-	-	2	3	3
CO5	<i>Design and develop methods for multiple transactions are managed concurrently and recovered efficiently during failures</i>	3	3	3	3	2	-	-	-	2	-	-	2	3	3
Average		3	3	3	3	2	-	-	-	2	-	-	2	3	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

CO-PO MAPPING

Course Code: 20IT412

Regulations:

R 2020

Course Name:

JAVA PROGRAMMING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	Apply java programming fundamentals to solve real world problem	3	3	3	3	3	-	-	-	-	3	-	3	3	3
CO2	Explain the concept of overloading and inheritances	3	3	3	3	3	-	-	-	-	3	-	3	3	3
CO3	Illustrate important features of java like string Manipulations and Exception Handling	3	3	3	3	3	-	-	-	-	3	-	3	3	3
CO4	Demonstrate the features of multithreaded programming and I/O operations	3	3	3	3	3	-	-	-	-	3	-	3	3	3
CO5	Develop application using the concepts of Collections and JDBC connectivity	3	3	3	3	3	-	-	-	-	3	-	3	3	3
Average		3	3	3	3	3	-	-	-	-	3	-	3	3	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - IV

20IT413	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	0	0	3

Prerequisite: Data Structures, programming for Problem Solving in C

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

CO1: Analyze the algorithms that are used to solve various problems.

Analyze

CO2: Generate and solve the recurrences for divide and conquer techniques.

Analyze

CO3: Solve the problems using greedy and dynamic programming paradigms.

Apply

CO4: Design the algorithms for solving the backtracking and transform and conquer methodologies.

Apply

CO5: Apply the branch and bound technique to solve various problems.

Apply

UNIT - I FUNDAMENTALS OF ALGORITHM ANALYSIS [9]

Introduction - Analysis framework - Time space tradeoff - Asymptotic notations - Conditional asymptotic notation - Properties of Big-Oh notation - Recurrence equations - Mathematical Analysis of Non-recursive algorithms - Mathematical analysis of recursive Algorithms - Analysis of linear search -Empirical analysis - Algorithm visualization

UNIT - II BRUTE FORCE AND DIVIDE AND CONQUER STRATEGIES [9]

Brute Force: Selection Sort - Bubble Sort - String matching - Exhaustive Search: Travelling Salesman problem - Divide and Conquer: General Method - Binary Search - Closest-pair problem - Merge Sort- Quick Sort.

UNIT - III GREEDY AND DYNAMIC PROGRAMMING PARADIGMS [9]

Greedy Algorithms: Prim's algorithm- Kruskal's algorithm - Dijkstra's algorithm - Huffman code - Knapsack problem - Dynamic Programming: Warshall's and Floyd's algorithm - Optimal binary search trees

UNIT - IV BACKTRACKING AND TRANSFORM AND CONQUER METHODOLOGIES [9]

Backtracking: General Method - N-Queen's problem - Sum of subsets - Graph coloring - Hamiltonian problem. Transform and conquer : Presorting - Gaussian elimination

UNIT - V GRAPH AND BRANCH AND BOUND STRATEGIES [9]

Graph : Connected Components - Bi-connected components - Branch and Bound: General Method (FIFO and LC) - Job assignment problem - 0/1 Knapsack problem - Traveling Salesman Problem - Introduction to NP-Hard and NP-Completeness

Total = 45 Periods

Text Books :

- 1 AnanyLevitin, Introduction to the Design and Analysis of Algorithms, Pearson education, 3rd Edition, 2017.
- 2 A.V.Aho, J.E. Hopcroft and J.D.Ullman, The Design and Analysis of Computer Algorithms, Pearson Education Asia, 2010.

Reference Books :

- 1 Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, Introduction to Algorithms, Prentice Hall of India, 2nd Edition, 2007.
- 2 Sara Baase and Allen Van Gelder, Computer Algorithms - Introduction to Design and Analysis, Pearson Education, 3rd Edition, 2010.
- 3 Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, Fundamentals of Computer Algorithms, Universities Press, 2nd Edition, 2008.
- 4 Robert Sedgewick, Philippe Flajolet, An Introduction to the Analysis of Algorithms, Addison-Wesley, Second Edition, 2013.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT413**

Regulations:

R 2020

Course Name:

**DESIGN AND ANALYSIS OF
ALGORITHMS**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	Analyze the algorithms that are used to solve various problems.	3	3	2	2	-	-	-	-	-	-	-	-	3	3
2	Generate and solve the recurrences for divide and conquer techniques.	3	3	2	2	-	-	-	-	-	-	-	-	3	3
3	Solve the problems using greedy and dynamic programming paradigms.	3	3	1	1	-	-	-	-	-	-	-	-	3	2
4	Design the algorithms for solving the backtracking and transform and conquer methodologies.	3	3	2	1	-	-	-	-	-	-	-	-	3	2
5	Apply the branch and bound technique to solve various problems.	3	3	1	1	-	-	-	-	-	-	-	-	3	2
Average		3	3	2	1	1	-	3	2						

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - IV

20IT414	SOFTWARE ENGINEERING PRINCIPLES AND PRACTICES	L	T	P	C
		3	0	0	3

Prerequisite:

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

CO1: Apply the principles of software engineering to real time application with practicing models

Analyze

CO2: Plan the requirement specification and design and implement the software systems.

Create

CO3: Design the processes and quality architecture to the specific needs

Apply

CO4: Discuss various software testing strategies

Understand

CO5: Create the software project with quality product

Create

UNIT – I THE SOFTWARE PROCESS [9]

Software Engineering: Generic View of Process - Software Engineering Practice - Software Process Model: Prescriptive Models- Waterfall Models- Increment- Evolutionary and Specialized model- Comparison Study of Software Process Models - Agile Process and Models

UNIT – II REQUIREMENTS ANALYSIS AND SPECIFICATION [9]

Requirements Analysis: Requirements Engineering Tasks - Initialization of the Requirement Engineering Process - Eliciting Requirements - Building the Analysis Model - Validating Requirements - Building the Analysis Model - Requirements Analysis - Model Approaches - Data Modeling Concepts - Scenario Based - Flow Oriented Modeling - Class Based Modeling - Behavioral Modeling- Case Study: Software Requirements Specification (SRS) for Application Project.

UNIT – III DESIGN CONCEPTS AND ARCHITECTURAL DESIGN [9]

Design Engineering: Design within the Context of Software Engineering - Design concepts - Design model-. Architectural design: Software Architecture - Architectural Styles - Architectural Design - Mapping Design Flow into Software Architecture- Introduction to Modeling with UML Language and Design Based on Case Study of SRS.

UNIT – IV SOFTWARE TESTING STRATEGIES AND STACTICS [9]

Testing strategies: Strategic Approach to Software Testing - Strategic Issues - Testing Strategies for Conventional Software-Object Oriented Software - Validating Testing - System Testing - Art of Debugging. Testing Tactics: Software Testing Fundamentals - White Box Testing - Basis Path Testing - Control Structure Testing - Black Box Testing - Testing for Specialized Environments-Architectures and Applications - Patterns for Software Testing-Case Study of Software Testing Tools.

UNIT –V MANAGING SOFTWARE PROJECT [9]

Project Management - Spectrum- People- Product and Process- Empirical Estimation Models-Scheduling: Timeline Chart and Tracking the Schedule- Risk management: Risk Identification- Projection and RMMM Plan- SCM Process- SQA Activities and Formal Technical Reviews- ISO 9000 Quality Standards- Emerging Trends in Software Engineering.

Total = 45 Periods

Text Books :

- 1 Roger S. Pressman, Software Engineering: A Practitioner Approach, McGraw-Hill ,Seventh Edition,2010
- 2 Ian Sommerville, Software Engineering, Sixth Edition, Pearson Education, New Delhi, 2011

Reference Books :

- 1 Jalote P , An Integrated Approach to Software Engineering, Third Edition, Narosa Publishers, New Delhi, 2015
- 2 David Gustafson, Software Engineering, Schaum's Outlines, Tata McGraw-Hill, New Delhi, Third Edition, 2004.
- 3 Shari Lawrence Pfleeger, Joanne M.Atlee, Software Engineering Theory and Practice, Pearson Education, New Delhi, Fourth Edition, 2009.
- 4 Richard Schmidt,Software Engineering: Architecture-driven Software Development, Elsevier Science,Netherlands,Fourth Edition, 2013.

CO-PO MAPPING

Course Code: 20IT414

Regulations:

R 2020

Course Name:

SOFTWARE ENGINEERING PRINCIPLES
AND PRACTICES

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	Apply the principles of software engineering to real time application with practicing models	3	3	2	2	1	-	-	-	-	-	-	-	3	3
2	Plan the requirement specification and design and implement the software systems	3	3	2	2	1	-	-	-	-	-	-	-	3	3
3	Design the processes and quality architecture to the specific needs	3	3	1	1	-	-	-	-	-	-	-	-	3	2
4	Discuss various software testing strategies	3	3	2	1	-	-	-	-	-	-	-	-	3	2
5	Create the software project with quality product	3	3	1	1	-	-	-	-	-	-	-	-	3	2
Average		3	3	2	1	-	3	2							

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - IV

20HS051	UNIVERSAL HUMAN VALUES AND UNDERSTANDING HARMONY (Common To All Branches)	L 3	T 0	P 0	C 3
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Prerequisite:

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

CO1: Explain the basic concepts of value education.	Understanding
CO2: Distinguish between the self and the body, implement the meaning of harmony in the Co-existence of Self and the Body.	Understanding
CO3: Explain the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships.	Understanding
CO4: Describe the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.	Understanding
CO5: Explain the ethical and unethical practices in work environment.	Understanding

UNIT - I INTRODUCTION TO VALUE EDUCATION [09]

Need and Basic Guidelines of Value Education - Content and Process of Value Education - Self Exploration - purpose of self-Exploration - Content and Process of Self exploration - Natural Acceptance - Realization and Understanding - Basic Human Aspirations - Continuous Happiness and Prosperity - Exploring Happiness and Prosperity - Basic Requirement for Fulfillment of Human Aspirations - Relationships - Physical Facilities - Right Understanding.

UNIT - II HARMONY IN THE HUMAN BEING [09]

Human Begin and Body - Understanding Myself as Co-existence of Self ('I') and Body, Needs of the Self and Body, Activities in the Self and Body, Self ('I') as the Conscious Entity, the Body as the Material Entity - Exercise - Body as an Instrument- Harmony in the Self ('I') - Understanding Myself - Harmony with Body.

UNIT - III HARMONY IN THE FAMILY AND SOCIETY [09]

Harmony in the Family - Justice - Feelings (Values) in Human Relationships - Relationship from Family to Society - Identification of Human Goal - Five dimensions of Human Endeavour.

UNIT - IV HARMONY IN NATURE AND EXISTENCE [09]

Order of Nature - Interconnectedness - Understanding the Four order - Innateness - Natural Characteristic - Basic Activity - Conformance - Introduction to Space - Co-existence of units of Space - Limited and unlimited - Active and No-activity - Existence is Co-existence.

UNIT - V PROFESSIONAL ETHICS [09]

Values in different dimensions of Human Living - Definitiveness of Ethical Human Conduct -Implications of Value based Living - Identification of Comprehensive Human Goal - Humanistic Education - Universal Human Order - Competence and Issues in Professional Ethics.

Total (L= 45, T = 0) = 45 Periods

Text Books :

- 1 Gaur R.R., Sangal, R., Bagaria, G.P., A Foundation Course in Human Values and Professional Ethics, Excell Books Pvt. Ltd., New Delhi, First Edition, 2016.
- 2 Tripaty, A.N., Human Values, New Age International Publishers, 2003.

Reference Books :

- 1 Ivan Illich, Energy & Equity, The Trinity Press, USA, 1974.
- 2 Schumacher E.F., Small is Beautiful: a study of economics as if people mattered, Britain, 1973.
- 3 Seebauer, E.G., Robert L. Berry, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press, 2000.
- 4 Banerjee, B.P., Foundations of Ethics and Management, Excel Book, 2005.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20HS051**

Regulations:

R 2020

Course Name:

**UNIVERSAL HUMAN VALUES AND
 UNDERSTANDING HARMONY**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Explain the basic concepts of value education.</i>	-	-	-	-	-	1	1	3	3	-	1	3	-	-
CO2	<i>Distinguish between the self and the body, implement the meaning of Harmony in the Co– existence of Self and the Body.</i>	-	-	-	-	-	1	1	3	3	-	1	3	-	-
CO3	<i>Explain the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human–human relationships.</i>	-	-	-	-	-	1	1	3	3	-	1	3	-	-
CO4	<i>Describe the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.</i>	-	-	-	-	-	1	1	3	3	-	1	3	-	-
CO5	<i>Explain the ethical and unethical practices in work environment.</i>	-	-	-	-	-	1	1	3	3	-	1	3	-	-
Round off Average		-	-	-	-	-	1	1	3	3	-	1	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – IV

20IT421	DATABASE SYSTEMS LABORATORY	L	T	P	C
		0	0	3	1

Prerequisite: No prerequisite needed for enrolling into the course

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

O1 :Design schema for the given database by creating appropriate tables

Create

CO2::Create SQL queries using DDL and DML statements to retrieve information out of it

Create

CO3::Create views and triggers that automatically indicate the updating of data in the tables

Create

CO4::Construct Import and export of data

Apply

CO5::Apply the concept of databases to the real time application development

Apply

List of Experiments:

1. Create a relational database system using DDL commands with constraints
2. Update the database system using DML commands
3. Query the database using simple and complex queries
4. Create and update views
5. High level programming language extensions (Control structures, Procedures and Functions)
6. Working with triggers
7. Use of front end tools to manipulate the database
8. Menu Design
9. Generate reports using a reporting tool
10. Mini Project (Application Development using Oracle/ SQL SERVER / MYSQL)

Sample Applications:

- Inventory Control System
- Hospital Management System
- Railway Reservation System
- Web Based User Identification System
- Hotel Management System
- Student Information System
- Library Information System and etc.,

Total = 45 Periods

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: 20IT421

Regulations:

R 2020

Course Name:

DATABASE SYSTEMS LABORATORY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Design schema for the given database by creating appropriate tables	3	2	1	1	-	-	-	-	-	-	-	-	3	2
CO2	Create SQL queries using DDL and DML statements to retrieve information out of it	3	2	1	1	-	-	-	-	-	-	-	-	3	2
CO3	Create views and triggers that automatically indicate the updating of data in the tables	3	2	1	1	-	-	-	-	-	-	-	-	3	2
CO4	Construct Import and export of data	3	2	1	1	-	-	-	-	-	-	-	-	3	2
CO5	Apply the concept of databases to the real time application development	3	2	1	1	-	-	-	-	-	-	-	-	3	2
Average		3	2	1	1	-	3	2							

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER –IV

20IT422

JAVA PROGRAMMING LABORATORY

L	T	P	C
0	0	3	1

Prerequisite: Basic knowledge of Object Oriented Concepts**Course Outcomes :** On successful completion of the course, the student will be able to

- CO1: Analyze and apply the features of java to find optimal solution for the real world problem
 CO2: Develop the concept of constructors, inheritance and overloading
 CO3: Interpret the concept of arrays and string manipulation functions
 CO4: Demonstrate the features of exception handling and threads
 CO5: Construct the concept of database connectivity

Cognitive Level

- Analyze
 Create
 Understand
 Understand
 Apply

List of Experiments:

- Write a program to read n elements in array, remove duplications and Display them in sorted order.
- Write a program for college management system to illustrate the concept of constructor overloading and method overloading.
- Write a program to illustrate hierarchical inheritance and interface for student information system.
- Write a program for employee management system using packages and import statements.
- Write a program to perform calculator operations using exception handling.
- Write a program for the illustration of string and string builder manipulation functions.
- Write a program for threads (extending Thread class and implementing Runnable interface).
- Write a program to implement student details using database connectivity.
- Write a java program to implement the concept of collections.
- Write a java program to illustrate the various I/O and file operations.

Total = 45 Periods

CO-PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Analyze and apply the features of java to find optimal solution for the real world problem	3	3	3	3	3	-	-	-	-	3	-	3	3	3
CO2	Develop the concept of constructors, inheritance and overloading	3	3	3	3	3	-	-	-	-	3	-	3	3	3
CO3	Interpret the concept of arrays and string manipulation functions	3	3	3	3	3	-	-	-	-	3	-	3	3	3
CO4	Demonstrate the features of exception handling and threads	3	3	3	3	3	-	-	-	-	3	-	3	3	3
CO5	Construct the concept of database connectivity	3	3	3	3	3	-	-	-	-	3	-	3	3	3
Average		3	3	3	3	3	-	-	-	-	3	-	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER -IV

20IT423	DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY	L	T	P	C
		0	0	3	1

Prerequisite: Programming for problem solving using C

Course Outcomes : On successful completion of the course, the student will be able to

CO1: Discuss about various sorting algorithms

CO2: Analyze various searching algorithms

CO3: Develop spanning tree algorithm

CO4: Construct shortest path algorithms

CO5: Construct Travelling salesman problem

Cognitive Level

Create

Analyze

Apply

Create

Apply

List of Experiments:

1. Implementation of Merge Sort Algorithm.
2. Implementation of Quick Sort Algorithm.
3. Implementation of Selection Sort Algorithm.
4. Implementation of Heap Sort Algorithm.
5. Implementation of Binary Search Algorithm.
6. Implementation of Minimum Spanning Tree Algorithm.
7. Implementation of Knapsack Algorithm.
8. Implementation of All Pair Shortest Path Algorithm.
9. Implementation of Eight Queens Problem.
10. Implementation of Travelling Salesman Problem

Total = 45 Periods

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT423**

Regulations:

R 2020

Course Name:

**DESIGN AND ANALYSIS OF
ALGORITHMS LABORATORY**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Discuss about various sorting algorithms	3	2	2	1	-	-	-	-	2	-	1	2	3	2
CO2	Analyze various searching algorithms	3	2	2	1	-	-	-	-	2	-	1	2	3	2
CO3	Develop spanning tree algorithm	3	2	2	1	-	-	-	-	2	-	1	2	3	2
CO4	Implement shortest path algorithms	3	2	2	1	-	-	-	-	2	-	1	2	3	2
CO5	Implement Travelling salesman problem	3	2	2	1	-	-	-	-	2	-	1	2	3	2
Average		3	2	2	1	-	-	-	-	2	-	1	2	3	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20HR462**

Regulations:

R 2020

Course Name:

CAREER DEVELOPMENT SKILLS II

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	<i>Speak and write appropriately by understanding verbal and logical reasoning</i>	-	-	-	-	-	-	-	-	-	2	3	-	3	2	2
CO2	<i>Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions</i>	-	-	-	-	-	-	-	-	-	2	3	-	3	2	2
CO3	<i>Enhance their skills on quantitative aptitude</i>	-	-	-	-	-	-	-	-	-	2	3	-	3	2	2
CO4	<i>Speak and write appropriately by understanding and applying the basic grammatical rules</i>	-	-	-	-	-	-	-	-	-	2	3	-	3	2	2
CO5	<i>Critically evaluate problems related to quantitative aptitude</i>	-	-	-	-	-	-	-	-	-	2	3	-	3	2	2
Average		-	-	-	-	-	-	-	-	-	2	3	-	3	2	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

SEMESTER – V

20EC532

MICROCONTROLLER AND EMBEDDED SYSTEMS

L	T	P	C
3	0	0	3

Prerequisite: No prerequisites needed for enrolling into the course**Course Outcomes:** On Completion of this course, the student will be able to**Cognitive Level**

CO1: Interpret the concept about 8-bit embedded controller

Evaluate

CO2: Compare and contrast various Soft Computing Frameworks

Understand

CO3: Develop programs for embedded system at the basic level

Apply

CO4: Explain the various functions and services in Real Time Operating Systems

Understand

CO5: Discuss the real time applications using embedded system concepts

Create

UNIT – I 8 BIT EMBEDDED CONTROLLER**[9]**

8051 Microcontroller - Introduction - Architecture - Instruction set - I/O ports and circuits - External memory interfacing - counters and timers - Interrupts.

UNIT – II INTRODUCTION TO EMBEDDED SYSTEMS**[9]**

Embedded system: Introduction - Categories - Recent trends - Overview of architecture: Hardware architecture- Software architecture - Application software - Communication Software – Major application areas - Design life cycle.

UNIT – III EMBEDDED PROGRAMMING**[9]**

Software programming in assembly and high level language - Program elements: Macros and functions- Data types- Data structures-, modifiers- statements-loops and pointers - Object oriented programming - Embedded programming in C++- Program models - DFG models -Modeling of multiprocessor systems -UML modeling.

UNIT – IV REAL TIME OPERATING SYSTEMS**[9]**

Multiple tasks and processes - Semaphore and its functions - Interprocess communication -Message queue functions - Mailbox functions - Pipe functions-Socket functions - OS services - Process management -Timer functions - Event functions – Memory management.

UNIT – V EMBEDDED SOFTWARE DEVELOPMENT**[9]**

Embedded software development processes and tools - Debuggers and Emulators - Introduction and features of MUCOS II-VxWorks - Design issues in embedded system development - Case studies: Automatic chocolate vending machine - Adaptive cruise control.

Total = 45 Periods**Text Books :**

- 1 Raj Kamal, Embedded Systems Architecture, Programming and Design, McGraw-Hill Education, New Delhi, Second Edition, 2011.
- 2 Prasad K.V.K.K, Embedded Real-Time Systems: Concepts, Design & Programming, Dream Tech Press, New Delhi, First Edition, 2015.

Reference Books :

- 1 David E. Simon, An Embedded Software Primer, Addison-Wesley Professional, United States, First Edition, 2007.
- 2 Daniel .W Lewis, Fundamentals of Embedded Software, Prentice Hall India Learning, New Delhi, 2003.
- 3 Jean J. Labrosse, MicroC/OS - II The Real Time Kernel, CRC Press Publisher, United States, Second Edition, 2002.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215

DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: 20EC532

Regulations:

R 2020

Course Name:

MICROCONTROLLER AND EMBEDDED
SYSTEMS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
1	<i>Interpret the concept about 8-bit embedded controller</i>	2	2	1	2	-	-	-	-	-	-	-	-	3	2
2	<i>Compare and contrast various Soft Computing Frameworks</i>	2	2	1	2	-	-	-	-	-	-	-	-	3	2
3	<i>Develop programs for embedded system at the basic level</i>	3	3	3	3	-	-	-	-	-	-	-	2	3	2
4	<i>Explain the various functions and services in Real Time Operating Systems</i>	3	3	3	3	-	-	-	-	-	-	-	2	3	2
5	<i>Discuss the real time applications using embedded system concepts.</i>	3	3	3	3	-	-	-	-	-	-	-	2	3	2
Average		2.6	2.6	2.2	2.6	-	-	-	-	-	-	-	2	3	2

SEMESTER - V

20IT511	DATA ANALYTICS	L	T	P	C
		3	0	0	3

Prerequisite:

Course Outcomes: On successful completion of the course, the student will be able

Cognitive Level

CO1: Demonstrate proficiency with AI and ML for Data Analytics

Apply

CO2: Describe the concepts and technologies of Big Data Analytics

Remember

CO3: Summarize the techniques used in Big Graph Analytics

Understand

CO4: Know the Concept of Dark Data Application and Solution

Remember

CO5: Summarize the Frameworks and Visualization Techniques

Understand

UNIT - I DATA ANALYTICS CONCEPT [09]

Machine Learning - AI - ML and Statistics - Types of ML: Supervised - Unsupervised - Semi supervised - Reinforcement - Regression: Linear Regression - Logistic Regression - Problems Regression - Hyper-Parameter.

UNIT - II BIG DATA ANALYTICS [09]

Big Data Analytics : Characteristics - Types - Application - Challenges : Data Management - Data Analysis - Visualization of Data - Big Data Processing - Tools and Technologies: Tools - Resource Management - Data Processing

UNIT - III BIG GRAPH ANALYTICS [09]

Approaches - Graph Analytic Techniques: Centrality Analysis - Path Analysis - Community Analysis - Connectivity Analysis - Algorithms: Page Rank - Connected Component - Clustering - Graph Search - Issues - Applications..

UNIT - IV DARK DATA FOR ANALYTICS [09]

Dark Data - Risks - Dark Data Analytics: Implication - Gaining Market Advantage - Social Media Insights - Personalization - Solution - Ability - Managing Dark Data.

UNIT - V DATA ANALYTICS APPLICATIONS [09]

Big Data - Road Map - Big Data Technologies - Architecture Framework - Learning Experience Cycle - Benefits of Big Data - Enabling Personalized Learning - Proper Decision-Making - Measure Return on Investment - Performance of Predictions.

Total (L= 45, T = 0) = 45 Periods

Text Books :

- 1 Mohiuddin Ahmed , Al-Sakib Khan Pathan , Data Analytics - Concepts , Techniques and Applications, CRC Press, United States, First Edition , 2020
- 2 Jay Liebowitz, Data Analytics and AI, CRC Press , United States , First Edition , 2020

Reference Books :

- 1 Adedeji Badiru, Data Analytics Handbook of Formulas and Techniques, CRC Press, New York , First Edition , 2020.
- 2 Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Data sets, Cambridge University Press , UK, Third Edition , 2020
- 3 David J. Hand , Dark Data : Why What You Don't Know Matters, Princeton University Press, United States, First Edition, 2020

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: 20IT511

Regulations:

R 2020

Course Name:

DATA ANALYTICS

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
1	<i>Demonstrate proficiency with AI and ML for Data Analytics</i>	2	3	3	-	3	-	-	-	-	-	-	-	2	3	3
2	<i>Describe the concepts and technologies of Big Data Analytics</i>	2	3	3	-	3	-	-	-	-	-	-	-	2	3	3
3	<i>Summarize the techniques used in Big Graph Analytics</i>	2	3	3	-	3	-	-	-	-	-	-	-	2	3	3
4	<i>Know the Concept of Dark Data Application and Solution</i>	2	3	3	-	3	-	-	-	-	-	-	-	2	3	3
5	<i>Summarize the Frameworks and Visualization Techniques</i>	2	3	3	-	3	-	-	-	-	-	-	-	2	3	3
Average		2	3	3	-	3	-	2	3	3						

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – V

20IT512	THEORY OF COMPUTATION	L	T	P	C
		3	1	0	4

Prerequisite: Basic Concepts of Discrete Mathematics.

Course Outcomes: On Completion of this course , the student will be able to

Cognitive level

CO1:	Compare and analyze various finite automata and convert NFA to DFA.	<i>Evaluate</i>
CO2:	Construct finite automata to regular expression and identify the properties of regular language.	<i>Apply</i>
CO3:	Summarize the types of grammars and convert them into normal forms.	<i>Evaluate</i>
CO4:	Construct Pushdown Automata and convert pushdown automata to context-free grammar.	<i>Apply</i>
CO5:	Design Turing Machines for various problems and analyze the undecidability of languages.	<i>Create</i>

UNIT-I AUTOMATA THEORY [12]

Concepts of Finite Automata- Deterministic Finite Automata (DFA) - Non-Deterministic Finite Automata (NFA) - Equivalence of NFA and DFA - Finite Automata with Epsilon Transition - Applications of Finite Automata.

UNIT-II REGULAR EXPRESSIONS AND LANGUAGES [12]

Regular Expressions: Definitions - Equivalence of Regular Expression and Finite Automata -Arden's Theorem-Proving languages not to be regular - Closure Properties of Regular Language - Equivalence and Minimization of Automata (DFA).

UNIT - III CONTEXT-FREE GRAMMAR AND LANGUAGES [12]

Context Free Grammar (CFG): Definition - Derivations - Parse Trees - Ambiguity - Simplification of Grammars: Conversion to Normal Forms: ChomskyNormal Form (CNF) - GreibachNormal Form (GNF).Pumping Lemma for Context Free Language -Applications of Pumping Lemma - Closure Properties of CFL.

UNIT -IV PUSHDOWN AUTOMATA [12]

Pushdown Automata (PDA): Definition and representation - Instantaneous Description of Pushdown Automata - The Languages of Pushdown Automata - The Language acceptance by Final State and Empty Stack -Equivalence of PDA and CFG: Construction of PDA from CFG - Construction of CFG from PDA - Deterministic Pushdown Automata.

UNIT-V TURING MACHINE AND UNDECIDABILITY [12]

Basic Model -Instantaneous Description- Language acceptance by Turning Machine (TM)- Programming Techniques for TM-Variants of TM-A language that is not Recursively Enumerable-Undecidable problems about Turing machine - PostCorrespondence Problem.

Total (L: 45 T:15) =60 Periods

Text Books :

- 1 John E. Hopcroft, Rajeev Motwani and JeffreyD.Ullman, Introduction to Automata Theory, Languages and Computation, Pearson Education, New Delhi, Third Edition, 2014.
- 2 Michael Sipser, Introduction to the Theory of Computation, Thompson Course Technology, Cengage Learning India Pvt. Ltd., India, Third Edition, 2014.

References :

- 1 John C Martin, Introduction to Languages and Automata Theory, Tata McGraw-Hill, New Delhi, Third Edition, 2007.
- 2 K.L.P.Misra and N.Chandrasekharan, Theory of Computer Science, Automata, Languages and Computation, Prentice Hall, India, Third Edition, 2010.
- 3 Adesh K. Pandey, An Introduction to Automata Theory and Formal Languages, S.K.Kataria& Sons, New Delhi, First Edition, 2009.
- 4 https://www.youtube.com/watch?v=_9fuEO5khrl

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT512**

Regulations:

R 2020

Course Name:

THEORY OF COMPUTATION

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	Compare and analyze various finite automata and convert NFA to DFA.	3	3	3	-	-	-	-	-	-	-	-	-	3	1
CO2	Construct finite automata to regular expression and identify the properties of regular language.	3	3	3	-	-	-	-	-	-	-	-	-	3	1
CO3	Summarize the types of grammars and convert them into normal forms.	3	3	3	-	-	-	-	-	-	-	-	-	3	1
CO4	Construct Pushdown Automata and convert pushdown automata to context-free grammar.	3	3	3	-	-	-	-	-	-	-	-	-	2	1
CO5	Design Turing Machines for various problems and analyze the undecidability of languages.	3	3	3	-	-	-	-	-	-	-	-	-	3	1
Average		3	3	3	-	-	-	-	-	-	-	-	-	3	1

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - V**20IT513****COMPUTER NETWORKS**

L	T	P	C
3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course.**Course Outcomes: On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Identify the components required to build different types of networks

Apply

CO2: Explain error and flow control mechanisms

Evaluate

CO3: Choose the required functionality at each layer for given application

Create

CO4: Identify solution for each functionality of transport layer protocols

Apply

CO5: Discuss about different protocols used in application layer

Create

UNIT – I**INTRODUCTION****[9]**

Data Communications - Data Flow - Networks - The Internet - Protocols and Standards - Network Models: Layered Tasks - The OSI Model - TCP/IP Protocol Suite - Addressing - Transmission Media - Connecting LANs - Backbone Networks - and Virtual LANs: Connecting Devices.

UNIT - II**DATA LINK LAYER****[9]**

Introduction - Block Coding - Cyclic Codes - Checksum - Data Link Control: Framing - Flow and Error Control - Noiseless Channels - Noisy Channels - HDLC - Multiple Access: Random Access - Channelization - Wired LANs: IEEE Standards - Standard Ethernet - Wireless LANs: IEEE 802.11.

UNIT - III**NETWORK LAYER****[9]**

IPv4 Addresses - IPv6 Addresses - Internetworking - IPv4 - IPv6 - Transition from IPv4 to IPv6 - Network Layer: Delivery- Forwarding and Routing - Address Mapping - Internet Control Message Protocol (ICMP) - Internet Group Management Protocol (IGMP) - Unicast Routing Protocol - Multicast Routing Protocols.

UNIT - IV**TRANSPORT LAYER****[9]**

Process-to-Process Delivery - User Datagram Protocol (UDP) - Transmission Control Protocol (TCP) - Stream Control Transmission Protocol (SCTP) - Congestion Control and Quality of Service: Data Traffic - Congestion Control - Quality of Services (QoS) - Techniques to Improve QoS - Integrated Services - Differentiated Services.

UNIT - V**APPLICATION LAYER****[9]**

Domain Name System (DNS): Domain Name Space - Distribution of Name Space - DNS in the Internet - WWW and HTTP - Network Management: Simple Network Management Protocol (SNMP).

Total = 45 Periods**Text Books:**

- 1 Behrouz A. Forouzan, Data Communication and Networking, Fourth Edition, Tata McGraw Hill, 2016.
- 2 Larry L. Peterson, Bruce S. Davie, Computer Networks: A systems approach, Fifth Edition, Morgan Kaufmann Publishers, 2015

Reference Books:

- 1 James F. Kurose, Keith W. Ross, Computer Networking - A Top-Down Approach Featuring the Internet, Fifth Edition, Pearson Education, 2012
- 2 Andrew S. Tanenbaum, Computer Networks, Fourth Edition, Pearson Education, 2016
- 3 William Stallings, Data and Computer Communication, Tenth Edition, Pearson Education, 2013
- 4 Ying Dar Lin Ren, Hung Hwang Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2011

CO-PO MAPPING

Course Code: 20IT513

Regulations:

R 2020

Course Name:

COMPUTER NETWORKS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Identify the components required to build different types of networks	2	3	3	-	3	-	-	-	-	-	-	2	3	3
CO2	Explain error and flow control mechanisms	2	3	3	-	3	-	-	-	-	-	-	2	3	3
CO3	Choose the required functionality at each layer for given application	2	3	3	-	3	-	-	-	-	-	-	2	3	3
CO4	Identify solution for each functionality of transport layer protocols	2	3	3	-	3	-	-	-	-	-	-	2	3	3
CO5	Discuss about different protocols used in application layer	2	3	3	-	3	-	-	-	-	-	-	2	3	3
Average		2	3	3	-	3	-	-	-	-	-	-	2	3	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – V

20HS002	TOTAL QUALITY MANAGEMENT	L	T	P	C
	(Common to AU, CS, EE, IT , ME , SF)	3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course.

Course Outcomes: On completion of this course, the student will be able to

CO1: Explain the fundamental concepts of total quality management

CO2: Illustrate the Various TQM principles for continuous process improvement

CO3: Classify the statistical tools to control and improve the quality of the products and services.

CO4: Summarize the tools and techniques to improve the quality concept

CO5: Explain the quality system in manufacturing and service sectors

Cognitive Level

Understand

Understand

Analyze

Understand

Understand

UNIT - I INTRODUCTION**[9]**

Introduction - Need for quality - Evolution of quality -Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM - TQM implementation steps - Quality council-Importance of leadership and motivation in TQM - Contributions of Deming- Juran and Crosby - Barriers to TQM.

UNIT - II TQM PRINCIPLES**[9]**

Quality statements - Customer perception of quality - Customer complaints- Customer retention- Employee involvement- Empowerment- Team and Teamwork- Recognition and Reward - Continuous process improvement - Juran trilogy- PDSA cycle- 5s- 8D Methodology - Supplier partnership - Partnering- Supplier selection- Supplier Rating.

UNIT - III STATISTICAL PROCESS CONTROL**[9]**

The seven traditional tools of quality - Measurement of central tendency and dispersion-Population and sample- Normal curve- Control chart (X,R,p) for variable and attributes- Process capability - Seven new management tools - Six-sigma Concepts.

UNIT - IV TQM TOOLS**[9]**

Bench marking - Reason - Process - Quality circles concepts - FMEA - Stages-Types- Quality Function Deployment (QFD) - Taguchi quality loss function -TPM - Concepts -Improvement needs -Performance measures-criteria - Quality Cost.

UNIT - V QUALITY SYSTEMS**[9]**

Need for ISO 9000 - ISO 9001-2014 - ISO 14000- Quality System - Elements-Implementation- Documentation- Quality auditing - Concepts-Requirements and benefits-Non-conformance report - Case studies of TQM implementation in manufacturing and service sectors

Total = 45 Periods**Text Books :**

1. Dale H.Besterfield, et al., Total Quality Management, Pearson Education Asia, Indian Reprint, New Delhi, Third Edition, 2016
2. Janakiraman,B and Gopal, R.K, Total Quality Management - Text and Cases, Prentice Hall (India) Pvt. Ltd., New Delhi, Third Edition, 2015

Reference Books :

1. Suganthi,L and Anand Samuel, Total Quality Management, Prentice Hall (India)Pvt. Ltd.,, New Delhi, First Edition, 2014
2. James R. Evans and William M. Lindsay, The Management and Control of Quality, South-Western (Thomson Learning), New Delhi, NinetyEdition, 2015
3. Subburaj R, Total Quality Management, Tata McGraw Hill, New Delhi, First Edition, s2014
4. EugenceMckenna and Nic Beach, Total Quality Management, Pearson Education Limited, New Delhi, Second Edition, 2014

CO-PO MAPPINGCourse Code: **20HS002**

Regulations:

R 2020

Course Name:

TOTAL QUALITY MANAGEMENT

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Explain the fundamental concepts of total quality management</i>	-	-	-	-	-	1	1	3	3	-	1	3	-	-
CO2	<i>Illustrate the Various TQM principles for continuous process improvement</i>	-	-	-	-	-	1	1	3	3	-	1	3	-	-
CO3	<i>Classify the statistical tools to control and improve the quality of the products and services.</i>	-	-	-	-	-	1	1	3	3	-	1	3	-	-
CO4	<i>Summarize the tools and techniques to improve the quality concept</i>	-	-	-	-	-	1	1	3	3	-	1	3	-	-
CO5	<i>Explain the quality system in manufacturing and service sectors</i>	-	-	-	-	-	1	1	3	3	-	1	3	-	-
Round off Average		-	-	-	-	-	1	1	3	3	-	1	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – V**20IT521****DATA ANALYTICS LABORATORY**

L	T	P	C
0	0	3	1

Prerequisite: Basic concepts of Database Management Systems**Course Outcomes:**

CO1: Build the Various framework

CO2: Construct the Map Reduce programs for processing big data

CO3: Discover a familiarity with major algorithm design techniques

CO4: Compose the big data using linear models

CO5: Solve Simple to moderately difficult algorithmic problems arising in applications

Cognitive Level

Apply

Create

Analyze

Create

Apply

List of Experiments:

1. Install configure and run Hadoop and HDFS
2. Implement word count / frequency programs using Map Reduce.
3. Implement a MR program that processes a weather dataset.
4. Implement Linear and logistic Regression.
5. Install and run R programming then use programming statements (if statement- for loop and own function)
6. Implement SVM / Decision tree classification techniques.
7. Implement clustering techniques.
8. Visualize data using any plotting framework.
9. Implementation of Eight Queens Problem.
10. Implement an application that stores big data in HBase / MongoDB .

Total = 45 Periods**CO PO MAPPING**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Build the Various framework	3	3	3	1	3	-	-	-	-	-	-	-	3	1
CO2	Construct the Map Reduce programs for processing big data	3	3	3	1	3	-	-	-	-	-	-	-	3	1
CO3	Discover a familiarity with major algorithm design techniques	3	3	3	1	3	-	-	-	-	-	-	-	3	1
CO4	Compose the big data using linear models	3	3	3	1	3	-	-	-	-	-	-	-	3	1
CO5	Solve Simple to moderately difficult algorithmic problems arising in applications	3	2	2	1	3	-	-	-	-	-	-	-	3	1
Average		3	3	3	1	3	-	3	1						

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – V**20IT522****COMPUTER NETWORKS LABORATORY**

L	T	P	C
0	0	3	1

Prerequisite: Basic Programming Knowledge**Course Outcomes:** On successful completion of the course, the student will be able to**Cognitive Level**

CO1: Analyze about Simulation tools

Analyze

CO2: Build various protocols

Apply

CO3 Develop Socket Programming

Apply

CO4: Construct routing algorithm

Apply

CO5: Analyze congestion control algorithm

Analyze

List of Experiments:

1. Study of socket programming and client server model.
2. Implementation of stop and wait protocol and sliding window protocol.
3. Write a code simulating ARP /RARP protocols.
4. Write a code simulating PING and TRACEROUTE commands.
5. Create a socket for HTTP for web page upload and download.
6. Write a program to implement RPC (Remote Procedure Call).
7. Implementation of Subnetting.
8. Applications using TCP and UDP sockets.
9. Study of Network Simulator (NS) and simulation of congestion control algorithms.
10. Perform a case study about the different routing algorithms.

Total = 45 Periods**CO PO MAPPING**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Analysis on Simulation tools	3	2	2	1	2	-	-	-	-	-	1	2	3	2
CO2	Build various protocols	3	2	2	1	2	-	-	-	-	-	1	2	3	2
CO3	Develop Socket Programming	3	2	2	1	2	-	-	-	-	-	1	2	3	2
CO4	Build routing algorithm	3	2	2	1	2	-	-	-	-	-	1	2	3	2
CO5	Analyze congestion control algorithm	3	2	2	1	2	-	-	-	-	-	1	2	3	2
Average		3	2	2	1	2	-	-	-	-	-	1	2	3	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - V

20HR563

CAREER DEVELOPMENT SKILLS III

L	T	P	C
0	2	0	0

Prerequisite: No prerequisite needed for enrolling into the course.**Course Outcomes:** On successful completion of the course, the student will be able to**Cognitive Level****CO1** Develop the basic grammatical rules for written and oral communication.

Understand

CO2 Perform well in verbal and logical reasoning.

Apply

CO3 Enhance their skills on quantitative aptitude.

Understand

CO4 Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

Understand

CO5 Extend the knowledge in core IT domain concepts.

Create

UNIT - I Written and Oral Communication**[6]**

Reading Comprehension Level 3 - Self Introduction - News paper Review - Self Marketing - Debate - Structured and Unstructured GDs Psychometric Assessment - Types & Strategies to answer the questions Practices: Sentence Completion - Sentence Correction - Jumbled Sentences - Synonyms & Antonyms - Using the Same Word as Different Parts of Speech - Interpretation of Pictorial Representations - Editing.

UNIT - II VERBAL & LOGICAL REASONING**[6]**

Syllogism - Assertion and Reasons - Statement and Assumptions - Identifying Valid Interferences - Identifying Strong Arguments and Weak Arguments - Cause and Effect - Deriving Conclusions from Passages - Seating Arrangements Practices

UNIT - III QUANTITATIVE APTITUDE**[6]**

Probability - Calendar - Clocks - Logarithms - Permutations and Combinations

UNIT - IV QUANTITATIVE APTITUDE**[6]**

Algebra - Linear Equations - Quadratic Equations Polynomials - Problems on Numbers - Ages - Train - Time and Work - Sudoku - Puzzles.

UNIT - V IT DOMAIN CONCEPTS**[6]**

Data Structures - Operating System - Database Technology - Computer Architecture - Computer Networks

Total :30 Periods**Text Books :**

- 1 Anne Laws, Writing Skills, Orient Black Swan, Hyderabad, First Edition, 2011.
- 2 Abhijit Guha, Quantitative Aptitude, Tata McGraw Hill, New Delhi, First Edition, 2009.

Reference Books:

- 1 Ashra Rizvi, Effective Technical Communication, Tata McGraw Hill, New Delhi, First Edition, 2005.
- 2 Sarah Freeman, Written Communication in English, Orient Black Swan, Hyderabad, First Edition, 2005.
- 3 M.B. Lal & Goswami, Objective Instant Arithmetic, Upkar Publications, First Edition, 2010.
- 4 <https://www.geeksforgeeks.org/>

CO-PO MAPPING

Course Code: 20HR563

Regulations:

R 2020

Course Name:

CAREER DEVELOPMENT SKILLS III

CO-PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Develop the basic grammatical rules for written and oral communication.</i>	-	-	-	-	-	-	-	1	3	3	-	-	1	1
CO2	<i>Perform well in verbal and logical reasoning.</i>	-	-	-	-	-	-	-	1	3	3	-	2	1	1
CO3	<i>Enhance their skills on quantitative aptitude.</i>	-	-	-	-	-	-	-	1	3	3	-	1	1	1
CO4	<i>Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.</i>	-	-	-	-	-	-	-	1	3	3	-	2	1	1
CO5	<i>Extend the knowledge in core IT domain concepts.</i>	-	-	-	-	-	-	-	1	3	3	-	-	1	1
Average		-	-	-	-	-	-	-	1	3	3	-	2	1	1

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER –VI

20IT611	WEB TECHNOLOGY	L	T	P	C
		3	0	0	3

Prerequisite: IT Essentials**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Outline the technologies around the internet.

Understand

CO2: Design of web pages using CSS.

Apply

CO3: Infer the knowledge of Java script.

Analyze

CO4: Perceive the fundamentals of Angular JS.

Evaluating

CO5: Design and handle the online database and web service.

Create

UNIT – I INTERNET AND HTML [9]

Web Essentials: Client-Server communication-Internet Protocols- World Wide Web - HTTP request and response message - HTML5.0:Syntax and Semantics - Links - Lists - Tables -Images -Frames - Forms.

UNIT – II CASCADING STYLE SHEETS [9]

Cascading Style Sheets: Syntax - Features- Style Sheets and HTML: Backgrounds, Colors, and Properties - Style Rule Cascading and Inheritance -Text Properties - Padding Lists - CSS Positioning.

UNIT – III JAVA SCRIPT [9]

History and Versions - Internal, Embedded and External JavaScript - Syntax-Variables and Data Types - Operators-Literals - Functions-Arrays- Conditional and Looping statements - Type Conversion - Objects and DOM- Validation and Regular Expressions.

UNIT – IV Angular JS [9]

Angular JS Framework: MVC Architecture - Expressions and Controllers - Directives -Modules -Scopes- Dependency-Filters -Tables - Forms-Validation -Animation.

UNIT – V WEB SERVICE AND DATABASE [9]

Web Services: REST: Architecture - Restful methods - REST Resources - Representation of REST Resources - HTTP features for REST. JDBC: Drivers - Driver Manager - Connection - Statement - Result Set.

Total = 45 Periods**Text Books :**

- 1 Randy Connolly and Ricardo Hoar, Fundamentals of Web Development, Pearson Education, New Delhi, Third Edition, 2022.
- 2 Paul Deitel, Harvey Deitel and Abbey Deitel, Internet and World Wide Web - How to Program, Pearson Education, New Delhi, Fifth Edition, 2018.

Reference Books :

- 1 John Dean, Web Programming With HTML5, CSS and JavaScript, Jones and Bartlett Publishers, Inc, United States, Third Edition, 2018.
- 2 Felipe Coury , Ari Lerner , Carlos Taborda, The Complete Guide to Angular, Createspace Independent Publishing Platform, United States, First Edition, 2018.
- 3 Sanjiv Purba,High-Performance Web Databases: Design, Development, and Deployment, Auerbach Publications, United States, First Edition , 2019

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT611**

Regulations:

R 2020

Course Name:

WEB TECHNOLOGY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
1	<i>Outline the technologies around the internet.</i>	3	3	3	3	2	-	-	-	-	-	-	3	3	2
2	<i>Design of web pages using CSS.</i>	3	3	3	3	2	-	-	-	-	-	-	3	3	2
3	<i>Inference the knowledge of Java script.</i>	3	3	3	3	2	-	-	-	-	-	-	3	3	2
4	<i>Perceive the fundamentals of Angular JS.</i>	3	3	3	3	2	-	-	-	-	-	-	3	3	2
5	<i>Design and handle the online database and web service.</i>	3	3	3	3	2	-	-	-	-	-	-	3	3	2
Average		3	3	3	3	2	-	-	-	-	-	-	3	3	2

SEMESTER - VI

20IT612

SOFTWARE TESTING

L	T	P	C
3	0	0	3

*Prerequisite: Software Engineering Principles and Practices***Course Outcomes: On successful completion of the course, the student will be able to**

- CO1: Summarize the strategies for software testing
 CO2: Interpret the concept of testing requirements
 CO3: Apply various testing techniques
 CO4: Classify testing types and their levels
 CO5: Discuss the test case design and test automation

Cognitive Level
 Understand
 understand
 Apply
 Create
 Understand

UNIT – I INTRODUCTION TO TESTING**[9]**

Software Testing - Definition of Software Testing - Objective and limits of testing - Testing Strategy - Roles and Responsibilities of a Software Tester - Independent Verification and Validation

UNIT – II SOFTWARE TESTING REQUIREMENTS**[9]**

Software Testing Requirements - Analyzing the requirements -Classifying the Functional and Non-Functional Requirements. Software Testing Review Process - Objective of Software Testing Review - Types of Reviews: Peer Review- Walkthrough - Inspection - Checklists of Review Process - Review Log

UNIT – III TESTING TECHNIQUES**[9]**

White box testing techniques - Static and Dynamic Testing - Statement Coverage - Decision/Branch Coverage - Basic Path Testing - Control Flow Graph Coverage - Conditional Coverage - McCabe's Cyclomatic Complexity - Mutation Testing - Black Box Test Techniques: Boundary Value Analysis - Equivalent Class Partition - Cause-Effect Analysis-Decision Table - State Transition Table - Pair Wise Testing - Use Case Testing

UNIT – IV TESTING TYPES**[9]**

Manual Testing Techniques: Types of manual testing - Manual Testing Tools - Manual Tester - SDLCVs. STLC - BugLife Cycle - ManualTesting Test Case - Manual Testing Vs Automation Testing - AutomatedTesting Process - Typesof Automated Testing - Choosing an Automation Tool -Automation Testing Tool: Selenium - Selenium WebDriver architecture.

UNIT – V TEST CASE DESIGN AND AUTOMATION**[9]**

Test Case - Standards - Guidelines and Naming Conventions - Characteristics of Good Test Cases - Test Case templates - Creation of Test Case - Test Case Review Process - Test Execution- Need for Automation - Categorization of Testing Tools - Selection of Testing Tools - Guidelines for Automated Testing - Overview of Commercial Testing Tools - Case Study: Income Tax Calculator

Total =45Periods**Text Books:**

1. S.Subashni, N.Satheesh Kumar, Dr.B.G.Geetha, Dr.G.Singaravel, Software Testing, Umayam Publications, First Edition, 2013
2. Srinivasan Desikan, Gopalaswamy Ramesh, Software Testing: Principles and Practice, Pearson Education India, Second Edition, 2017

Reference Books:

1. Naresh Chauhan, Software Testing: Principles and Practices, Oxford University Press, Second Edition, 2016.
2. Roger Pressman, Software Engineering: A Practitioner's Approach, McGraw Publications, Seventh Edition ,2017
3. M. G. Limaye, Software Testing: Principles and Techniques and Tools, Tata McGraw-Hill Education, First Edition, 2012

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: 20IT612

Regulations:
Course Name:

R 2020
SOFTWARE TESTING

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1:	Summarize the strategies for software testing	3	3	3	2	-								3	3	2
CO2:	Interpret the concept of testing requirements	3	3	3	2	-								3	3	2
CO3:	Apply various testing techniques	3	3	3	2	2								3	3	2
CO4:	Classify testing types and their levels	3	3	2	2	2								3	3	2
CO5:	Discuss the test case design and test automation	3	3	3	2	2								3	3	2
Average		3	3	3	2	2								3	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER – VI

20IT613	PRINCIPLES OF COMPILER DESIGN	L	T	P	C	
		3	1	0	4	
<i>Prerequisite: Theory of Computation</i>						
Course Outcomes: On successful completion of the course, the student will be able to					Cognitive Level	
CO1: Identify the different phases in the design of a compiler.					Remember	
CO2: Design of parser using top-down and bottom-up techniques.					Create	
CO3: Determine the intermediate code for the control statements in high level language.					Evaluate	
CO4: Recognize the issues in the design of code generation and generate machine code from the source code.					Remember	
CO5: Apply different optimization techniques to an intermediate code.					Apply	
UNIT – I	LEXICAL ANALYSIS					[9]
Compiler: Language Processors - Structure of a Compiler: Phases of Compiler - Compiler Construction Tools. Lexical Analysis: Role of the Lexical Analyzer - Input Buffering - Structure of Lex Programs.						
UNIT – II	SYNTAX ANALYSIS					[9]
Syntax Analysis: Role of the Parser - Context Free Grammars - Top-Down Parsing - Bottom-Up Parsing: Operator Precedence - LR Parsing: SLR - Canonical LR - LALR - Parser Generators.						
UNIT – III	SYNTAX DIRECTED TRANSLATION AND INTERMEDIATE CODE GENERATION					[9]
Syntax Directed Definitions - Evaluation Orders for SDD's. Intermediate Code Generation - Three Address Code - Control Flow - Back patching - Run Time Environments: Storage Organization - Activation Trees and Records.						
UNIT – IV	CODE GENERATION					[9]
Issues in Design of Code Generation - The Target Language - Addresses in Target Code - Basic Blocks and Flow Graphs - Optimization of Basic Blocks - Simple Code Generator - Peephole Optimization.						
UNIT – V	CODE OPTIMIZATION					[9]
Principal Sources of Optimization: Local-Global and Loop Optimization - Semantics Preserving Transformation. Data Flow Analysis: Data Flow Abstraction - Live-Variable Analysis.						

Total (L:45 + T:15) = 60 Periods

Text Book:

- 1 Alfred V Aho, Ravi Sethi and Jeffrey D Ullman, Compilers - Principles, Techniques and Tools, Pearson Education, India, Second Edition, 2014.

Reference Books:

- 1 Randy Allen, Ken Kennedy, Optimizing Compilers for Modern Architectures: A Dependence-based Approach, Morgan Kaufmann Publishers, United States, Second Edition, 2012
- 2 Steven S. Muchnick, Advanced Compiler Design and Implementation, Morgan Kaufmann Publishers, India, Seventh Edition, 2012.
- 3 Keith D Cooper and Linda Torsion, Engineering a Compiler, Morgan Kaufmann Publishers, Pearson Education, New Delhi, Third Edition, 2012.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: 20IT613

Regulations: R 2020

Course Name: PRINCIPLES OF COMPILER DESIGN

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	Identify the different phases in the design of a compiler.	3	3	3	2									3	2
2	Design of parser using top-down and bottom-up techniques.	3	3	3	2									3	2
3	Determine the intermediate code for control statements in high level language.	3	3	3	2									3	2
4	Recognize the issues in the design of code generation and generate machine code from the source code.	3	3	3	2									3	2
5	Apply different optimization techniques to an intermediate code.	3	3	3	2									3	2
Average		3	3	3	2									3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - VI**20IT621****WEB TECHNOLOGY LABORATORY**

L	T	P	C
0	0	3	1

Prerequisite: IT Essential Laboratory**Course Outcomes: On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Create dynamic web pages using HTML, CSS and Java scripts.

Create

CO2: Design web application using Angular JS

Create

CO3: Construct the Server-side web pages that have to process request from client web pages.

Create

CO4: Create a web-based application using REST.

Create

CO5: Deploy various web services and how these web services interact.

Analyze

List of Experiments

1. Create a webpage with the following using HTML
 - a. Use paragraph and list tags.
 - b. drop down list with data received as JSON.
 - c. insert an image and create a link such that clicking on image takes user to other page.
2. Create a web page with all types of cascading style sheets.
3. Using HTML, CSS, and JavaScript, create an image light box gallery to portray the highlights of your department.
4. Creation of web forms and validating it through JS.
5. Create a student nominal role using an angular application that allows users to add or remove names and displays an error notice if you add the same name twice.
6. Create user registration web Application.
 - a. At the server end, write code to retrieve contents of request object and show them to the user. Match user input password with predefined password and show "Valid User" or "Invalid User" .
 - b. A web application that takes name and age from html page. If age less than 18 it should show Hello <name> You are not authorized to visit the site. Otherwise, welcome <name> to website.
7. Program using XML - Schema - XSLT/XSL.
8. Program using DOM and SAX Parsers.
9. Create dynamic HTML based web applications.
10. Consider a case where we have two web services - an airline service and a travel agent. The travel agent is searching for an airline. Implement this scenario using Web Service and Database.

Total : 45 Periods

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT621**

Regulations:

R 2020

Course Name:

WEB TECHNOLOGY LABORATORY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Create dynamic web pages using HTML , CSS and Java scripts.	3	3	3	2	3	-	-	-	-	-	-	3	3	2
CO2:	Design web application using Angular JS	3	3	3	2	3	-	-	-	-	-	-	3	3	2
CO3:	Construct the Server-side web pages that have to process request from client web pages.	3	3	2	2	3	-	-	-	-	-	-	3	3	2
CO4:	Create a web-based application using REST.	3	3	2	2	3	-	-	-	-	-	-	3	3	2
CO5:	Deploy various web services and how these web services interact.	3	3	3	2	3	-	-	-	-	-	-	3	3	2
Average		3	3	3	2	3	-	-	-	-	-	-	-	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - VI

20IT622

COMPILER DESIGN LABORATORY

L	T	P	C
0	0	3	1

*Prerequisite: Data Structures.***Course Outcomes: On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Design of lexical analyzer using LEX tool

Create

CO2: Develop a code segment to implement an application using YACC

Create

CO3: Design of top-down and bottom-up parser and parse the given input.

Create

CO4: Implementation of control flow analysis and Data Flow Analysis

Create

CO5: Implement the back end of the compiler which takes the three-address code and produces the assembly code language

*Create*List of Experiments

1. Implementation of Symbol Table.
2. Develop a lexical analyzer to recognize a few patterns using Lex Tool
3. Generate YACC specification for a few syntactic categories.
 - a). Program to recognize a valid variable which starts with a letter followed by any number of letters or digit
 - b). Implementation of Calculator using LEX and YACC
4. a) Design of Predictive Parser for the language and parse the given input.
b) Design a LALR bottom-up parser for the language and parse the given input.
5. Convert the BNF rules into YACC form and write code to generate Abstract Syntax Tree.
6. Implement type checking
7. Implementation of control flow analysis and Data Flow Analysis
8. Implement storage allocation strategies using Stack and Heap
9. Construction of DAG
10. Implement the back end of the compiler which takes the three-address code and produces assembly code.

Total : 45 Periods

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT622**

Regulations:

R 2020

Course Name:

Compiler Design Laboratory

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1:	Design of lexical analyzer using LEX tool	3	3	3	3	3								2	3	2
CO2:	Develop a code segment to implement an application using YAAC	3	3	3	3	3								2	3	2
CO3:	Design of top-down and bottom-up parser and parse the given input.	3	3	3	3	3								2	3	2
CO4:	Implementation of control flow analysis and Data Flow Analysis	3	3	3	3	3								2	3	2
CO5:	Implement the back end of the compiler which takes the three-address code and produces the assembly code language	3	3	3	3	3								2	3	2
Average		3	3	3	3	3								2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER –VI

20IT623

MINI PROJECT

L	T	P	C
0	0	6	3

Prerequisite: Core IT courses**Course Outcomes:** On successful completion of the course, the student will be able to**Cognitive Level**

CO1: Apply critical thinking to obtain innovative solutions for real-world problems.

Apply

CO2: Choose appropriate SDLC methodology to gain new skills in emerging technologies and apply them to practical use cases at the industry level.

Create

CO3: Test and validate the design with a prototype, and calculate the cost.

Create

CO4: Build teamwork and leadership abilities as well as career competencies.

Create

CO5: Develop time management, project management skills and communication skills

Apply

Guidelines:

- Student group comprises of three to four members on a project title under the guidance of a faculty is approved by the head of the department.
- The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department.
- Comprehensive project report is submitted after completing the work to the satisfaction of the supervisor.
- The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners.

Total = 45 Periods

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT623**

Regulations:

R 2020

Course Name:

MINI PROJECT

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Apply critical thinking to obtain innovative solutions for real-world problems.</i>	3	3	3	3	3	-	-	-	3	3	3	3	3	3
CO2:	<i>Choose appropriate SDLC methodology to gain new skills in emerging technologies and apply them to practical use cases at the industry level.</i>	3	3	3	3	3	-	-	-	3	3	3	3	3	3
CO3:	<i>Test and validate the design with a prototype, and calculate the cost.</i>	3	3	3	3	3	-	-	-	3	3	3	3	3	3
CO4:	<i>Build teamwork and leadership abilities as well as career competencies.</i>	3	3	3	3	3	-	-	-	3	3	3	3	3	3
CO5:	<i>Develop time management, project management skills and communication skills</i>	3	3	3	3	3	-	-	-	3	3	3	3	3	3
		3	3	3	3	3		-	-	-	3	3	3	3	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - VI

20HR664	CAREER DEVELOPMENT SKILLS IV	L	T	P	C
		0	2	0	0
Prerequisite: No prerequisites are needed for enrolling into the course					
Course Outcomes : On successful completion of the course, the student will be able to					Cognitive Level
CO1:	Employ critical thinking in personal interviews type situations.				Apply
CO2:	Understand the Quantitative Aptitude problems in geometry.				Understand
CO3:	Understand the data interpretation and analysis by using various graphs.				Understand
CO4:	Enhance the skills in resume writing and presentation.				Create
CO5:	Build the IT domain proficiency skills				Create
UNIT - I	WRITTEN AND ORAL COMMUNICATION – PART 2				[06]
Self-Introduction - GD - Personal Interview Skills Practices on Reading Comprehension Level 2 - Paragraph Writing - Newspaper and Book Review Writing - Skimming and Scanning - Interpretation of Pictorial Representations - Sentence Completion - Sentence Correction - Jumbled Sentences - Synonyms & Antonyms - Using the Same Word as Different Parts of Speech - Editing.					
UNIT - II	QUANTITATIVE APTITUDE				[06]
Geometry - Straight-line - Triangles - Quadrilaterals - Circles - Co-ordinate Geometry - Cube - Cone - Sphere.					
UNIT - III	DATA INTERPRETATION AND ANALYSIS				[06]
Data Interpretation based on Text - Data Interpretation based on Graphs and Tables. Graphs Column Graphs, Bar Graphs, Line Charts, Pie Chart, Graphs representing Area, Venn Diagram & Flow Charts.					
UNIT - IV	RESUME WRITING & PRESENTATION SKILLS				[06]
An Introduction to the Resume - Types of Resumes - Common Resume Errors - Anatomy of a Resume - What is a Cover Letter? - Types of Cover Letters - Enhancing the Language and Style of Your Resume and Cover Letter - Assessment. Presentation Skills: Oral presentation and public speaking skills; business presentations. - Understand the Situation - Know Your Tools - Know Yourself - Organize it, Write the Script - Practice - Delivering a Presentation.					
UNIT - V	DOMAIN PROFICIENCY				[06]
Logic Building - Advanced Data Structures - SQL & PL SQL - Object Oriented Concepts - SDLC & STLC – Cloud and Devops.					

Total (L= 0, T = 30) = 30 Periods**Text Books :**

- 1 Anne Laws, Writing Skills, Orient Black Swan., Hyderabad, 2011.
- 2 Abhijit Guha, Quantitative Aptitude, TMH, New Delhi, Third Edition, 2009

Reference Books :

- 1 Agarwal. R.S ,A.Modern Approach to Verbal and Non- verbal Reasoning, Revised Edition 2008, Reprint 2009, S.Chand & Co Ltd., New Delhi.
- 2 M Ashra Rizvi, Effective Technical Communication, Tata McGraw HILL, New Delhi, First Edition, 2005.
- 3 M.B. Lal & Goswami, Objective Instant Arithmetic, Upkar Publications, New Delhi, second edition, 2012.
- 4 V.K. Mehta & Rohit Mehta, Objective Electrical Technology, S Chand publications, First Edition, 2012.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20HR664**

Regulations:

R 2020

Course Name:

CAREER DEVELOPMENT SKILLS IV

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Employ critical thinking in personal interviews type situations.</i>	-	-	-	-	2	-	-	-	1	3	-	2	-	-
CO2	<i>Understand the Quantitative Aptitude problems in geometry.</i>	-	-	-	-	2	-	-	-	1	3	-	2	-	-
CO3	<i>Understand the data interpretation and analysis by using various graphs.</i>	-	-	-	-	2	-	-	-	1	3	-	2	-	-
CO4	<i>Enhance the skills in resume writing and presentation.</i>	-	-	-	-	2	-	-	-	1	3	-	2	-	-
CO5	<i>Enhance the comprehension Skills in core subjects.</i>	-	-	-	-	2	-	-	-	1	3	-	2	-	-
Average		-	-	-	-	2	-	-	-	1	3	-	2	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020			
20IT561	SEMESTER – V	L	T	P	C
	OBJECT ORIENTED ANALYSIS AND DESIGN				
	(Professional Elective - I)	3	0	0	3

Prerequisite: No Prerequisite Needed For Enrolling Into The Course.

Course Outcomes: On Completion of this course, the student will be able to

Cognitive Level

CO1	Know about the object basics and object-oriented life cycle.	Understand
CO2	Identify classes and their relationships	Analysis
CO3	Draw UML diagrams for various projects	Remember
CO4	Understand object-oriented design process.	Understand
CO5	Realize the need of software Quality and testing.	Understand

UNIT-I OBJECT ORIENTED METHODOLOGY [9]

An Overview of Object-Oriented Systems Development - Object Basics - Object Oriented Systems Development Life Cycle - Unified Approach - Rumbaugh Methodology - Booch Methodology - Jacobson Methodology - Patterns - Frameworks.

UNIT-II OBJECT ORIENTED ANALYSIS [9]

Identifying use cases - Object Analysis - Classification - Identifying Object - relationships - Attributes and Methods.

UNIT-III UNIFIED MODELING LANGUAGE [9]

Unified Modelling Language: UML Diagrams - Use Case Diagram - Class Diagram - Interaction Diagram - State Chart Diagram - Activity Diagram - UML Meta Model.

UNIT-IV OBJECT ORIENTED DESIGN [9]

Design process and axioms - Designing Classes - Access Layer - Object Storage and Object Interoperability - View Layer - Designing Interface Objects - Prototyping the user interface.

UNIT - V SOFTWARE QUALITY AND TESTING [9]

Software Quality Assurance - Testing Strategies - Test Cases - Test Plan - System Usability and Measuring User Satisfaction - Usability testing - User satisfaction test - Case Study.

Total = 45 Periods

Text Books:

- 1 Craig Larman, Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development, Pearson Education, India, Third edition, 2012.
- 2 Alan Dennis, Barbara Wixom, David Tegarden, Systems Analysis and Design: An Object-Oriented Approach with UML, Wiley Publisher, India, Fifth edition, 2015

Reference Books:

- 1 Martin Fowler, UML Distilled, Pearson Education, India, Third Edition, 2018
- 2 Grady Booch, Object Oriented Analysis & Design with applications, Pearson Education, India, Second Edition, 2010.
- 3 James R Rumbaugh and Michael R. Blaha, Object-Oriented Modeling and Design with UML, Pearson Education, India, Second Edition, 2018
4. Gandharba Swain, Object-Oriented Analysis and Design Through Unified Modeling Language, Laxmi Publications Pvt. Limited, India, Second Edition, 2010.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT561**Regulations: **R 2020**Course Name: **OBJECT ORIENTED ANALYSIS AND DESIGN**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	Know about the object basics and object-oriented life cycle.	3	3	2	3	-	-	-	-	-	-	-	-	3	2
CO2	Identify classes and their relationships	3	3	2	3	-	-	-	-	-	-	-	-	3	2
CO3	Draw UML diagrams for various projects	3	3	2	3	-	-	-	-	-	-	-	-	3	2
CO4	Understand object-oriented design process.	3	3	2	3	-	-	-	-	-	-	-	-	3	2
CO5	Realize the need of software Quality and testing.	3	3	2	3	-	-	-	-	-	-	-	-	3	2
Average		3	3	2	3	-	3								

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - V

20IT562	ADVANCED COMPUTER ARCHITECTURE (Professional Elective - I)	L	T	P	C
		3	0	0	3

Prerequisite: Computer Organization

Course Outcomes: On successful completion of the course, the student will be able to

Cognitive Level

CO1: Summarize the concept of Parallel Processing and its applications.

Understand

CO2: Implement the Hardware for Arithmetic Operations.

Apply

CO3: Analyze the performance of different scalar Computers.

Analyze

CO4: Build the Pipelining Concept for a given set of Instructions.

Apply

CO5: Distinguish the performance of pipelining and non-pipelining environment in a processor.

Apply

UNIT - I PIPELINE AND VECTOR PROCESSING [9]

Parallel Processing - Pipelining - Arithmetic Pipeline - Instruction Pipeline - RISC Pipeline - Vector Processing - Array Processors.

UNIT - II COMPUTER ARITHMETIC [9]

Addition and Subtraction - Hardware Implementation - Multiplication Algorithms and Hardware Implementation - Division Algorithms and Hardware Implementation - Floating Point Arithmetic Operations.

UNIT - III PARALLEL COMPUTER MODELS [9]

Evolution of Computer Architecture - System Attributes to Performance - Shared Memory Multiprocessors - Distributed Memory Multicomputer - Vector Super Computers - SIMD Super Computers.

UNIT - IV PROCESSORS AND MEMORY HIERARCHY [9]

Advanced Processor Technology: Design Space of Processors - Instruction - Set Architectures - CISC Scalar Processors - RISC scalar Processors - Super Scalar and Vector Processors: Superscalar Processors.

UNIT - V PIPELINING AND SUPERSCALAR TECHNIQUES [9]

Linear Pipeline Processors: Asynchronous and Synchronous models - Clocking and Timing Control - Pipeline Schedule Optimization - Instruction Pipeline Design: Instruction Execution Phases - Mechanisms for Instruction Pipelining - Dynamic Instruction Scheduling - Branch Handling Techniques.

Total = 45 Periods

Text Books:

- 1 Kai Hwang, Naresh Jotwani, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw-Hill, India, Third Edition, 2016.
- 2 William Stallings, Peter Zeno, Computer Organization and Architecture-Designing for Performance, Pearson, India, Seventh Edition, 2015.

Reference Books:

- 1 William Stallings, Computer Organization and Architecture: Design for performance, Pearson Education, India, 8th edition, 2015.
- 2 Carl Hamacher, Vranesic, Zaky, Computer Organization, McGraw - Hill Companies, India, 5th Edition, 2002.
- 3 John L. Hennessy, David A. Patterson, Computer Architecture: A Quantitative Approach, Elsevier Science, 5th Edition, 2012.
- 4 <https://nptel.ac.in/courses/106102229>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT562**

Regulations:

R 2020

Course Name:

**ADVANCED COMPUTER
ARCHITECTURE**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	<i>Summarize the concept of Parallel Processing and its applications.</i>	3	3	2	3	-	-	-	-	-	-	-	2	3	2
2	<i>Implement the Hardware for Arithmetic Operations.</i>	3	3	2	3	-	-	-	-	-	-	-	2	3	2
3	<i>Analyze the performance of different scalar Computers.</i>	3	3	2	3	-	-	-	-	-	-	-	2	3	2
4	<i>Build the Pipelining Concept for a given set of Instructions.</i>	3	3	2	3	-	-	-	-	-	-	-	2	3	2
5	<i>Distinguish the performance of pipelining and non-pipelining environment in a processor.</i>	3	3	2	3	-	-	-	-	-	-	-	2	3	2
Average		3	3	3	2	-	-	-	-	-	-	-	2	3	2

SEMESTER - V

20IT563	MOBILE COMPUTING	L	T	P	C
	(Professional Elective - I)	3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

CO1: Examine the basic concept of the mobile networks

Analyze

CO2: Explain Mobile Telecommunication System

Evaluate

CO3: Elaborate Knowledge on Mobile IP and TCP

Create

CO4: Summarize Mobile Ad-hoc Networks

Understand

CO5: Discriminate mobile internet connectivity

Analyze

UNIT - I FUNDAMENTALS OF MOBILE COMPUTING [9]

Mobile Computing: Mobile Computing vs. wireless Networking, Mobile Computing Applications - Characteristics of Mobile computing - Structure of Mobile Computing Application. MAC Protocols - Wireless MAC Issues - Fixed Assignment Schemes - Random Assignment Schemes - Reservation Based Schemes

UNIT - II MOBILE TELECOMMUNICATION SYSTEM [9]

Global System for Mobile Communication (GSM) - Services and architecture - Radio interfaces - Localization - Calling - Handover - Security - New data services - General packet radio service - High speed circuit switched data

UNIT - III MOBILITY SUPPORT IN IP AND TCP [9]

IP and mobile network layers - Packet Delivery and Handover Management - Conventional TCP/IP Transport Layer Protocols - Indirect TCP - Snooping TCP - Mobile TCP - Other methods of mobile TCP - Layer transmission -TCP over 2.5G/3G Mobile networks.

UNIT - IV MOBILE DEVICES:SERVER AND MANAGEMENT [9]

Mobile agent - Application server - Gateways - Portal - Service Discovery - Device management - Mobile file systems - Security - Mobile ADHOC wireless Sensor Networks - Introduction to mobile Adhoc network - MANET - Wireless Sensor Networks - Applications

UNIT - V MOBILE INTERNET CONNECTIVITY AND PERSONAL AREA NETWORK [9]

WirelessLAN(WIFI) Architecture and Protocol layers - WAP 1.1 and 2.0 Architecture - XHTML - MP - Bluetooth enabled devices network - layers in Bluetooth protocol - security in Bluetooth protocol - IrDA - Zigbess - Mobile application languages and mobile application development platforms

Total = 45 Periods

Text Books :

- 1 Raj Kamal, Mobile Computing, Oxford Higher Education, New Delhi, Third Edition,2018
- 2 Kang-chun peng, E.Sithirasenan, Scitus AC, Mobile Communication Systems, Scitus Academics, USA, Second Edition, 2019

Reference Books :

- 1 Krishnamurthy Raghunandan, Introduction to Wireless Communications and Networks, Springer, New York, First Edition,2022
- 2 Asoke k Talukder, Hasan Ahmed, Mobile Computing, Tata McGraw-Hill, India, Second Edition , 2017
- 3 Sunilkumar S, Manvi , Wireless and Mobile Network , McGraw-Hill ,New Delhi, Second Edition, 2016
- 4 Michael G Solomon, David Kim , Fundamentals of Communications and Networking, Jones & Bartlet Learning, New England, Third Edition, 2021

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT563**

Regulations:

R 2020

Course Name:

MOBILE COMPUTING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Examine the basic concept of the mobile networks</i>	3	3	2	3	-	-	-	-	-	-	-	-	3	2
CO2	<i>Explain Mobile Telecommunication System</i>	3	3	2	3	-	-	-	-	-	-	-	-	3	2
CO3	<i>Elaborate Knowledge on Mobile IP and TCP</i>	3	3	2	3	-	-	-	-	-	-	-	-	3	2
CO4	<i>Summarize Mobile Ad-hoc Networks</i>	3	3	2	3	-	-	-	-	-	-	-	-	3	2
CO5	<i>Discriminate mobile internet connectivity</i>	3	3	2	3	-	-	-	-	-	-	-	-	3	2
.Average		3	3	3	3	-	3	2							

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - V**20IT564****UNIX INTERNALS
(Professional Elective - I)**

L	T	P	C
3	0	0	3

Prerequisite: Operating Systems**Course Outcomes:** On completion of this course, the student will be able to

CO1: Describe the architecture of UNIX operating system.

CO2: Interpret knowledge on files and directories.

CO3: Infer the knowledge on various system calls for file systems.

CO4: Explain the structure and activities of process control.

CO5: Summarize process scheduling and memory management of UNIX OS.

UNIT – I SYSTEM STRUCTURE**[9]**

History - System Structure - User Perspective - Operating System Services - Assumptions about Hardware-Kernel Architecture of UNIX Operating System - System Concepts - Kernel Data Structures - System Administration.

UNIT –II BUFFER CACHE**[9]**

Buffer Headers - Structure of the Buffer Pool - Advantages and Disadvantages of the Buffer Cache - Internal representation of files: Inodes - Structure of a regular file - Directories - Conversion of a path name to an Inode - Super block - Other file types

UNIT – III SYSTEM CALLS FOR FILE SYSTEM**[9]**

Open - Read, Write File and Record Locking - Adjusting the position of file I/O - LSEEK - File Creation - Creation of Special Files - Pipes - Mounting and Unmounting File Systems

UNIT – IV STRUCTURE OF PROCESS**[9]**

Process States and Transitions - Layout of System Memory - Context of a Process - Saving the context of a process - Process Control: Process Creation - Signals - Process Termination - Awaiting Process Termination - Invoking other programs - Shell - System boot and the INIT Process.

UNIT –V PROCESS SCHEDULING AND MEMORY MANAGEMENT**[9]**

Process Scheduling - Memory Management: Swapping - Demand paging - Hybrid System with Swapping and Demand Paging - I/O Subsystem: Driver Interfaces - Disk Drivers - Terminal Drivers.

Total = 45 Periods**Text Books:**

- 1 Maurice J. Bach, The Design of the Unix Operating System, Pearson Education, India, First Edition, 2015.
- 2 Sumitabha Das, UNIX: Concepts and Applications, McGraw Hill Education, USA, Fourth Edition, 2017.

Reference Books:

- 1 Vahalia, Unix Internals: The New Frontiers, Pearson Education, India, Second Edition, 2013
- 2 John Lion, Lion's Commentary on UNIX, Peer to Peer Communications, India, Sixth Edition, 2014
- 3 M. Beck et al, Linux Kernel Programming, Pearson Education Asia, 2012
- 4 <https://nptel.ac.in/courses/117106113>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT564**

Regulations:

R 2020

Course Name:

UNIX INTERNALS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	<i>Describe the architecture of UNIX operating system.</i>	3	3	2	3	–	–	–	–	–	–	–	–	3	2
2	<i>Interpret knowledge on files and directories.</i>	3	3	2	3	–	–	–	–	–	–	–	–	3	2
3	<i>Infer the knowledge on various system calls for file systems.</i>	3	3	2	3	–	–	–	–	–	–	–	–	3	2
4	<i>Explain the structure and activities of process control.</i>	3	3	2	3	–	–	–	–	–	–	–	–	3	2
5	<i>Summarize process scheduling and memory management of UNIX OS.</i>	3	3	2	3	–	–	–	–	–	–	–	–	3	2
Average		3	3	2	3	–	–	–	–	–	–	–	–	3	2

SEMESTER – V

20IT565	AGILE METHODOLOGIES (Professional Elective - I)	L	T	P	C
		3	0	0	3

Prerequisite: Software Engineering.

Course Outcomes: On Completion of this course, the student will be able to

CO1: Discern the background and driving forces for taking an Agile approach to software development.

CO2: Recognize the framework used in Agile.

CO3: Comprehend the Agile testing.

CO4: Drive development with unit tests using Test Driven Development.

CO5: Apply design principles and refactoring to achieve Agility.

UNIT - I FUNDAMENTALS OF AGILE [9]

Theories for Agile Management - Agile Software Development - Traditional Model Vs. Agile Model - Classification of Agile Methods - Agile Manifesto and Principles - Agile Project Management - Agile Team Interactions - Ethics in Agile Teams - Agility in Design, Testing - Agile Documentations - Agile Drivers, Capabilities and Values.

UNIT - II AGILE SCRUM FRAMEWORK [9]

Lean Production - SCRUM, Crystal, Feature Driven Development - Adaptive Software Development - Extreme Programming: Method Overview - Lifecycle - Work Products, Roles and Practices

UNIT - III AGILE INFORMATION SYSTEMS [9]

Agile Information Systems - Agile Decision Making - Earls' Schools of KM - Institutional Knowledge Evolution Cycle - Development - Acquisition - Refinement - Distribution - Deployment - Leveraging - KM in Software Engineering - Managing Software Knowledge - Challenges of Migrating to Agile Methodologies - Agile Knowledge Sharing - Role of Story-Cards - Story-Card Maturity Model (SMM).

UNIT - IV AGILE SOFTWARE DESIGN AND DEVELOPMENT [9]

Impact of Agile Processes in RE-Current Agile Practices - Variance - Overview of RE Using Agile - Managing Unstable Requirements - Requirements Elicitation - Agile Requirements Abstraction Model - Requirements Management in Agile Environment, Agile Requirements Prioritization - Agile Requirements Modeling and Generation - Concurrency in Agile Requirements Generation

UNIT - V INDUSTRY TRENDS [9]

Agile Product Development - Agile Metrics - Feature Driven Development (FDD) - Financial and Production Metrics in FDD - Agile Approach to Quality Assurance - Test Driven Development - Agile Approach in Global Software Development.

Total = 45 Periods

Text Books :

- 1 David J. Anderson and Eli Schragenheim, Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, New Delhi, First Edition, 2003.
- 2 Hazza and Dubinsky, Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer, New York, Second Edition, 2009

Reference Books:

- 1 Craig Larman, Agile and Iterative Development: A Managers Guide, Addison-Wesley, USA, First Edition, 2004.
- 2 Kevin C. Desouza, Agile Information Systems: Conceptualization, Construction, and Management, ButterworthHeinemann, United Kingdom, First Edition, 2007.
- 3 Robert Martin, Agile Software Development, Principles, Patterns, and Practices, PHI, New Delhi, First Edition, 2002.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT565**

Regulations:

R 2020

Course Name:

AGILE METHODOLOGIES

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	<i>Discern the background and driving forces for taking an Agile approach to software development.</i>	3	3	2	3	-	-	-	-	-	-	-	-	3	3
2	<i>Recognize the framework used in Agile.</i>	3	3	2	3	-	-	-	-	-	-	-	-	3	3
3	<i>Comprehend the Agile testing.</i>	3	3	2	3	-	-	-	-	-	-	-	-	3	2
4	<i>Drive development with unit tests using Test Driven Development.</i>	3	3	2	3	-	-	-	-	-	-	-	-	3	2
5	<i>Apply design principles and refactoring to achieve Agility.</i>	3	3	2	3	-	-	-	-	-	-	-	-	3	2
Average		3	3	2	3	-	-	-	-	-	-	-	-	3	2

SEMESTER - V

20IT566	ENTERPRISE RESOURCE AND PLANNING (Professional Elective - I)	L	T	P	C
		3	0	0	3

Prerequisite: -

Course Outcomes: On successful completion of the course, the student will be able to

Cognitive Level

CO1: Analyze the concepts of ERP and its related technologies

Analyze

CO2: Describe the implementation methodologies and its related issues

Understand

CO3: Explain the various business modules in ERP packages and ERP security

Apply

CO4: Discuss about the project proposal, approval and evaluation techniques in ERP

Understand

CO5: Describe about current trends in ERP implementation and its security

Understand

UNIT - I INTRODUCTION TO ERP [9]

Overview of ERP - Related Technologies - Business Intelligence - Conceptual Model of ERP - Advanced ERP -SCM and CRM systems and related technologies -ERP Life Cycle - ERP implementation life cycle - SDLC and ERP life cycle.

UNIT - II ERP IMPLEMENTATION [9]

Implementation Challenges - Strategies - Reasons for ERP failure - Pre implementation Tasks - Implementation methodologies - Process definition - Dealing with employee resistance Training and Education - Project management and monitoring Success - Failure factors of an ERP implementation - Package selection - Project Teams

UNIT - III ERP IN ACTION & POST IMPLEMENTATION [9]

ERP in Action: Operation and Maintenance - Performance - Maximizing the ERP System - Business Modules - Finance - Manufacturing - Human Resources -Change Management - Post implementation: review, support, maintenance and security of ERP - Different business modules of an ERP package

UNIT - IV ERP SYSTEM OPTIONS AND SELECTION METHODS [9]

Enterprise Application Integration - ERP and E-Business - Optimal Means of Developing an ERP - Measurement of Project Impact - IT Selection and Project Approval - ERP proposal Evaluation - Project Evaluation Techniques - Testing

UNIT - V ERP PRESENT AND FUTURE [9]

Turbo charge the ERP system - EAI - ERP Internet and WWW Future Directions - Trends in ERP - Future Directions in ERP: New Markets - New Technologies - Faster Implementation Methodologies - New Business Segments - Trends in ERP Security.

Total = 45 Periods

Text Books:

- 1 Singla, Enterprise Resource Planning, Cengage Learning, New Delhi, 2013.
- 2 Alexleon, Enterprise Resource Planning, Tata McGraw Hill, New Delhi, 2011.

Reference Books:

- 1 Mary Sumner, Enterprise Resource Planning, Pearson Education, 2007.
- 2 N. Venkateswaran, Enterprise Resource Planning, SCITECH Publication, New Delhi, 2009.
- 3 S. Kesharwani, S Bodduluri, Enterprise Resource Planning, Paramount Publishing House, New Delhi, 2013.
- 4 MahadeoJaiswal, Ganesh Vanapalli, Enterprise Resource Planning, MacMillon, New Delhi, 2013.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT566**

Regulations:

R 2020

Course Name:

**ENTERPRISE RESOURCE AND
PLANNING**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	Analyze the concepts of ERP and its related technologies	3	3	2	2	-	-	-	-	-	-	-	-	3	2
2	Describe the implementation methodologies and its related issues	3	3	2	2	-	-	-	-	-	-	-	-	3	2
3	Explain the various business modules in ERP packages and ERP security	3	3	2	2	-	-	-	-	-	-	-	-	3	2
4	Discuss about the project proposal, approval and evaluation techniques in ERP	3	3	2	2	-	-	-	-	-	-	-	-	3	2
5	Describe about currents trends in ERP implementation and its security	3	3	2	2	-	-	-	-	-	-	-	-	3	2
Average		3	3	2	2	-	-	-	-	-	-	-	-	3	2

SEMESTER -V

20IE591	AUGMENTED INTELLIGENCE LED MANAGED SERVICES- I	L	T	P	C
	(Common toCS, EC, EE& IT) [INDUSTRY ELECTIVE – VIRTUSA] (PROFESSIONAL ELECTIVE - I)	3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes : On successful completion of the course, the student will be able to

- CO1: Identify the operation policies and procedures based on how the organization
 CO2: Analysing the procedures to achieve a safe working environment in line with health and safety regulation.
 CO3: Apprehend the Key Concepts of Service Management of IT-enabled services
 CO4: Recognize an IT Infrastructure and Information Security
 CO5: Implement the policies in Microsoft 365.

Cognitive Level
 Understand
 Analyze
 Create
 Analyze
 Understand

UNIT - I IT OPERATIONS [9]

Evolution of Technologies - IT Operations Introduction - Policies - Roles -Support - Procedures for Managing Problems and Incidents

UNIT- II SECURE WORKING ENVIRONMENT AND ETIQUETTE [9]

Introduction - Safety Enforcement - National Standards - Safety Compliance - Health and Safety Awareness - Components of Etiquette - Professionalism and Ethics - Etiquette Standards - Email Communication - Business Meetings, Grooming and Personal Attire - Dining Etiquette

UNIT- III ITIL [9]

Introduction - Understanding ITIL Guiding Principles in an Organization - Optimize and Automate - Four Dimensions of Service Management - Key Activities of the Service Value Chain

UNIT - IV IT INFRASTRUCTURE AND INFORMATION SECURITY [9]

IT Infrastructure - Hardware, Software, Network - IT Infrastructure Types - Designing, Maintenance - Risks faced by Computer Systems and Networks - Analyzing Security Problems - Standard Security Mechanism

UNIT - V AMS AND TOOLS [9]

Introduction - Support Models - Activities Type - Audits - Microsoft 365 - Domain Management - Licensing - Managing Teams - Meeting Policies - Messaging Policies

Total = 45 Periods

Text Books :

- 1 Eric N. Smith, Workplace Security Essentials. A Guide for Helping Organizations Create Safe Work Environments, Butterworth Heinemann, Elsevier, United States of America, 2014
2. AXELOS, ITIL Foundation ITIL 4 Edition, AXELO Limited, London, Second Edition, 2019

Reference Books :

- 1 John R. Vacca, Cyber Security and IT Infrastructure Protection, Syngress, ELSEVIER, United States of America ,First Edition, 2014
- 2 <https://docs.microsoft.com/en-us/learn/m365/>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
CO-PO MAPPING

Regulations: R 2020

Course Code: 20IE591

Course Name: AUGMENTED INTELLIGENCE LED
MANAGED SERVICES – I

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	Identify the operation policies and procedures based on how the organization works.	3	2	2	-	2	-	-	2	1	-	-	2	-	-
CO2	Apply the procedures to achieve a safe working environment in line with health and safety.	3	3	3	-	3	-	-	2	1	-	-	2	-	-
CO3	Outline the Key Concepts of Service Management of IT-enabled services	3	2	2	-	3	-	-	2	1	-	-	2	-	-
CO4	Recognize an IT Infrastructure and Security mechanism	3	2	3	-	2	-	-	2	1	-	-	2	-	-
CO5	Implement the policies in Microsoft 365.	3	2	3	-	3	-	-	1	1	-	-	3	-	-
Average		3	2	3	-	3	-	-	2	1	-	-	2	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - VI**20IT661****BIOINFORMATICS
(PROFESSIONAL ELECTIVE – II)**

L	T	P	C
3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course**Course Outcomes:** On successful completion of the course, the student will be able to**Cognitive Level**

CO1: Develop models for biological data.

Apply

CO2: Translate pattern matching techniques to bioinformatics data and protein data

Analyze

CO3: Build micro array technology for genomic expression study.

Apply

CO4: Explain about pattern recognition and visualization

understand

CO5: Categorize microarray analysis

Analyze

UNIT - I INTRODUCTION**[9]**

Need for Bioinformatics Technologies - Bioinformatics Technologies: Structural Bioinformatics - Data Format and Processing - Secondary Resources and Applications - Structural Bioinformatics - Biological Data Integration System

UNIT - II DATAMINING IN BIOINFORMATICS**[9]**

Bioinformatics Data - Data Warehousing Architecture - Data Quality - Biomedical Data Analysis - DNA Data Analysis - Protein Data Analysis - Machine Learning - Neural Network Architecture and applications in bioinformatics

UNIT - III MODELING FOR BIOINFORMATICS**[9]**

Hidden Markov Modelling for Biological Data Analysis - Sequence Identification - Sequence Classification - Multiple Alignment Generation - Comparative Modelling - Protein Modelling - Genomic Modelling - Probabilistic Modelling - Bayesian Networks - Boolean Networks - Molecular Modeling - Computer Programs for Molecular Modelling

UNIT - IV PATTERN MATCHING AND VISUALIZATION**[9]**

Gene Regulation - Motif Recognition - Motif Detection - Strategies for Motif Detection - Visualization - Fractal Analysis - DNA Walk Models - One Dimension - Two Dimension - Higher Dimension - Chaos Game representation (CGR) of Biological Sequences - DNA, Protein, Amino Acid Sequences.

UNIT - V MICROARRAY ANALYSIS**[9]**

Microarray Technology for Genome Expression Study - Image Analysis for Data Extraction - Pre-Processing - Segmentation - Gridding - Spot Extraction - Normalization, Filtering - Cluster Analysis - Gene Network Analysis - Compared Evaluation of Scientific Data Management Systems - Cost Matrix - Evaluation Model - Benchmark - Tradeoffs

Total = 45 Periods**Text Book:**

- 1 Rastogi, Namita Mendiratta, Bioinformatics: Methods and Applications, PHI Learning, India, Fifth Edition, 2022
- 2 Bryan Bergeron, Bio Informatics Computing, Pearson Education, Second Edition, 2013

Reference Books:

- 1 Arthur M Lesk, Introduction to Bioinformatics, Oxford University Press, Second Edition, 2012
- 2 Ronald Brachman, Hector Levesque, Knowledge Representation and Reasoning II, The Morgan Kaufmann Series in Artificial Intelligence, 2012
- 3 Timothy J. Ross, Fuzzy Logic with Engineering Applications, John Wiley & Sons, Third Edition, 2011
- 4 https://onlinecourses.nptel.ac.in/noc22_bt12/preview

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT661**Regulations: **R 2020**Course Name: **BIOINFORMATICS**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	<i>Develop models for biological data.</i>	3	3	2	2	-	-	-	-	-	-	-	2	3	2
2	<i>Translate pattern matching techniques to bioinformatics data and protein data</i>	3	3	2	2	-	-	-	-	-	-	-	2	3	2
3	<i>Build micro array technology for genomic expression study.</i>	3	3	2	2	-	-	-	-	-	-	-	2	3	2
4	<i>Explain about pattern recognition and visualization</i>	3	3	2	2	-	-	-	-	-	-	-	2	3	2
5	<i>Categorize microarray analysis</i>	3	3	2	2	-	-	-	-	-	-	-	2	3	2
Average		3	3	2	2		-	-	-	-	-	-	-	3	2

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

SEMESTER - VI

20IT662

CLOUD COMPUTING
(PROFESSIONAL ELECTIVE – II)L T P C
3 0 0 3**Prerequisite:** No prerequisite needed for enrolling into the course**Course Outcomes:** On successful completion of the course, the student will be able to**Cognitive Level**

CO1: Explain the main concepts, key technologies, strengths and limitations of cloud computing.

Understand

CO2: Learn the key and enabling technologies that help in the development of cloud

Understand

CO3: Discuss the concept of cloud architecture.

Analyze

CO4: Explain the core issues of cloud computing such as resource management and security.

Understand

CO5: Discuss the different simulators of cloud.

Analyze

UNIT – I INTRODUCTION**[9]**

Introduction to Cloud Computing - Definition of Cloud - Evolution of Cloud Computing -Underlying Principles of Parallel and Distributed Computing - Cloud Characteristics - Elasticity in Cloud - On-demand Provisioning.

UNIT – II CLOUD ENABLING TECHNOLOGIES**[9]**

Service Oriented Architecture - REST and Systems of Systems - Web Services - Publish Subscribe Model - Basics of Virtualization: Xen architecture - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU -Memory - I/O Devices -Virtualization Support and Disaster Recovery.

UNIT – III CLOUD ARCHITECTURE, SERVICES AND STORAGE**[9]**

Layered Cloud Architecture Design - NIST Cloud Computing Reference Architecture - Public, Private and Hybrid Clouds - IaaS - PaaS - SaaS - Architectural Design Challenges - Cloud Storage - Storage-as-a-Service - Archiving-as-a-Service -Advantages of Cloud Storage - Cloud Storage Providers - S3.

UNIT – IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD**[9]**

Inter Cloud Resource Management - Resource Provisioning and Resource Provisioning Methods - Global Exchange of Cloud Resources - Security Overview - Cloud Security Challenges -Software-as-a-Service Security - Security Governance - Virtual Machine Security - IAM -Security Standards.

UNIT-V CLOUD TECHNOLOGIES AND ADVANCEMENTS**[9]**

Introduction to Simulator- understanding CloudSim simulator- CloudSimArchitecture (User code- CloudSim- GridSim- SimJava) Understanding Working platform for CloudSim- Introduction to Green Cloud-Hadoop - MapReduce - Virtual Box – Google App Engine - Programming Environment for Google App Engine – Open Stack -Federation in the Cloud - Four Levels of Federation - Federated Services and Applications - Future of Federation.

Total = 45 Periods**Text Books:**

- 1 Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Morgan Kaufmann Publishers, USA, Second Edition, 2017.
- 2 Rittinghouse, John W., and James F. Ransome, Cloud Computing: Implementation, Management and Security, CRC Press, Boca Raton, 2017.

Reference Books:

- 1 Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, Mastering Cloud Computing, Tata Mcgraw Hill, 2013
- 2 Rajkumar Buyya, James Broberg, Andrzej Goscinski, Cloud Computing: Principles and Paradigms, Wiley, India, First Edition, 2011.
- 3 https://onlinecourses.nptel.ac.in/noc22_cs20/preview

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: 20IT662

Regulations: R 2020

Course Name: CLOUD COMPUTING

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1:	<i>Explain the main concepts, key technologies, strengths and limitations of cloud computing.</i>	3	3	3	2	2	-	-	-	-	-	-	-	3	3	2
CO2:	<i>Learn the key and enabling technologies that help in the development of cloud</i>	3	3	3	2	2	-	-	-	-	-	-	-	3	3	2
CO3:	<i>Discuss the concept of cloud architecture.</i>	3	3	3	2	2	-	-	-	-	-	-	-	3	3	2
CO4:	<i>Explain the core issues of cloud computing such as resource management and security.</i>	3	3	3	2	2	-	-	-	-	-	-	-	3	3	2
CO5:	<i>Discuss the different simulators of cloud.</i>	3	3	3	2	2	-	-	-	-	-	-	-	3	3	2
Average		3	3	3	2	2	-	-	-	-	-	-	-	3	3	23

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - VI

20IT663

FUNDAMENTALS OF DEVOPS
(PROFESSIONAL ELECTIVE – II)L T P C
3 0 0 3**Prerequisite:** No prerequisite needed for enrolling into the course.**Course Outcomes:** On successful completion of the course, the student will be able to**Cognitive Level**

CO1:	Explain the DevOps' principles, architecture, and tools used for automation.	Understand
CO2:	Infer the industry's most effective SCM and configuration management approaches.	Understand
CO3:	Interpret the containerization and orchestration tools used in DevOps.	Understand
CO4:	Outline the key features and architecture of Terraform and Jenkins tools.	Understand
CO5:	Summarize the components and industry best practices for AWS DevOps and DevSecOps.	Understand

UNIT – I INTRODUCTION [9]

DevOps - DevOps Vs Traditional IT- DevOps Vs Agile - Principles of DevOps -Workflow and Architecture -Life Cycle Phases - DevOps Engineer: Roles, Responsibilities, and Skills -Best Practices and Anti-Patterns - Automation Tools.

UNIT – II SOURCE CODE AND CONFIGURATION MANAGEMENT [9]

Source Code Management(SCM) : Need and Benefits of SCM - SCM vs. Version control - Categories of SCM Tools - Best Practices. **Configuration Management:** Configuration Management Process - Ansible workflow and architecture -YAML.

UNIT – III CONTAINERIZATION AND ORCHESTRATION [9]

Containerization: Docker - Benefits and Features - VirtualMachines vs. Docker - Docker's Workflow and Architecture. **Container Orchestration:**Significance-Kubernetes:KeyTerminologies and Features - KubernetesArchitecture- Basics Modules of Kubernetes- Dockervs.Kubernetes.

UNIT – IV IAC AND CI/CD [9]

Infrastructure as Code(IaC): Types of approaches -Methods of IaC - IaC Tools: Terraform Architecture. **Continuous Integration and Continuous Delivery(CI/CD):**Significance and Features -CI/CD Pipeline Stages -CI/CD Tools: Jenkins Architecture -Jenkins Pipeline-Continuous Deployment.

UNIT-V MONITORING AND CLOUD-DEVOPS [9]

Monitoring and Logging:Monitoring vs. Observability - Types of Monitoring Tools: Prometheus Monitoring Architecture.**AWS DevOps:** Architecture of AWS DevOps-AWS DevOps Tools and Best Practices- **DevOps Security:** Challenges, BestPractices and Tools.

Total = 45 Periods**Text Books:**

- 1 Mikael Krief, Learning DevOps - A Comprehensive Guide to Accelerating DevOps Culture Adoption with Terraform, Azure DevOps, Kubernetes, and Jenkins, Packt Publishing Limited, India, Second Edition, 2019.
- 2 Gene Kim, Jez Humble, The Devops Handbook: How to Create World-Class Agility, Reliability, & Security in Technology Organizations, IT Revolution Press, USA, Second Edition, 2021.

Reference Books:

- 1 Mark Reed, DevOps: The Ultimate Beginners Guide to Learn DevOps Step-by-Step,Publishing Factory, Switzerland, First Edition, 2020.
- 2 Emily Freeman,DevOps For Dummies, Wiley, United States, First Edition, 2019.
- 3 Qiao Liang, Continuous Delivery 2.0: Business-leading DevOps Essentials, CRC Press, United States, First Edition, 2021.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: 20IT663

Regulations: R 2020

Course Name: FUNDAMENTALS OF DEVOPS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Explain the DevOps' principles, architecture, and tools used for automation.</i>	3	3	3	3	2	-	-	-	-	-	2	3	3	2
CO2:	<i>Infer the industry's most effective SCM and configuration management approaches.</i>	3	3	3	3	2	-	-	-	-	-	2	3	3	2
CO3:	<i>Interpret the containerization and orchestration tools used in DevOps.</i>	3	3	3	3	2	-	-	-	-	-	2	3	3	2
CO4:	<i>Outline the key features and architecture of Terraform and Jenkins tools.</i>	3	3	3	3	2	-	-	-	-	-	2	3	3	2
CO5:	<i>Summarize the componets and industry best practices for AWS DevOps and DevSecOps.</i>	3	3	3	3	2	-	-	-	-	-	2	3	3	2
Average		3	3	3	3	2	-	-	-	-	-	2	3	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - VI

20IT664	AUGMENTED AND VIRTUAL REALITY (PROFESSIONAL ELECTIVE – II)	L T P C
		3 0 0 3

Prerequisite: No prerequisite needed for enrolling into the course

Course Outcomes: On successful completion of the course, the student will be able to

Cognitive Level

C01:	<i>Summarize the fundamentals of computer graphics and human-computer interaction techniques related to VR/AR.</i>	<i>Understand</i>
C02:	<i>Outline the techniques used in geometric modeling.</i>	<i>Understand</i>
C03:	<i>Infer the system for the virtual reality environment.</i>	<i>Understand</i>
C04:	<i>Explain the different technologies used in.</i>	<i>Understand</i>
C05:	<i>Interpret the AR/VR hardware and software for different applications.</i>	<i>Apply</i>

UNIT - I INTRODUCTION TO VIRTUAL REALITY [09]

Virtual Reality and Virtual Environment - Computer graphics - Real time computer graphics - Flight Simulation - Virtual environment requirement - Benefits of virtual reality - Historical Development of VR - Scientific Landmark.

UNIT - II GEOMETRIC MODELLING [09]

Virtual world space- positioning the virtual observer-perspective projection- human vision- stereo perspective projection- Color theory- Conversion From 2D to 3D- 3D space curves- 3D boundary representation- Simple 3D modelling- 3D clipping- Illumination models- Reflection models- Shading algorithms- Geometrical Transformations: Frames of reference- Modelling transformations- Instances- Picking and Flying- Scaling the VE- Collision detection.

UNIT - III VIRTUAL ENVIRONMENT [09]

Input/Output Devices- Generic VR system: Virtual environment- Computer environment- VR technology- Model of interaction- VR Systems- Animating the Virtual Environment: Linear and Nonlinear interpolation-Linear and Non-Linear Translation- shape & object in between- Free from deformation - Particle System-Physical Simulation: Objects falling in a gravitational field- Rotating wheels-Elastic Collisions- Projectiles- Simple Pendulum- Springs- Flight dynamics of an aircraft.

UNIT - IV AUGMENTED REALITY [09]

Taxonomy-Technology and Features of Augmented Reality-AR Vs VR-Challenges with AR-AR Systems and Functionality-Augmented Reality Methods-Visualization Techniques for Augmented Reality-Enhancing interactivity in AR Environments-Evaluating AR Systems.

UNIT - V DEVELOPMENT TOOLS AND FRAMEWORKS [09]

Human factors: Somatic Sense - Hardware: Sensor Hardware- Head - Coupled Displays- Acoustic Hardware-Integrated VR Systems-Software: Modelling Virtual World-Physical Simulation-VR Toolkits-VRML-Applications: Engineering -Science - Entertainment - Training - Game Development .

Total = 45 Periods

Text Books:

- 1 Coiffet P and Burdea G, Virtual Reality Technology, Wiley - IEEE Press, Hoboken, Second Edition, 2017.
- 2 Schmalstieg D and Hollerer T, Augmented Reality: Principles & Practice, Pearson Education, England, First Edition, 2016.

Reference Books:

- 1 Craig A. B, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann Publisher, United States, Second Edition, 2013.
- 2 Craig A. B and Sherman W. R, Developing Virtual Reality Applications, Foundations of Effective Design Morgan Kaufmann Publisher, United States, First Edition, 2009.
- 3 O'Connell K, Designing for Mixed Reality: Blending Data, AR and the Physical World, O'Reilly Publishers, United States, First Edition, 2019.
- 4 Sanni Siltanen S, Theory and Applications of Marker-Based Augmented Reality, Julkaisija- Utgivare Publisher, Finland, First Edition, 2012.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: 20IT664

Regulations: R 2020

Course Name: AUGMENTED AND VIRTUAL REALITY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Summarize the fundamentals of computer graphics and human-computer interaction techniques related to VR/ AR.</i>	3	3	3	3	2	-	-	-	-	-	2	3	3	2
CO2:	<i>Outline the techniques used in geometric modeling.</i>	3	3	3	3	2	-	-	-	-	-	2	3	3	2
CO3:	<i>Infer the system for the virtual reality environment.</i>	3	3	3	3	2	-	-	-	-	-	2	3	3	2
CO4:	<i>Explain the different technologies used in.</i>	3	3	3	3	2	-	-	-	-	-	2	3	3	2
CO5:	<i>Interpret the AR/VR hardware and software for different applications.</i>	3	3	3	3	2	-	-	-	-	-	2	3	3	2
Average		3	3	3	3	2	-	-	-	-	-	2	3	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - VI

20IT665	FUNCTIONAL PROGRAMMING	L	T	P	C
	(PROFESSIONAL ELECTIVE – II)	3	0	0	3

Prerequisite: Object Oriented Programming

Course Outcomes: On successful completion of the course, the student will be able to

Cognitive Level

CO1:	Outline the paradigms of programming languages.	Understand
CO2:	Summarize the fundamental design of the Functional Programming Language.	Understand
CO3:	Infer the programming structure of GOLANG language	Understand
CO4:	Explain the usage of arrays, strings and functions in real world problems	Understand
CO5:	Intrepret the concepts of map, concurrency and files to get solutions	Understand

UNIT - I PROGRAMMING LANGUAGE PARADIGM [09]

Programming languages- Programming Domains - Language EvaluationCriteria- Influences on Language Design- Language Categories- Programming Paradigms: Imperative- Object Oriented- Functional Programming and Logic Programming- Programming Language Implementation- Compilation and Virtual Machines- ProgrammingEnvironments.

UNIT - II FUNCTIONAL PROGRAMMING LANGUAGE [09]

Functional Programming-Functional Programs and Scheme-Order of Evaluation-Recursion-Higher-Order Functions-Anonymous Functions-Curryfication-Definitions-Lists-Recursion on Flat and Nested Lists-Correctness Proofs-Typed languages-Lambda-Calculus and LISP-Search Strategies in LISP

UNIT - III GOLANG [09]

Golang: Features and Advantages - Program Structure - Basic Syntax - Data Types - Variables - Constants - Operators - Decision Making - Loops.

UNIT - IV ARRAYS, STRINGS AND FUNCTIONS [09]

Go Arrays: Slice -Command Args. Strings: Regex -Functions: Recursion -Closure-Types: Struct -Interface -Pointer -Reflect -Rune

UNIT -V MAP, CONCURRENCY AND FILE [09]

Go Map - Go Error: Go Recover - Go Defer - Go Panic - Go Concurrency: Go Race - Go Mutex- Go Atomic Variable - Go Channels - Go Worker Pools - File: Golang File Handling - Packages - File Path - Read/ Write

Total = 45 Periods

Text Books:

- 1 Alan A. A. Donovan and Brian W. Kernighan, The Go Programming Language, Addison Wesley, United States, First Edition, 2015.
- 2 Fethi A. Rabhi and Guy Lapalme, Algorithms - A Functional Programming Approach, Pearson Education, England, First Edition, 1999.

Reference Books:

- 1 oe Armstrong, Programming Erlang. Software for a Concurrent World, O'Reillypublication, United States, First Edition, 2009.
- 2 ack Widman, Learning Functional Programming, O'Reillypublication, United States, First Edition, 2022.
- 3 Stan Vangilder, Up and Running with Concurrency in Go (Golang), O'Reillypublication, United States, First Edition, 2021.
- 4 Lex Sheekan, Learning Functional Programming in Go, Packt Publishing, India, First Edition, 2017.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: 20IT665

Regulations: R 2020

Course Name: FUNCTIONAL PROGRAMMING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Outline the paradigms of programming languages.</i>	3	3	3	3	2						2	3	3	2
CO2:	<i>Summarize the fundamental design of the Functional Programming Language.</i>	3	3	3	3	2						2	3	3	2
CO3:	<i>Infer the programming structure of GOLANG language</i>	3	3	3	3	2						2	3	3	2
CO4:	<i>Explain the usage of arrays, strings and functions in real world problems</i>	3	3	3	3	2						2	3	3	2
CO5:	<i>Intreperet the concepts of map, concurrency and files to get solutions</i>	3	3	3	3	2						2	3	3	2
Average		3	3	3	3	2						2	3	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - VI

20IT666	INTERNET OF THINGS (PROFESSIONAL ELECTIVE – II)	L	T	P	C
		3	0	0	3

Prerequisite: Micro Controller and Embedded Systems

Course Outcomes: On successful completion of the course, the student will be able to

- CO1: Comprehend the definition and significance of the Internet of Things
 CO2: Understand the architecture, operation, and business benefits of an IoT solution
 CO3: Describes the physical and logical design of IoT Using Python
 CO4: Design and program IoT devices, use real IoT protocols for communication, Secure the elements of an IoT device.
 CO5: Create real world application using IoT tools

Cognitive Level
 Understand
 Remember
 Analyze
 Apply
 Create

UNIT – I BASICS OF INTERNET OF THINGS [9]

Defining and Characteristics of IoT - Elements of an IoT ecosystem -- Physical Design of IoT - Logical Design of IoT: Functional Blocks - Communication Models - IoT Communication APIs - IoT Enabling Technologies -IoT reference Model - Domain specific IoT

UNIT – II IoT ARCHITECTURE AND COMMUNICATION PROTOCOL [9]

Layered Architecture for IoT, Protocol Architecture of IoT, Infrastructure Protocols: MAC protocols for sensor network, S-MAC, IEEE 802.15.4, Near Field Communication (NFC), RFID, ZigBee, Bluetooth Low Energy (BLE), IPv6 over Low-Power Wireless Personal Area Networks (6LoWPAN), Long Term Evolution-Advanced, Z-Wave, Protocols for IoT Service Discovery: DNS service discovery, multicast domain name system

UNIT – III IoT PROTOCOL [9]

Constrained Application Protocol (CoAP), Message Queue Telemetry Transport (MQTT), Extensible Messaging and Presence Protocol (XMPP), Advanced Message Queuing Protocol (AMQP), Data Distribution Service (DDS) - representational state transfer (REST)

UNIT – IV PLATFORMS FOR IOT APPLICATIONS AND ANALYTICS [9]

Role of the cloud and fog resources in the delivery of IoT services, The IoT Building Blocks, Connected Devices, IoT or Sensor Data Gateway, The IoT Data Analytics Platforms: IBM Watson IoT Platform, Splunk Software for IoT Data, Amazon Web Service IoT Platform, Azure IoT Hub, The IoT Data Virtualization Platforms, IoT Data Visualization Platform, Security and Privacy in IoT

UNIT – V IOT APPLICATION AND TOOLS [9]

Cloud Storage Models and Communication APIs: WAMP - Xively Cloud for IoT - RESTful web API - Amazon Web Service- Tools for IoT: Chef - Puppet.CaseStudy: Eclipse IoT - Home automation, Agriculture and IoT printer.

Total = 45 Periods

Text Books :

- 1 Srinivasa K. G., Siddesh G. M., Hanumantha Raju R, Internet of Things, Cengage India, First Edition, 2018
- 2 Arsdeep Bahga and Vijay Madiseti, Internet of Things - Hands on Approach, University Press India Private Limited, Hyderabad, First Edition, 2018

Reference Books :

- 1 Simone Cirani, Gianluigi Ferrari, Marco Picone, Luca Veltri, Internet of Things: Architectures, Protocols and Standards, Wiley, First Edition, 2018
- 2 David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, First Edition, 2017
- 3 Dr Kamlesh Lakhwani, Dr Hemant Kumar Gianey, Joseph Kofi Wireko, Kamal Kant Hiran , Internet of Things (IoT), Principles, Paradigms and Applications of IoT, First Edition, 2020
- 4 Pethuru Raj and Anupama C. Raman, The Internet of Things: Enabling Technologies, Platforms, and Use Cases, CRC Press, Second Edition, 2022

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT666**

Regulations:

R 2020

Course Name:

INTERNET OF THINGS

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
1	Comprehend the definition and significance of the Internet of Things	3	3	3	2	3				1				1	3	1
2	<i>Understand the architecture, operation, and business benefits of an IoT solution</i>	3	3	3	2	3				1				1	3	1
3	<i>Describes the physical and logical design of IoT Using Python</i>	3	3	3	1	3				1				1	3	1
4	<i>Design and program IoT devices, use real IoT protocols for communication, Secure the elements of an IoT device.</i>	3	3	3	2	3				1				1	3	1
5	<i>Create real world application using IoT tools</i>	3	3	3	2	3				1				1	3	1
Average		3	3	3	2	3				1				1	3	1

SEMESTER – VI**WIRELESS COMMUNICATION
(PROFESSIONAL ELECTIVE – III)**

L	T	P	C
3	0	0	3

20IT667

Prerequisite: Computer Networks**Course Outcomes: On Completion of this course, the student will be able to****Cognitive level**

CO1:	Demonstrate the understanding on functioning of wireless communication system and evolution of different wireless communication systems and standards.	Understand
CO2:	Compare different technologies used for wireless communication systems.	Apply
CO3:	Explain the multiple access techniques for wireless communication	Understand
CO4:	Illustrate the architecture, functioning, protocols, capabilities and application of various wireless communication networks	Understand
CO5:	Evaluate the design challenges, constraints and security issues associated with Ad-hoc wireless networks.	Evaluate

UNIT-I WIRELESS COMMUNICATION [09]

Wireless Communication - Various Modulation Techniques for Wireless Communication- Cellular Communication- Different Generations and Standards in Cellular Communication System- Satellite Communication Including GPS- Wireless Local Loop- Cordless Phone- RFID.

UNIT-II MODULATION TECHNIQUES [09]

Multicarrier Modulation -OFDM-MIMO System- Diversity-Multiplexing Trade-Off- MIMO-OFDM System- Smart-Antenna; Beamforming and MIMO - Cognitive Radio- Software Defined Radio- Communication Relays- Spectrum Sharing.

UNIT – III MULTIPLE ACCESS TECHNIQUES IN WIRELESS COMMUNICATION [09]

Contention - Free Multiple Access Schemes:FDMA - TDMA- CDMA - SDMAand Hybrid- Contention-Based Multiple Access Schemes:ALOHA and CSMA.

UNIT –IV WIRELESS NETWORKS AND STANDARDS [09]

Wireless Networks and Standards: Wireless Personal Area Networks:Bluetooth and Zigbee- Wireless Local Area Networks:IEEE 802.11- Network Architecture- Medium Access Methods - WLAN Standards- Wireless Metropolitan Area Networks

UNIT-V WIRELESS ADHOC NETWORKS AND SECURITY [09]

Design Challenges in AdhocWireless Networks- Concept of Cross Layer Design- Energy Constrained Networks- MANET- WSN Security Standards In Current Wireless & Mobile Systems:WEP and WPA - Security For Wireless Ad Hoc And Sensor Networks

Total =45 Periods**Text Books:**

- 1 Andrea Goldsmith, Wireless Communications, Cambridge University Press, United Kingdom, Second Edition, 2020.
- 2 Sanjay Kumar, Wireless Communication the Fundamental and Advanced Concepts, River Publishers, Denmark, First Edition, 2015

Reference Books:

- 1 Jochen Schiller, Mobile communication, Pearson Education, India, Second Edition, 2014.
- 2 Andreas F. Molisch, Wireless Communications, Wiley-IEEE Press, United States, Second Edition, 2010.
- 3 SahaMisra, Wireless Communication and Networks: 3G and Beyond, McGraw Hill Education, India, Second Edition, 2013.

CO-PO MAPPING

Course Code: 20IT667

Regulations:

R 2020

Course Name:

WIRELESS COMMUNICATION

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	<i>Demonstrate the understanding on functioning of wireless communication system and evolution of different wireless communication systems and standards.</i>	3	3	3	3	-	-	-	-	-	-	-	2	3	1
CO 2	<i>Compare different technologies used for wireless communication systems.</i>	3	3	3	3	-	-	-	-	-	-	-	2	3	1
CO 3	<i>Explain the multiple access techniques for wireless communication</i>	3	3	3	3	-	-	-	-	-	-	-	2	3	1
CO 4	<i>Illustrate the architecture, functioning, protocols, capabilities and application of various wireless communication networks</i>	3	3	3	3	-	-	-	-	-	-	-	2	3	1
CO 5	<i>Evaluate the design challenges, constraints and security issues associated with Ad-hoc wireless networks.</i>	3	3	3	3	--	-	-	-	-	-	-	2	3	1
Average		3	3	3	3	-	-	-	-	-	-	-	2	3	1

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – VI

R 2020

20IT668	C# AND .NET TECHNOLOGIES (PROFESSIONAL ELECTIVE – III)	L	T	P	C
		3	0	0	3
<i>Prerequisite: Object Oriented Programming</i>					
Course Outcomes: On Completion of this course, the student will be able to					
	<i>CO1: Classify the data types in C#</i>	Cognitive level <i>Analyze</i>			
	<i>CO2: Apply advanced features of C#</i>	<i>Apply</i>			
	<i>CO3: Create class libraries and threads</i>	<i>Create</i>			
	<i>CO4: Develop window based applications</i>	<i>Apply</i>			
	<i>CO5: Design applications using .NET framework</i>	<i>Create</i>			
UNIT-I	INTRODUCTION	[09]			
Net Architecture Core C# - Variables - Data Types - Flow control - Objects and Types - Classes and Structs - Inheritance- Generics - Arrays and Tuples - Operators and Casts - Indexes.					
UNIT-II	ADVANCED FEATURES	[09]			
Delegates - Lambdas - Lambda Expressions - Events - Event Publisher - Event Listener - Strings and Regular Expressions - Generics - Collections - Memory Management and Pointers - Errors and Exceptions - Reflection.					
UNIT – III	CLASS LIBRARIES AND DATA MANIPULATION	[09]			
Diagnostics - Tasks - Threads and Synchronization -.Net Security - Localization - Manipulating XML - SAX and DOM -Manipulating files and the Registry - Transactions - ADO.NET- PeertoPeer Networking - PNRP - Building P2P Applications.					
UNIT -IV	WINDOW BASED APPLICATIONS	[09]			
Window based applications - Core ASP.NET - ASP.NET Web forms - Windows Communication Foundation (WCF) - Introduction to Web Services - .Net Remoting - Windows Service - Windows Workflow Foundation (WWF) - Activities Workflows					
UNIT-V	.NET FRAMEWORK	[09]			
Assemblies-Shared assemblies - Custom Hosting with CLR Objects - Appdomains - Core XAML- Bubbling and Tunneling Events - Reading and Writing XAML - .Net Compact Framework - Compact Edition Data Stores - Errors - Testing and Debugging - Optimizing performance - Packaging and Deployment - Networking and Mobile Devices					
Total =45 Periods					

Text Books:

- 1 Christian Nagel, Bill Evjen, Jay Glynn, Professional C# 2012 and .NET 4.5, Wiley, India, Second Edition, 2012
- 2 Andrew Troelsen, Pro C# 5.0 and the .NET 4.5 Framework, Apress publication, India, Sixth Edition, 2012

Reference Books:

- 1 an Gariffiths, Mathew Adams, Jesse Liberty, Programming C# 4.0 , O'Reilly, Sixth Edition, United states, 2010
- 2 Andy Wigley, Daniel Moth, Peter Foot, Microsoft Mobile Development Handbook, First Edition, Microsoft Press, United states, 2007
- 3 Jung Hyun Han, 3D Graphics for Game Programming, CRC Press, United states, First Edition, 2011.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT668**

Regulations: **R 2020**
 Course Name: **C# and .Net Technologies**

CO PO MAPPING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Classify the data types in C#</i>	3	3	3	3	2								3	2
CO2	<i>Apply advanced features of C#</i>	3	3	3	3	2								3	2
CO3	<i>Create class libraries and threads</i>	3	3	3	3	2								3	2
CO4	<i>Develop window based applications</i>	3	3	3	3	2								3	2
CO5	<i>Design applications using .NET framework</i>	3	2	2	3	2								3	2
Average		3	3	3	3	2								3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - VI

20IT669	MACHINE LEARNING TECHNIQUES (PROFESSIONAL ELECTIVE – III)	L	T	P	C
		3	0	0	3

Prerequisite: Data Analytics

Course Outcomes: On successful completion of the course, the student will be able to

Cognitive Level

CO1: Illustrate the basic concepts and techniques of machine learning	Understand
CO2: Develop appropriate computational model for supervised learning	Create
CO3: Outline the algorithms, applications that are used for unsupervised learning.	Understand
CO4: Design neural network for a given application	Create
CO5: Implement reinforcement learning algorithm for exploration related problems	Apply

UNIT – I INTRODUCTION [9]

Learning Problems - Perspectives and Issues - Concept Learning task - Version Spaces and Candidate Eliminations - Inductive bias - Regression - Linear regression - Logistic regression - Decision Tree learning - Representation - Algorithm - Heuristic Space Search- Hypothesis Space Search - issues

UNIT – II SUPERVISED LEARNING [9]

Bayes Theorem - Concept Learning - Maximum Likelihood - Minimum Description Length Principle - Bayes Optimal Classifier - Gibbs Algorithm - Naïve Bayes Classifier - Bayesian Belief Network - EM Algorithm - Probability Learning - Sample Complexity - Finite and Infinite Hypothesis Spaces - Mistake Bound Model of learning - Applications and Use cases.

UNIT – III UNSUPERVISED LEARNING [9]

Clustering - Hierarchical - divisive, agglomerative, dendrograms, K- means - identification of centroids and location near centroids - Clustering large applications (CLARA) - Dimension Reduction - Genetic Algorithm - Applications & Use cases.

UNIT – IV ARTIFICIAL NEURAL NETWORKS [9]

Artificial Neural Network Representation - Perceptrons - Multilayer Networks and Back Propagation Algorithms - Advanced Topics in neural networks - K- Nearest Neighbour Learning - Locally weighted Regression - Random Forest Algorithm - Applications and Use cases.

UNIT – V LEARNING SETS OF RULE AND REINFORCEMENT LEARNING [9]

Learning Sets of Rules - Sequential Covering Algorithm - Learning Rule Set - First Order Rules - Sets of First Order Rules - Induction on Inverted Deduction - Inverting Resolution - Analytical Learning - Perfect Domain Theories - Explanation-Based Learning - Reinforcement Learning - Task - Q-Learning - Temporal Difference Learning- Applications and Use cases.

Total = 45 Periods

Text Books:

- 1 Tom M. Mitchell, Machine Learning, McGraw Hill Education, United States, First Edition, 2017.
- 2 Stephen Marsland, Machine Learning: An Algorithmic Perspective, CRC Press Taylor & Francis Group, United States, Second Edition, 2015.

Reference Books:

- 1 Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press, United States, Fourth Edition, 2020.
- 2 Harrington, Peter. Machine learning in action. Manning Publications Co., United States, First edition, 2012
- 3 Kevin P. Murphy, Machine Learning A Probabilistic Perspective, The MIT Press, United States, First Edition, 2012
- 4 S.Sridhar, M.Vijayalakshmi, Machine Learning, Oxford University Press, London, First Edition, 2021.

CO-PO MAPPING

Course Code: 20IT669

Regulations:

R 2020

Course Name:

Machine Learning Techniques

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Illustrate the basic concepts and techniques of machine learning</i>	3	3	3	3	1					2		2	2	2
CO2:	<i>Develop appropriate computational model for supervised learning</i>	3	3	3	3	1					2		2	2	2
CO3:	<i>Outline the algorithms, applications that are used for unsupervised learning.</i>	3	3	3	3	1					2		2	2	2
CO4:	<i>Design neural network for a given application</i>	3	3	3	3	1					2		2	2	2
CO5:	<i>Implement reinforcement learning algorithm for exploration related problems</i>	3	2	2	3	1					2		2	2	2
Average		3	3	3	3	1					2		2	2	2

1: Slight (Low) 2: Moderate (Medium)

SEMESTER - VI

20IT670	OPEN SOURCE SOFTWARE (PROFESSIONAL ELECTIVE – III)	L	T	P	C
		3	0	0	3

Prerequisite:IT Essentials

Course Outcomes: On successful completion of the course, the student will be able to

Cognitive Level

CO1: Discuss the basic concepts in Open-Source Software	Understand
CO2: Apply the knowledge of MySQL for application development	Apply
CO3: Develop applications using PHP	Create
CO4: Develop programs to deliver solutions for the given problem using python	Create
CO5: Outline the life cycle and operations of GIT	Understand

UNIT - I INTRODUCTION [9]

Open sources - Need, Uses and advantages- Applications of Open Sources - LINUX: Kernel Mode and user mode - Process-Scheduling - Personalities - Cloning - Signals - Development with Linux- Apache Tomcat:Installation. XAMPP Server.

UNIT - II MYSQL DATABASE [9]

Setting up account - Starting and terminating SQL Programs - Create SQL statements - Record selection Technology- Sorting Query Results-Strings - Date and Time- Group Functions - Generating Summary - Working with metadata - Using sequences - MySQL and Web.

UNIT - III PHP [9]

Programming in web environment - variables - constants - data types - operators - Statements -Functions - Arrays - OOPs - String Manipulation and regular expression - File handling and data storage - PHP and MySQL database Connectivity- Email management - Debugging and error handling -Security - Templates.

UNIT - IV PYTHON [9]

Syntax and Style - Python Objects - Numbers - Sequences - Strings - Lists and Tuples - Dictionaries - Conditionals andLoops - Files - Input and Output - Errors and Exceptions - Functions - Modules - Classes and OOP - Execution

UNIT - V GIT [9]

Version Control System: Functions and Types - Advantages - Environment Setup - LifeCycle - Operations : Staging and commits - Undoing changes -Inspecting changes - Branching & Merging - Collaborating: Fetch , Pull and Push.

Total =45Periods**Text Books:**

- 1 Remy Card, Eric Dumas and Frank Mevel, The Linux Kernel Book, Wiley Publications, New York,2013
2. Frank M. Kromann, W Jason Gilmore , Beginning PHP and MySQL,Apress publication,USA,2018

Reference Books :

- 1 Steve Suehring,TimConverse,Joyce Park,PHP6 and MySQL Bible,WileyIndia Private Limited,New Delhi,2009
- 2 Martin C. Brown, Perl: The Complete Reference, Tata McGraw-Hill Publishing Company Limited, India ,2009
- 3 Steven Holzner, PHP: The Complete Reference, TMG Publishing Company Limited, India ,2009
- 4 VikramVaswani, MYSQL: The Complete Reference, TMG Publishing Company Limited, India, 2009

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT670**

Regulations:
 Course Name:

R 2020
OPEN SOURCE SOFTWARE

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1:	<i>Discuss the basic concepts in Open-Source Software</i>	3	3	3	3	3									3	3
CO2:	<i>Apply the knowledge of MySQL for application development</i>	3	3	3	3	3									3	3
CO3:	<i>Develop applications using PHP</i>	3	3	3	3	3									3	3
CO4:	<i>Develop programs to deliver solutions for the given problem using python</i>	3	3	3	3	3									3	3
CO5:	<i>Outline the life cycle and operations of GIT</i>	3	3	3	3	3									3	3
Average		3	3	3	3	3									3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER - VI

20IT671	TELE COMMUNICATION AND SWITCHING TECHNIQUES (PROFESSIONAL ELECTIVE – III)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Course Outcomes: On successful completion of the course, the student will be able to

CO1: Comprehend the main concepts of telecommunication switching and circuit.

CO2: Analyze and evaluate the fundamentals of electronic switching.

CO3: Describe the basic modern signalling system.

CO4: Determine the integrated digital networks system problems.

CO5: Apply the basic concepts of data networks.

Cognitive Level

Understand

Apply

Analyze

Evaluate

Apply

UNIT - I EVOLUTION OF TELECOMMUNICATION SWITCHING AND CIRCUIT [09]

Evolution of Public Switched Telecommunication Networks Stronger exchange - Crossbar exchange - Stored programme exchange Digital exchange - Basic Tele communication equipments - Telephone handset - Hybrid circuit - Echo suppressors and cancellers - PCMcoders - Modems and Relays.

UNIT - II ELECTRONIC SWITCHING [09]

Circuit Switching - Message switching -Centralized stored programme switching - Time switching - Spare switching, Combination switching - Digital switching system hardware configuration -Switching system software -Switching system call processing software -Hardware software integration.

UNIT - III TELECOMMUNICATION SIGNALLING AND TRAFFIC [09]

Channel associated signalling -Common channel signalling -SS7 signalling protocol - SS7protocol architecture - Concept of Telecommunication traffic -Grade of service - Modelling switching systems -Blocking models and Delay systems.

UNIT - IV INTEGRATED DIGITAL NETWORKS [09]

Subscriber loop characteristics -Local access wire line - wireless PCM / TDM carrierstandards transmission line codes -Digital multiplexing techniques -Synchronous, Asynchronous -Plesiocronous multiplexing techniques -SONET / SDH -Integrated DigitalNetwork (IDN) environment - Principles of Integrated Services Digital Network (ISDN) -Cellular Mobile Communication Principles.

UNIT - V DATA NETWORKS [09]

Data transmission in PSTN - Connection oriented and Connection less protocols - packetswitching - ISO-OSI architecture-Satellite based data networks - Multiple accesstechniques - LAN, WAN standards - TCP / IP - Internet - Principles of ATM networks.

Total (L= 0, T = 30) = 45 Periods

Text Books :

- 1 John. C. McDonald, Fundamentals of Digital Switching, Springer, US, Second Edition, 2013
- 2 J.E. Flood, Telecommunication Switching Traffic and networks, Pearson Education Ltd, India, Second Edition, 2016

Reference Books :

- 1 Thiagarajan Viswanathan, Manav Bhatnagar, Telecommunication Switching Systems and networks, PHI Learning Private Limited, India, Second Edition, 2015
- 2 Peter Bocker, G. Arndt, The Integrated Services Digital Network, Springer Berlin Heidelberg Publisher, Germany, Second edition, 2013
- 3 Behrouz A. Forouzan, Data Communications and Networking, McGraw-Hill, India, Fourth Edition, 2017
- 4 P. Gnanasivam, Telecommunication Switching and Networks, New Age International Pvt Ltd Publishers, India, Second Edition, 2010

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT671**Regulations: **R 2020**Course Name: **Tele Communication and Switching Techniques****CO PO MAPPING**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Comprehend the main concepts of telecommunication switching and circuit.</i>	3	2	3	2	-	-	-	-	3	2	-	3	2	-
CO2	<i>Analyze and evaluate the fundamentals of electronic switching.</i>	3	3	2	2	-	-	-	-	3	3	-	3	2	-
CO3	<i>Describe the basic modem signalling system.</i>	3	2	2	2	-	-	-	-	3	3	-	3	2	-
CO4	<i>Determine the integrated digital networks system problems.</i>	3	3	3	3	-	-	-	-	3	3	-	3	2	-
CO5	<i>Apply the basic concepts of data networks.</i>	3	3	3	3	-	-	-	-	3	3	-	3	2	-
Average		3	3	3	3	-	-	-	-	3	3	-	3	2	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - VI

	AUGMENTED INTELLIGENCE LED MANAGED SERVICES – II	L	T	P	C
20IE691	(Common to CS, EC, EE and IT) (PROFESSIONAL ELECTIVE – III)	3	0	0	3

Prerequisite: Basic Knowledge of Augmented Intelligence Led Managed Services (AIMS) - I.

Course Outcomes : On Completion of this course, the student will be able to

Cognitive Level

CO1: Recognize the essentials of Cloud Computing	Understand
CO2: Identify with the Big Data Platform and create a Hadoop Environment and Generate a Map-Reduce Programming	Apply
CO3: Infer the ML and other AI technologies to implement the application.	Understand
CO4: Apply RPA technologies to automate the identification and resolution of common IT issues.	Apply
CO5: Inspect the life cycle of help desk tickets and fulfilment requests in ServiceNow.	Apply

UNIT - I CLOUD COMPUTING [9]

Introduction - Characteristics of Cloud computing - Architecture - Types - Service Models - SaaS, IaaS, PaaS - Regions - Cloud Security.

UNIT- II BIG DATA AND DATA SCIENCE [9]

Introduction - Data Science and Challenges - HDFS and Hadoop - Structured and Unstructured data - Processing Big Data - Supervised and Unsupervised Learning - Text Analysis - Data visualization.

UNIT- III AI/ML AND AIOPS [9]

Introduction - Structure of Intelligent Agents - Knowledge and Reasoning - Machine Learning - Deep Learning - Applications of AI - AIOps Technologies - AIOps Benefits - Implementation.

UNIT - IV ROBOT PROCESS AUTOMATION [9]

Introduction - Variables - Control flow - Data Tables and Excel Automation - UI Automation - Selectors - Email Automation.

UNIT - V SITE RELIABILITY ENGINEERING AND SERVICENOW [9]

Introduction - Adopting a DevOps and SRE Model - SRE Vs DevOps - Architecture and Lifecycle - Practices - Error Budgets - Toil Management - DevOps Tools - Introduction to ServiceNow - Reporting and Managing Issue - Benefits.

Total = 45 Periods

TEXT BOOKS :

- 1 Daniel Kirsch, Judith Hurwitz, Cloud Computing for Dummies, John Wiley & Sons, Second Edition, 2020
- 2 EMC Education Services, Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, Wiley, First Edition, 2015.

REFERENCE BOOKS :

- 1 Ui Path, RPA Design and Development, UiPath Academic Alliance Resource
- 2 Shamayel Mohammed Farooqui, Vishnu Vardhan Chikoti, Hands-on Site Reliability Engineering, PBP, First Edition, 2021
- 3 Tim Woodruff, Learning ServiceNow, Packt Publishing Limited, Second Edition, 2018.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
CO-PO MAPPING

Course Code:20IE691

Regulations: R 2020

Course Name: AUGMENTED INTELLIGENCE LED
MANAGED SERVICES– II

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Recognize the essentials of Cloud Computing	3	3	2	-	2	-	-	-	2	-	-	2	-	-
CO2	Identify with the Big Data Platform and create a Hadoop Environment and Generate a Map-Reduce Programming	3	3	3	-	3	-	-	-	1	-	-	3	-	-
CO3	Infer the ML and other AI technologies to implement the application	2	2	3	-	2	-	-	-	1	-	-	2	-	-
CO4	Apply RPA technologies to automate the identification and resolution of common IT issues.	2	2	2	-	3	-	-	-	1	-	-	3	-	-
CO5	Inspect the life cycle of help desk tickets and fulfilment requests in ServiceNow.	3	2	3	-	3	-	-	-	3	-	-	2	-	-
Average		3	2	3	-	3	-	-	-	1	-	-	2	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER – VII**MOBILE APPLICATION DEVELOPMENT****20IT711**

L	T	P	C
3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course**Course Outcomes:** On completion of this course, the student will be able to

CO1: Discuss the requirements for mobile applications

CO2: Explain the challenges in mobile application design and development

CO3: Develop design for mobile applications for specific requirements

CO4: Examine the design using Android SDK

CO5: Deploy mobile applications in Android and iPhone marketplace for distribution

Cognitive level

Understand

Understand

Applying

Analyzing

Creating

UNIT – I**INTRODUCTION****[9]**

Introduction to mobile applications - Embedded systems - Market and business drivers for mobile applications - Publishing and delivery of mobile applications - Requirements gathering and Validation for mobile applications

UNIT – II**BASIC DESIGN****[9]**

Introduction - Basics of embedded systems design - Embedded OS - Design constraints for Mobile applications both hardware and software related - Architecting Mobile applications - User interfaces for mobile applications - touch events and gestures - Achieving quality constraints - Performance, usability, security, availability and modifiability.

UNIT – III**ADVANCED DESIGN****[9]**

Designing applications with multimedia and web access capabilities - Integration with GPS and social media networking applications - Accessing applications hosted in a cloud computing Environment - Design patterns for mobile applications

UNIT – IV**TECHNOLOGY I ANDROID****[9]**

Introduction - Establishing the development environment - Android Architecture - Activities and views - Interacting with UI - Persisting data using SQLite - Packaging and deployment - Interaction with server side applications - Using Google Maps- GPS and Wifi Integration with social media applications

UNIT – V**TECHNOLOGY II IOS****[9]**

Introduction to Objective C - IOS features - UI implementation - Touch frameworks - Data persistence using Core Data and SQLite - Location aware applications using Core Location and Map Kit - Integrating calendar and address book with social media application - Using Wifi - iPhone marketplace

Total = 45 Periods**Text Books :**

- 1 Jeff McWherter and Scott Gowell, Professional Mobile Application Development, Wrox, 2012.
- 2 Charlie Collins, Michael Galpin and Matthias Kappler, Android in Practice, Dream Tech, 2012

Reference Books :

- 1 James Dovey and Ash Furrow, Beginning Objective C, Apress, 2012
- 2 David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, Beginning IOS 6 Development: exploring the iOS SDK, Apress, 2013.
- 3 Reto Meier, Professional Android 4 Application Development, Wrox Publications, John Wiley, 2012.
- 4 <http://developer.android.com/develop/index.html>

Regulation : R2020

Course Code : 20IT711

Course Name : MOBILE APPLICATION DEVELOPMENT

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Discuss the requirements for mobile applications	3	3	3	2	1	-	-	-	-	-	-	-	3	2
CO2:	Explain the challenges in mobile application design and development	3	3	3	2	1	-	-	-	-	-	-	-	3	2
CO3:	Develop design for mobile applications for specific requirements	3	3	3	2	2	-	-	-	-	-	-	-	3	2
CO4:	Examine the design using Android SDK	3	3	3	2	2	-	-	-	-	-	-	-	3	2
CO5:	Deploy mobile applications in Android and iPhone marketplace for distribution.	3	3	3	2	2	-	-	-	-	-	-	-	3	2
Average		3	3	3	2	2	-	-	-	-	-	-	-	3	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R COLLEGE OF ENGINEERING, TIRUCHENGODE-637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO PO MAPPING

Regulation : R2020

Course Code : 20IT712

Course Name : COMPUTER GRAPHICS AND VISUALIZATION

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Analyze a wide range of graphic design problems	2	3	3	3	2	-	-	-	-	-	1	2	1	2
CO2:	Demonstrate the concepts of two dimensional geometric transformations and Clipping operations	3	3	3	3	3	-	-	-	-	-	1	2	2	3
CO3:	Comprehend the concepts related to three dimensional object representations	3	2	3	3	3	-	-	-	-	-	1	2	2	3
CO4:	Illustrate the Animation languages	2	2	3	2	3	-	-	-	-	-	1	2	2	2
CO5:	Discuss Visualization Principles and its Algorithms	3	2	3	2	3	-	-	-	-	-	1	3	3	2
Average		3	2	3	3	3	-	-	-	-	-	1	2	2	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – VII

R 2020

20IT713	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
		3	0	0	3

Prerequisite: Computer Networks**Course Outcomes:** On completion of this course, the student will be able to**Cognitive Level**

C01: Understand various Cryptographic Techniques	Understand
C02: Elaborate the concept of various Block Ciphers	Understand
C03: Explain various Public key cryptography algorithms	Understand
C04: Make use of data transmission security for Authentication	Applying
C05: Evaluation of security among the systems by making the firewall and security standards efficient	Evaluate

UNIT – I INTRODUCTION [9]

The OSI security architecture - Services, Mechanisms and attacks - Network security model - Classical Encryption Techniques: Symmetric Cipher Model - Substitution Techniques - Transposition Techniques. Number Theory: Polynomial Arithmetic -Prime numbers - Fermat's and Euler's theorem - Testing for Primality - The Chinese Remainder Theorem

UNIT – II BLOCK CIPHERS [9]

Block cipher principles-Data Encryption Standard-Advanced Encryption Standard (AES)-Block cipher modes of operation-Triple DES-Blowfish- RC5Algorithm.

UNIT – III PUBLIC KEY CRYPTOGRAPHY [9]

Principles of public key cryptosystems-The RSA algorithm-Key management -Diffie Hellman Key exchange-Elliptic curve arithmetic - Elliptic curve cryptography

UNIT – IV HASH FUNCTIONS AND DIGITAL SIGNATURES [9]

Hash functions-Hash Algorithms: MD5-Secure Hash Algorithm-Authentication functions-Message authentication codes- Digital Signatures: Authentication protocols- Digital signature standard

UNIT – V SECURITY PRACTICE AND SYSTEM SECURITY [9]

Authentication applications - Kerberos - X.509 Authentication services - Internet Firewalls for Trusted System: Roles of Firewalls - Firewall related terminology-Types of Firewalls - Firewall designs - SET for E- Commerce Transactions. Intruder - Intrusion detection system - Virus and related threats - Countermeasures - Firewalls design principles

Total = 45 Periods**Text Books :**

- 1 William Stallings, Cryptography and Network Security, Pearson Education, New Delhi, Sixth Edition, 2013
- 2 Behrouz A Forouzan, Cryptography and Network Security, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2007

Reference Books :

- 1 AtulKahate, Cryptography and Network Security, McGraw Hill Education India Pvt Ltd, Second Edition, 2009
- 2 Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security, Prentice Hall of India, 2002
- 3 CharlesPfleeger, Security in computing, Prentice Hall of India, Fourth Edition, 2006
- 4 UlysessBlack, Internet Security Protocols, Pearson Education Asia, 2000

Regulation : R2020

Course Code : 20IT713

Course Name : CRYPTOGRAPHY AND NETWORK SECURITY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Understand various Cryptographic Techniques	3	3	2	3	-	-	-	-	-	-	-	2	2	-
CO2:	Elaborate the concept of various Block Ciphers	3	3	2	3	-	-	-	-	-	-	-	2	2	-
CO3:	Explain various Public key cryptography algorithms	3	3	2	3	-	-	-	-	-	-	-	2	2	-
CO4:	Make use of data transmission security for Authentication	3	3	2	3	-	-	-	-	-	-	-	2	2	-
CO5:	Evaluation of security among the systems by making the firewall and security standards efficient	3	3	2	3	-	-	-	-	-	-	-	2	2	-
Average		3	3	2	3	-	2	2	-						

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - VII

20IT714	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Course Outcomes: On completion of this course- the student will be able to

CO1: Interpret knowledge about intelligent agent

CO2: Outline the optimistic problems of CSP

CO3: Discuss about First order logic and syntax, semantics

CO4: Explain about planning problems

CO5: Summarize the basic concepts of learning and communication

COGNITIVE LEVEL

Understand

Understand

Understand

Evaluate

Understand

UNIT – I FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE [9]

Intelligent Agents - Agents and environments - Good behavior - The nature of environments -Structure of agents - Problem Solving - Problem solving agents - Example problems -Searching for Solutions - Uniformed search strategies - Avoiding Repeated States - Searching with partial information

UNIT – II SEARCHING TECHNIQUES [9]

Informed search and exploration - Informed search strategies - Heuristic Function - Local Search Algorithms and optimistic problems - Constraint Satisfaction Problems (CSP) - Backtracking search - Structure of problems - Adversarial Search -Games - Optimal decisions in games - Alpha , Beta Pruning

UNIT – III LOGICAL REASONING [9]

First order logic - Representation Revisited - Syntax and semantics for first order logic - Using first order logic - Knowledge Engineering in first order logic - Inference in First Order Logic - Prepositional versus first order logic -Unification and Lifting - Forward Chaining - Backward Chaining - Resolution - Knowledge representation

UNIT – IV PLANNING [9]

The Planning Problem - Planning with statespace search - Partialorder planning - Planning graphs - planning and acting in the real world :Time schedules and resources - Planning and acting in non deterministic Domain - Conditional Planning - Execution monitoring and preplanning - continuous planning and multi agent planning

UNIT-V LEARNING AND COMMUNICATIONS [9]

Learning from observation - Inductive learning - Decision trees - Explanation based learning Communication - Communication as action - Formal grammar for a fragment of English -Syntactic analysis - Augmented grammars -Semantic interpretation - Ambiguity and disambiguation - Discourse understanding - Grammar induction

Total = 45 Periods

Text Books :

- 1 S. Russel and P. Norvig, Artificial Intelligence ,A Modern Approach, Third Edition, Pearson Education, 2016
- 2 Michael Huth and Mark Ryan, Logic in Computer Science: Modelling and Reasoning about Systems, Cambridge University Press, Second edition, 2014

Reference Books :

- 1 Elaine Rich and Kevin Knight and Shivashankar B.Nair, Artificial Intelligence, 2nd Edition, Tata McGraw-Hill, 2009
- 2 David Poole, Alan Mackworth, Randy Goebel, Computational Intelligence : a logical approach, Oxford University Press, 2004
- 3 G. Luger, Artificial Intelligence: Structures and Strategies for complex problem solving, Fourth Edition, Pearson Education, 2012
- 4 Nils J. Nilsson, Artificial Intelligence: A new Synthesis, Harcourt Asia Pvt. Ltd., 2012

K.S.R COLLEGE OF ENGINEERING, TIRUCHENGODE-637215

DEPARTMENT OF INFORMATION TECHNOLOGY

CO PO MAPPING

Regulation : R2020

Course Code : 20IT714

Course Name : ARTIFICIAL INTELLIGENCE

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Interpret knowledge about intelligent agent</i>	3	2	2	2	3	-	-	-	-	-	-	-	3	1
CO2:	<i>Outline the optimistic problems of CSP</i>	3	3	2	2	3	-	-	-	-	-	-	-	3	1
CO3:	<i>Discuss about First order logic and syntax, semantics</i>	3	3	1	2	3	-	-	-	-	-	-	-	3	1
CO4:	<i>Explain about planning problems</i>	3	2	2	2	3	-	-	-	-	-	-	-	3	1
CO5:	<i>Summarize the basic concepts of learning and communication</i>	3	3	2	2	3	-	-	-	-	-	-	-	3	1
Average		3	3	2	2	3	-	-	-	-	-	-	-	3	1

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – VII

20IT721

MOBILE APPLICATION DEVELOPMENT LABORATORY

L	T	P	C
0	0	3	1

Prerequisite: Object Oriented Programming Laboratory**Course Outcomes:** Upon Completion of this course, the students will be able to

CO1: Create mobile application using GUI and Layouts

CO2: Develop mobile application using Event Listener

CO3: Build mobile application using Databases

CO4: Construct mobile application using GPS

CO5: Analyze and discover own mobile app for simple needs

COGNITIVE LEVEL

Creating

Creating

Creating

Creating

Creating

List of Experiments:

1. Create an Android application that shows Hello + name of the user and run it on an emulator. (b) Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button.
2. Develop an application that uses Layout Managers and event listeners.
3. Write an application that draws basic graphical primitives on the screen.
4. Develop an application that makes use of Notification Manager
5. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.
6. Develop a native application that uses GPS location information
7. Create a user registration application that stores the user details in a database table
8. Implement an application that creates an alert upon receiving a message
9. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user
10. Develop a mobile application to send an email

Total = 45 Periods

Regulation : R2020

Course Code : 20IT721

Course Name : MOBILE APPLICATION DEVELOPMENT LABORATORY

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1:	Create mobile application using GUI and Layouts	3	3	2	1	2	-	-	-	-	-	-	-	-	3	1
CO2:	Develop mobile application using Event Listener	3	3	2	2	2	-	-	-	-	-	-	-	-	3	1
CO3:	Build mobile application using Databases	3	3	2	2	2	-	-	-	-	-	-	-	-	3	1
CO4:	Construct mobile application using GPS	3	3	2	2	2	-	-	-	-	-	-	-	-	3	1
CO5:	Analyze and discover own mobile app for simple needs	3	3	2	1	2	-	-	-	-	-	-	-	-	3	1
Average		3	3	2	2	2	-	-	-	-	-	-	-	-	3	1

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – VII**20IT722****COMPUTER GRAPHICS LABORATORY**

L	T	P	C
0	0	3	1

Prerequisite: Programming in C**Course Outcomes: On completion of this course, the student will be able to**

- CO1:** Develop models for computer graphics and animation applications
CO2: Apply 2D and 3D transformation techniques to various graphics models
CO3: Analyze and Handle various animation and image editing tools
CO4: Develop multimedia compression algorithm
CO5: Illustrate the basic operations in animation

COGNITIVE LEVEL

Creating
 Creating
 Creating
 Creating
 Creating

List of Experiments:

- To implement Bresenham's algorithms for line, circle and ellipse drawing
- To perform 2D Transformations such as translation, rotation, scaling, reflection and shearing
- To implement Cohen-Sutherland 2D clipping and window-viewport mapping
- To perform 3D Transformations such as translation, rotation and scaling
- To implement polygon clipping algorithm
- To implement Liang, Bersky line clipping algorithm
- To visualize projections of 3D images and Hidden Surface Elimination
- To convert between color models
- To implement text compression algorithm
- To implement image compression algorithm
- To perform basic operations on image using Photoshop

Total = 45 Periods

Regulation : R2020

Course Code : 20IT722

Course Name : COMPUTER GRAPHICS LABORATORY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Develop models for computer graphics and animation applications	3	3	3	3	3	-	-	-	-	-	-	2	2	2
CO2:	Apply 2D and 3D transformation techniques to various graphics models	3	3	3	3	3	-	-	-	-	-	-	2	2	2
CO3:	Analyze and Handle various animation and image editing tools	3	3	3	3	3	-	-	-	-	-	-	2	2	2
CO4:	Develop multimedia compression algorithm	3	3	3	3	3	-	-	-	-	-	-	2	2	2
CO5:	Illustrate the basic operations in animation	3	3	3	3	3	-	-	-	-	-	-	2	2	2
Average		3	3	3	3	3	-	-	-	-	-	-	2	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER –VIII**20IT821****PROJECT WORK**

L	T	P	C
0	0	12	6

Prerequisite: Core IT courses**Course Outcomes: On Completion of this course, the student will be able to***CO1: Identify problems and provide solutions for the real world problems**CO2: Discover appropriate strategies and methodologies for the problem**CO3: Utilize modern tools and techniques to obtain the solution for the technical project**CO4: Test and validate through prototype and measure the cost analysis**CO5: Communicate and report effectively project related activities and findings***Guidelines:**

- Student group comprises of three to four members on a project title under the guidance of a faculty is approved by the head of the department
- The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department
- Comprehensive project report is submitted after completing the work to the satisfaction of the supervisor.
- The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners

Total = 45 Periods

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: **20IT821**

Regulations:

R 2020

Course Name:

PROJECT

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Identify problems and provide solutions for the real world problems.	3	3	3	3	3	-	-	-	3	3	3	3	3	3
CO2:	Discover appropriate strategies and methodologies for the problem	3	3	3	3	3	-	-	-	3	3	3	3	3	3
CO3:	Utilize modern tools and techniques to obtain the solution for the technical project	3	3	3	3	3	-	-	-	3	3	3	3	3	3
CO4:	Test and validate through prototype and measure the cost analysis	3	3	3	3	3	-	-	-	3	3	3	3	3	3
CO5:	Communicate and report effectively project related activities and findings	3	3	3	3	3	-	-	-	3	3	3	3	3	3
		3	3	3	3	3		-	-	-	3	3	3	3	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - VII

20IT761

CYBER SECURITY
(PROFESSIONAL ELECTIVE – IV)L T P C
3 0 0 3**Prerequisite:** No prerequisite needed for enrolling into the course.**Course Outcomes:** On successful completion of the course, the student will be able to**Cognitive Level**

CO1: Understand the field of digital security and concepts of data encryption	Understand
CO2: Outline the keywords and jargons involved in operating system security.	Understand
CO3: Explore firm knowledge on network basics and familiarize on security countermeasures.	Understand
CO4: Discuss the fundamentals of computer forensics and evidence collection	Understand
CO5: Describe the vulnerabilities in cyber security	Remember

UNIT – I INTRODUCTION TO SECURITY

[9]

Introduction - Computer Security - Controls - Authentication -Access Control and Cryptography - Browser Attacks - Web Attacks Targeting Users - Obtaining User Website Data - Protecting servers using physical and logical security - Email Attacks - DataEncryption Standard - Block cipher principles - Block cipher modes of operation.

UNIT – II SECURITY IN OPERATING SYSTEMS AND DEFENCES

[9]

Security in Operating Systems: Security in the Design of Operating Systems - Rootkit - Network security attack - Threats to Network Communications - Wireless Network Security - Denial of Service - Distributed Denial-of-Service - Security Countermeasures: Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems - Network Management - Databases - Security Requirements of Databases - Reliability and Integrity - Database Disclosure.

UNIT – III CYBER SECURITY MANAGEMENT

[9]

Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Incident response and management - Cyber security in industrial contexts - Information Governance in Industry - Securing Internet of Things data - Intrusion detection and prevention - Cybercrime- Defending Cyber Warfare and Ransomware.

UNIT – IV DIGITAL EVIDENCE IN CRIMINAL INVESTIGATIONS

[9]

Digital Evidence in Criminal Investigations: The Analog and Digital World - Training and Education - Evidence Collection and Data Seizure: Collection Options Obstacles - Types of Evidence -Rules of Evidence -Volatile Evidence.

UNIT-V CYBER SECURITY VULNERABILITIES

[9]

Vulnerabilities in software - System administration - Complex Network Architectures - Open Access to Organizational Data – Unprotected Broadband communications - Poor Cyber Security Awareness - Encryption Tool: KeePass.

Total = 45 Periods

Text Books:

- 1 Amit Garg, Krishna Kumar Goyal, Cyber Security, LaxmiPublications,India, Second Edition 2022.
- 2 William Stallings and Lawrie Brown, Computer Security: Principles and Practice, Prentice Hall, United States, Third Edition, 2017.

Reference Books:

- 1 George K. Kostopoulos, Cyber Space and Cyber Security, CRC Press,United States, Second Edition2017.
- 2 John W. Rittinghouse, William M. Hancock,Cyber Security Operations Handbook, ElsevierPublications , India ,First Edition,2008.
- 3 Deborah G Johnson, Computer Ethics, Pearson Education Publication, India ,Fourth Edition , 2014.
- 4 <https://www.simplilearn.com/tutorials/cyber-security-tutorial/cyber-security-for-beginners>

Regulation : R2020

Course Code : 20IT761

Course Name : CYBER SECURITY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Understand the field of digital security and concepts of data encryption	3	3	3	2	-	-	-	3	-	-	-	2	3	2
CO2:	Outline the keywords and jargons involved in operating system security.	3	3	3	2	-	-	-	3	-	-	-	2	3	2
CO3:	Explore firm knowledge on network basics and familiarize on security countermeasures.	3	3	3	2	-	-	-	3	-	-	-	2	3	2
CO4:	Discuss the fundamentals of computer forensics and evidence collection	3	3	3	2	-	-	--	3	-	-	-	2	3	2
CO5:	Describe the vulnerabilities in cyber security	3	3	3	2	-	-	-	3	-	-	-	2	3	2
Average		3	3	3	2	-	-	-	3	-	-	-	2	3	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - VII

20IT762	CYBER-PHYSICAL SYSTEMS (PROFESSIONAL ELECTIVE – IV)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course.

Course Outcomes: On successful completion of the course, the student will be able to

	Cognitive Level
CO1 Understand the core principles behind cyber-physical systems	Understand
CO2 Outline the requirements of cyber-physical systems	Understand
CO3 Identify the various models of cyber-physical systems	Applying
CO4 Explain the foundations of cyber-physical systems	Understand
CO5 Develop the various platforms to implement the cyber-physical systems	Creating

UNIT – I INTRODUCTION TO CYBER-PHYSICAL SYSTEMS [9]

Cyber-Physical Systems(CPS)-Emergence of CPS, Key Features of Cyber-Physical Systems,, CPS Drivers-Synchronous Model : Reactive Components, Properties of Components, Composing Components, Designs- Asynchronous Model of CPS: Processes, Design Primitives, Coordination Protocols.

UNIT – II CPS - REQUIREMENTS [9]

Safety Specifications: Specifications, Verifying Invariants, Enumerative Search, Symbolic SearchLiveness Requirements: Temporal Logic, Model Checking, Proving Liveness

UNIT – III CPS MODELS [9]

Dynamical Systems: Continuous, Linear Systems-Time Models, Linear Systems, Designing Controllers, Analysis Techniques-Timed Model: Processes, Protocols, Automata- Hybrid Dynamical Models.

UNIT – IV CPS FOUNDATIONS [9]

Symbolic Synthesis for CPS- Security in CPS-Synchronization of CPS-Real-Time Scheduling for CPS-Model Integration In CPS

UNIT-V APPLICATIONS AND PLATFORMS [9]

Medical CPS- CPS Built on Wireless Sensor Networks- CyberSim User Interface- iClebo Kobuki - iRobot Create- myRIO- Cybersim- Matlab toolboxes - Simulink.

Total = 45 Periods

Text Books:

- 1 Raj Rajkumar, Dionisio De Niz , and Mark Klein, Cyber-Physical Systems, AddisonWesley Professional, 2016
- 2 Rajeev Alur, Principles of Cyber-Physical Systems, MIT Press, 2015

Reference Books:

- 1 Lee, Edward Ashford, and Sanjit Arunkumar Seshia. Introduction to embedded systems: A cyber physical systems approach. 2nd Edition, 2017
- 2 André Platzer, Logical Analysis of Hybrid Systems: Proving Theorems for Complex 91 Dynamics., Springer, 2010. 426 pages,ISBN 978-3-642-14508-7.
- 3 Jean J. Labrosse, Embedded Systems Building Blocks: Complete and Ready-To-Use Modules in C, The publisher, Paul Temme, 2011.

Regulation : R2020

Course Code : 20IT762

Course Name : CYBER-PHYSICAL SYSTEMS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Understand the core principles behind cyber-physical systems</i>	3	3	2	2	2	-	-	3	-	-	-	2	2	3
CO2:	<i>Outline the requirements of cyber-physical systems</i>	3	3	3	2	2	-	-	3	-	-	-	2	1	3
CO3:	<i>Identify the various models of cyber-physical systems</i>	3	3	3	2	3	-	-	3	-	-	-	2	3	3
CO4:	<i>Explain the foundations of cyber-physical systems</i>	3	3	2	2	2	-	-	3	-	-	-	2	2	3
CO5:	<i>Develop the various platforms to implement the cyber-physical systems</i>	3	3	3	2	2	-	-	3	-	-	-	2	3	3
Average		3	3	3	2	2	-	-	3	-	-	-	2	2	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – VII

20IT763

DIGITAL IMAGE PROCESSING
(PROFESSIONAL ELECTIVE - IV)

L	T	P	C
3	0	0	3

Prerequisite: Engineering Mathematics - I**Course Outcomes:** On completion of this course, the student will be able to

CO1: Discuss digital image fundamentals and the relations pixels and color models

CO2: Apply image enhancement and restoration techniques

CO3: Make use of image compression and segmentation techniques for processing the image

CO4: Identify features of different wavelets coding

CO5 :Summarize the image representation concepts

UNIT – I DIGITAL IMAGE FUNDAMENTALS**[9]**

Introduction - Origin - Steps in Digital Image Processing - Components - Elements of Visual Perception - Image Sensing and Acquisition - Image Sampling and Quantization - Relationships between pixels - Color models

UNIT – II IMAGE ENHANCEMENT**[9]**

Spatial Domain: Gray level transformations - Histogram processing - Basics of Spatial Filtering- Smoothing and Sharpening Spatial Filtering - Frequency Domain: Introduction to Fourier Transform - Smoothing and Sharpening frequency domain filters - Ideal , Butterworth and Gaussian filters

UNIT – III IMAGE RESTORATION AND SEGMENTATION**[9]**

Noise models - Mean Filters - Order Statistics - Adaptive filters - Band reject Filters - Band pass Filters - Notch Filters - Optimum Notch Filtering - Inverse Filtering - Wiener filtering Segmentation: Detection of Discontinuities-Edge Linking and Boundary detection - Region based segmentation- Morphological processing- Erosion and dilation

UNIT – IV WAVELETS AND IMAGE COMPRESSION**[9]**

Wavelets - Sub band coding - Multi resolution expansions - Compression: Fundamentals - Image Compression models - Error Free Compression - Variable Length Coding - Bit- Plane Coding - Lossless Predictive Coding - Lossy Compression - Lossy Predictive Coding - Compression Standards

UNIT – V IMAGE REPRESENTATION AND RECOGNITION**[9]**

Boundary representation - Chain Code - Polygonal approximation-Signature- Boundary segments - Boundary description - Shape number - Fourier Descriptor-Moments- Regional Descriptors - Topological feature- Texture - Patterns and Pattern classes - Recognition based on matching

Total = 45 Periods**Text Books :**

- 1 Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, 4th Edition, Pearson, 2018
- 2 William K. Pratt, Digital Image Processing , 4th Edition, John Wiley & Sons, 2013

Reference Books:

- 1 Anil Jain K. ,Fundamentals of Digital Image Processing, PHI Learning Pvt. Ltd., 2011
- 2 Malay K. Pakhira, Digital Image Processing and Pattern Recognition, First Edition, PHI Learning Pvt. Ltd., 2011
- 3 Rafael C. Gonzalez, Richard E. Woods, Steven L. Edins, Digital Image Processing Using MATLAB, Third Edition ,Tata McGraw Hill Pvt. Ltd., 2011
- 4 <https://nptel.ac.in/courses/117/105/117105079/>

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DEPARTMENT OF INFORMATION TECHNOLOGY

CO PO MAPPING

Regulation : R2020

Course Code : 20IT763

Course Name : DIGITAL IMAGE PROCESSING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Discuss digital image fundamentals and the relations pixels and color models	3	2	3	3	1	2	-	-	-	2	-	2	-	2
CO2:	Apply image enhancement and restoration techniques	3	2	3	3	2	2	-	-	-	2	-	2	-	2
CO3:	Make use of image compression and segmentation techniques for processing the image	3	2	3	3	2	2	-	-	-	2	-	2	-	2
CO4:	Identify features of different wavelets coding	3	2	3	3	1	2	-	-	-	2	-	2	-	2
CO5:	:Summarize the image representation concepts	3	2	3	3	2	2	-	--	-	2	-	2	-	2
Average		3	2	3	3	2	2	-	-	-	2	-	2	-	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)22

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DEPARTMENT OF INFORMATION TECHNOLOGY

CO PO MAPPING

Regulation : R2020

Course Code : 20IT764

Course Name : QUANTUM COMPUTING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1 :	Discuss about quantum bits and quantum computation	3	2	3	-	-	2	-	-	-	-	2	2	-	3
CO2 :	Summarize quantum circuits and NP-Complete problems	3	2	3	-	-	3	-	-	-	-	2	3	-	3
CO3 :	Classify the various types of quantum computers	3	3	3	-	-	2	-	-	-	-	3	3	-	2
CO4 :	Analyze the concept of quantum operations	3	3	3	-	-	2	-	-	-	-	3	3	-	3
CO5 :	Analyze the different error correction techniques in quantum computing	3	3	3	-	-	3	--	-	-	-	3	3	-	3
Average		3	3	3	-	-	2	-	-	-	-	3	3	-	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER – VII

20IT765	VIDEO ANALYTICS (PROFESSIONAL ELECTIVE - IV)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Course Outcomes: On completion of this course, the student will be able to

CO1: Interpret the knowledge about various components of video analytics

CO2: Summarize foreground extraction techniques

CO3: Apply various classifier algorithms for the given target application

CO4: Discuss about security principles for business intelligence

CO5: Explain the various applications of video analytics

UNIT – I VIDEO ANALYTIC COMPONENTS [9]

Need for Video Analytics - Video Analytics - Foreground Extraction - Feature Extraction - Classifier - Preprocessing- Edge Detection - Smoothing - Feature Space - PCA - FLD - SIFT Features

UNIT – II FOREGROUND EXTRACTION [9]

Background Estimation- Averaging- Gaussian Mixture Model- Optical Flow based- Image Segmentation - Region Growing - Region Splitting - Morphological Operations - Erosion- Dilation - Tracking in a multiple camera environment

UNIT – III CLASSIFIERS [9]

Neural Networks (Back Propagation) - Deep Learning Networks - Fuzzy Classifier- Bayesian Classifier - HMM Based classifier

UNIT – IV VIDEO ANALYTICS FOR SECURITY [9]

Abandoned Object Detection - Human Behavioral Analysis - Human Action Recognition - Perimeter Security - Crowd Analysis and Prediction of Crowd Congestion

UNIT– V APPLICATIONS OF VIDEO ANALYTICS [9]

Customer Behavior Analysis - People Counting - Traffic Rule Violation Detection - Traffic Congestion Identification for Route Planning - Driver Assistance - Lane Change Warning - Forensic video analysis

Total = 45 periods

Text Books :

- 1 Graeme A. Jones, Nikos Paragios, Carlo S. Regazzoni, Video- Based Surveillance Systems: Computer Vision and Distributed Processing , Kluwer Academic Publisher, 2002
- 2 Nilanjan Dey , Amira Ashour and Suvojit Acharjee, Applied Video Processing in Surveillance and Monitoring Systems, IGI Global, 2016

Reference Books :

- 1 Zhihao Chen, Ye Yang, Jingyu Xue, Liping Ye, Feng Guo, The Next Generation of Video Surveillance and Video Analytics: The Unified Intelligent Video Analytics Suite, Create Space Independent Publishing Platform, 2014
- 2 Aifeng Shan, Fatih Porikli, Tao Xiang, Shaogang Gong, Video Analytics for Business Intelligence, Springer, 2012
- 3 Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012
- 4 Oges Marques, Practical Image and Video Processing Using MATLAB, Wiley- IEEE Press, 2011

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DEPARTMENT OF INFORMATION TECHNOLOGY

CO PO MAPPING

Regulation : R2020

Course Code : 20IT765

Course Name : VIDEO ANALYTICS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Interpret the knowledge about various components of video analytics</i>	3	2	3	-	2	-	-	-	-	-	-	3	-	2
CO2:	<i>Summarize foreground extraction techniques</i>	3	2	3	-	2	-	-	-	-	-	-	3	-	2
CO3:	<i>Apply various classifier algorithms for the given target application</i>	3	2	2	-	2	-	-	-	-	-	-	3	-	2
CO4:	<i>Discuss about security principles for business intelligence</i>	3	2	3	--	2	-	-	-	-	-	-	3	-	2
CO5:	<i>Explain the various applications of video analytics</i>	3	2	2	-	2	-	-	-	-	-	-	3	-	2
Average		3	2	3	-	2	-	-	-	-	-	-	3	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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SEMESTER - VII

20IT766	BUSINESS INTELLIGENCE AND APPLICATIONS (PROFESSIONAL ELECTIVE - IV)	L T P C 3 0 0 3
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Prerequisite: Data Analytics**Course Outcomes:** On Completion of this Course, the student will be able to

CO1: Compare Transaction Processing and Analytical applications and describe the need for Business Intelligence

CO2: Comprehend of technology and processes associated with Business Intelligence framework

CO3: Discuss about data warehouse implementation methodology

CO4: Explain multidimensional data modeling to achieve the business goal

CO5: Demonstrate an enterprise dashboard that depicts the key performance indicators which helps in decision making

UNIT – I BUSINESS INTELLIGENCE [9]

Digital Data : Types : Structured- Semi Structured and Unstructured - OLTP and OLAP- OLAP Architectures - Data Models- BI Definitions - Applications - BI Framework -Process and Technology -Roles and Responsibilities -Industry Best Practices

UNIT – II DATA INTEGRATION [9]

Data Warehouse - Need and Goals of Data Warehouse- Data Integration - Need and Advantages of Data Integration - Common Data Integration Approaches - Data Integration Technologies - Data Quality - Data Profiling Concepts and Applications-Introduction to ETL using SSIS.

UNIT-III DATA FLOW AND TRANSFORMATIONS [9]

SSIS Architecture - Introduction to ETL using SSIS - Integration Services Objects - Data Flow Components - Sources, Transformations and Destinations - Working with Transformations- Containers- Tasks- Precedence Constraints and Event Handlers

UNIT – IV MULTIDIMENSIONAL DATA MODELING [9]

Data and Dimension Modeling : Types of Data Model-Data Modeling Techniques -Fact Table -Dimension Table - Typical Dimensional Models - Dimensional Model Life Cycle - Introduction to Business Metrics and KPIs - Creating Cubes using SSAS

UNIT – V ENTERPRISE REPORTING [9]

Enterprise Reporting: Reporting Perspectives- Report Standardization and Presentation Practices - Enterprise Reporting Characteristics in OLAP - Concepts of Balanced Scorecards-Dashboards: Create Dashboards - Scorecards Vs Dashboards -SSRS Architecture -Enterprise Reporting using SSRS-Case Study: Netflix Recommendation

Total : 45 Periods**Text Books:**

- 1 Prasad and Seema Acharya, Fundamentals of Business Analytics, John Wiley India Pvt.Ltd, 2014
- 2 vid Loshin, Business Intelligence, Morgan Kaufmann Publishers, 2003

References :

- 1 Mike Biere, Business Intelligence for the Enterprise, IBM Press, 2ndEdition, 2003
- 2 Stephen Few, Information Dashboard Design, O'Reilly Media, 2006
- 3 y Fouché and Lynn Langit, Foundations of SQL Server 2008 R2 Business Intelligence, Après,2ndEdition, 2008
- 4 [tps://research.netflix.com/research-area/recommendations](https://research.netflix.com/research-area/recommendations)

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DEPARTMENT OF INFORMATION TECHNOLOGY

CO PO MAPPING

Regulation : R2020

Course Code : 20IT766

Course Name : BUSINESS INTELLIGENCE AND APPLICATIONS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	To comprehend the fundamental of business intelligence	3	2	2	2	3	-	-	-	-	-	-	2	2	3
CO2:	To explore about data integration and technologies for building data warehouse	3	2	2	1	3	-	-	-	-	-	-	2	2	3
CO3:	To analyze business data using SSIS for ETL in the current market	3	3	2	2	3	-	-	-	-	-	-	2	2	3
CO4:	To understand the concept of multidimensional data modeling and KPIs	3	3	2	1	2	-	-	-	-	-	-	3	2	3
CO5:	To analyze enterprise reports and application of the concepts using open Source tools	3	3	2	2	3	-	-	-	-	-	-	3	2	3
Average		3	3	2	2	3	-	-	-	-	-	-	3	2	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

SEMESTER - VIII

20IT861	PATTERN RECOGNITION (PROFESSIONL ELECTIVE-V)	L	T	P	C
		3	0	0	3

Prerequisite: Statistical and Data mining

Course Outcomes: On Completion of this Course, the student will be able to

CO1:	Discuss the basic concepts of Pattern Recognition and its approaches	Understand
CO2:	Illustrate various statistical methods for supervised learning classification	Understand
CO3:	Illustrate the Clustering for Unsupervised learning classification	Understand
CO4:	Apply various syntactic pattern classification methods for recognizing the pattern	Apply
CO5:	Analyze neural networks and Pattern Recognition methods	Apply

UNIT – I PATTERN RECOGNITION OVERVIEW [9]

Pattern recognition - Classification and Description - Patterns and feature Extraction with Examples -Training and Learning in PR systems - Pattern recognition Approaches - Types of Pattern Recognition: Supervised - Unsupervised - Applications of Pattern recognition

UNIT – II STATISTICAL PATTERN RECOGNITION [9]

Introduction to statistical Pattern Recognition - Supervised Learning using Parametric and Non Parametric Approaches

UNIT – III LINEAR DISCRIMINANT FUNCTIONS AND UNSUPERVISED LEARNING AND CLUSTERING [9]

Introduction - Discrete and binary Classification problems - Techniques to directly Obtain linear Classifiers -- Formulation of Unsupervised Learning Problems - Clustering for unsupervised learning and classification

UNIT – IV SYNTACTIC PATTERN RECOGNITION [9]

Overview of Syntactic Pattern Recognition - Syntactic recognition via parsing and other grammars - Graphical Approaches to syntactic pattern recognition - Learning via grammatical inference

UNIT – V NEURAL PATTERN RECOGNITION [9]

Introduction to Neural networks - Feed forward Networks and training by Back Propagation - Content Addressable Memory Approaches and Unsupervised Learning in Neural RR

Case Study: Image Classification using Neural Networks

Total = 45 Periods

Text Books:

- 1 Robert Schalkoff, Pattern Recognition: Statistical Structural and Neural Approaches, John Wiley & sons,nc, 2012(Reprint edition)

References :

- 1 M. Narasimha Murthy, V. Susheela Devi, Pattern Recognition, Springer 2011
- 2 Duda R.O., P.E.Hart & D.G Stork, Pattern Classification, 2nd Edition, J.Wiley Inc 2001
- 3 Duda R.O.& Hart P.E., Pattern Classification and Scene Analysis, J.wiley Inc, 2013.
- 4 Earl Gose, Richard johnsonbaugh, Steve Jost, Pattern Recognition and Image Analysis, Prentice Hall of India,.Pvt Ltd, New Delhi, 1996

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation: R 2020

Course Code: 20IT861

Course Name: PATTERN RECOGNITION

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1:	<i>Discuss the basic concepts of Pattern Recognition and its approaches</i>	3	2	3	-	-	-	-	-	-	3	-	3	3	-
CO2:	<i>Illustrate various statistical methods for supervised learning classification</i>	3	2	3	-	-	-	-	-	-	3	-	3	3	-
CO3:	<i>Evaluate the Clustering for Unsupervised learning classification</i>	3	2	3	-	-	-	-	-	-	3	-	3	3	-
CO4:	<i>Apply various syntactic pattern classification methods for recognizing the pattern</i>	3	2	3	-	-	-	-	-	-	3	-	3	3	-
CO5:	<i>Analyze neural networks and Pattern Recognition methods</i>	3	2	3	-	-	-	-	-	-	3	-	3	3	-
Average		3	2	3	-	-	-	-	-	-	3	-	3	3	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER – VIII

20IT862	GREEN COMPUTING (PROFESSIONAL ELECTIVE-V)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisite needed for enrolling into the course

Course Outcomes: On Completion of this Course, the student will be able to

CO1:	<i>Explain green computing technology to reduce paper wastage and carbon footprint</i>	<i>Understand</i>
CO2:	<i>Describe behaviour and capabilities of green assets and processes</i>	<i>Understand</i>
CO3:	<i>Identify the best ways for green PCs and virtualizing IT systems</i>	<i>Applying</i>
CO4:	<i>Evaluate technology tools used in a socio-economic manner</i>	<i>Evaluating</i>
CO5:	<i>Develop various case studies for environmental and green activities.</i>	<i>Create</i>

UNIT - I GREEN IT FUNDAMENTALS [9]

Green IT Fundamentals: Business - IT and the Environment - Green IT Strategies: Drivers - Dimensions - And Goals - Environmentally Responsible Business: Policies - Practices and Metrics - Green computing: Carbon Foot Print - Scoop on Power- Choosing Earth Friendly Peripherals

UNIT- II GREEN ASSETS AND BUSINESS PROCESS MANAGEMENT [9]

Green Assets: Buildings - Data Centers - Networks and Devices - Green Business Process Management: Modeling - Optimization and Collaboration - Green Enterprise Architecture - Environmental Intelligence and Green Supply Chains - Green Information Systems - Design and Development Models

UNIT -III RECYCLING AND TELECOMMUTING [9]

Choosing Your Green PC Path: Buying a Green Computer - Recycling Your Computer - Greener Under the Hood: Optimize Your Computer Power Management - Greening Mobile Devices - Print Less, Breathe More- Seamless Sharing Across Systems-Telecommuting - Teleconferencing and Teleporting -: Making the Case for Telecommuting - Telecomm Central: The Green Home Office - Collaborating and Cloud Computing- Virtual Presence

UNIT - IV GREEN COMPLIANCE [9]

Socio cultural Aspects of Green IT - Green Enterprise Transformation Roadmap Green Compliance: Protocols - Standards - and Audits - Emergent Carbon Issues: Online resource for Green Information

UNIT - V CASE STUDIES [9]

The Environmentally Responsible Business Strategies - Research Survey - Case Study Scenarios for Trial Runs - Studies in Applying Green IT Strategies and Applications to a Hospital - Packaging Industry and Telecom Sector

Total = 45 periods

Text Books :

- 1 Bhuvan Unhelkar, Green IT Strategies and Applications: Using Environmental Intelligence, CRC Press, April 2016
- 2 Woody Leonhard, Katherrine Murray, Green Home Computing for Dummies, August 2009

Reference Books :

- 1 Wu Chun Feng (editor), Green computing: Large Scale energy efficiency, CRC Press, 2012
- 2 John Lamb, The Greening of IT, Pearson Education, 2009
- 3 Jason Harris, Green Computing and Green IT - Best Practices on Regulations & Industry, Lulu.com, 2008
- 4 Carl Speshocky, Empowering Green Initiatives with IT, John Wiley & Sons, 2010

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DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation: R 2020

Course Code: 20IT862

Course Name: GREEN COMPUTING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1:	<i>Explain green computing technology to reduce paper wastage and carbon footprint:</i>	3	2	3	-	2	-	3	-	-	3	-	3	3	3
CO2:	<i>Describe behaviour and capabilities of green assets and processes</i>	3	2	3	-	2	-	3	-	-	3	-	3	3	3
CO3:	<i>Discuss about Recycling and Telecommuting</i>	3	2	3	-	2	-	3	-	-	3	-	3	3	3
CO4:	<i>Utilize the resources in a socio economic manner</i>	3	2	3	-	2	-	3	-	-	3	-	3	3	3
CO5:	<i>Evaluate the environmental impacts of green activities</i>	3	2	3	-	2	-	3	-	-	3	-	3	3	3
Average		3	2	3	-	2	-	3	-		3	-	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

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R 2020

SEMESTER – VIII

20IT863	PRINCIPLES OF BLOCKCHAIN SYSTEMS (Professional Elective-V)	L T P C 3 0 0 3
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Prerequisite: -**Course Outcomes : On successful completion of the course, the student will be able to** **Cognitive Level**CO1: Infer the theoretical aspects of blockchain and apply in real case scenarios. UnderstandCO2: Discuss the core components and working of blockchain. RememberCO3: Explain the technical concepts of bit coin. RememberCO4: Interpret the Ethereum blockchain . UnderstandCO5: Outline the types and end-to-end development of a decentralized application. Understand**UNIT – I BLOCKCHAIN ARCHITECTURE** **[09]**History - Blockchain -Centralized vs. Decentralized Systems-Layers of Blockchain-Versions of Blockchain:3.0 and 4.0
- Blockchain Uses and Use Cases -Laying the Blockchain Foundation - Cryptography.**UNIT – II WORKING OF BLOCKCHAIN** **[09]**Game Theory -Prisoner's Dilemma -Byzantine Generals' Problem - The Blockchain - Merkle Trees - Properties of Blockchain
Solutions - Blockchain Transactions - Distributed consensus mechanisms - Blockchain applications.**UNIT – III BITCOIN BLOCKCHAIN** **[09]**History of Currency - Working with Bitcoins - Structure - Operations - Features - Consensus Model - Incentive Model -
Bitcoin price prediction model.**UNIT – IV ETHEREUM BLOCKCHAIN** **[09]**Bitcoin to Ethereum - Ethereum Blockchain - Ethereum Smart Contracts - Ethereum Structure - Operations -
Ethereum Virtual Machine and Code Execution- Ethereum Ecosystem - Swarm - Whisper - DApp - Development
components - Consensus Model - Incentive Model.**UNIT – V TYPES AND APPLICATIONS OF BLOCKCHAIN** **[09]**Blockchain 1.0 - Blockchain 2.0 - Blockchain 3.0 - Types of Blockchain: Public Blockchain -- Private Blockchain - Semi-
Private Blockchain - Sidechains.'Decentralized Applications - Blockchain Application Development - Interacting with
Bitcoin Blockchain - Sending Transactions-Creating a Smart Contract - Executing Smart Contract Functions - Public
vs. Private Blockchains - Supply chain management - Digital asset - Case study: Health care.**Total (L= 45, T = 0) = 45 Periods****Text Books:**

- 1 Bikramaditya Singhal, Gautam Dhameja, Priyansu Sekhar Panda, Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions, APress, New York, First Edition, 2018.
- 2 Brenn Hill, Samanyu Chopra, Paul Valencourt, Blockchain Quick Reference: A guide to exploring decentralized blockchain application development, Packt Publishing, Mumbai, First Edition, 2018.

Reference Books :

- 1 Imran Bashir, Mastering Blockchain Distributed Ledgers, Decentralization and Smart Contracts Explained, Packt Publishing, Mumabi , First Edition, 2017.
- 2 Pethuru Raj, Chellammal SuriaNarayanan, Kavita Saini, Blockchain Technology and Applications, CRC Press, United States, First Edition ,2021.
- 3 E. Golden Julie, J. Jesu Vedha Nayahi, Noor Zaman Jhanjhi, Blockchain Technology Fundamentals, Applications, and Case Studies, CRC Press , United States, First Edition, 2021.
- 4 https://onlinecourses.nptel.ac.in/noc20_cs01/preview ,<https://www.coursera.org/specializations/blockchain>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation: R 2020

Course Code: 20IT863

Course Name: PRINCIPLES OF BLOCKCHAIN SYSTEMS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	P011	P012	PSO1	PSO2
CO1:	<i>Infer the theoretical aspects of blockchain and apply in real case scenarios.</i>	3	2	3	-	3	-	-	-	-	-	-	3	2	3
CO2:	<i>Discuss the core components and working of blockchain.</i>	3	2	3	-	3	-	-	-	-	-	-	3	2-	3
CO3:	<i>Explain the technical concepts of bit coin.</i>	3	2	3	-	3	-	-	-	-	-	-	3	2	3
CO4:	<i>Interpret the Ethereum blockchain for different use cases.</i>	3	2	3	-	3	-	-	-	-	-	-	3	2	3
CO5:	<i>Outline the end-to-end development of a decentralized application.</i>	3	2	3	-	3	-	-	-	-	-	-	3	2	3
Average		3	2	3	-	3	-	-	-	-	-	-	3	2	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER – VIII

20IT864	DIGITAL MARKETING (PROFESSIONAL ELECTIVE-V)	L	T	P	C
		3	0	0	3

Prerequisite: Fundamentals of Software Engineering

Course Outcomes: On Completion of this Course, the student will be able to

CO1:	<i>Examine and explore the role and importance of digital marketing in today's rapidly changing business environment.</i>	Analyzing
CO2:	<i>Discuss how digital marketing can be utilised by organisations and how its effectiveness can be measured.</i>	Creating
CO3:	<i>Apply the key elements of a digital marketing strategy</i>	Applying
CO4:	<i>Identify the effectiveness of a digital marketing campaign that can be measured</i>	Applying
CO5:	<i>Demonstrate advanced practical skills in common digital marketing tools such as SEO, SEM, Social media and Blogs</i>	Understanding

UNIT – I INTRODUCTION TO ONLINE MARKET [9]

UNIT I Online Market space- Digital Marketing Strategy- Components -Opportunities for building BrandWebsite - Planning and Creation- Content Marketing.

UNIT – II SEARCH ENGINE OPTIMISATION [9]

Search Engine optimisation - Keyword Strategy- SEO Strategy - SEO success factors -On-Page Techniques - Off-Page Techniques. Search Engine Marketing- How Search Engine works- SEM components- PPC advertising -Display Advertisement

UNIT – III E - MAIL MARKETING [9]

E- Mail Marketing - Types of E- Mail Marketing - Email Automation - Lead Generation - Integrating Email with Social Media and Mobile- Measuring and maximising email campaign effectiveness. Mobile Marketing- Mobile Inventory/channels- Location based; Context based; Coupons and offers, Mobile Apps, Mobile Commerce, SMS Campaigns-Profiling and targeting.

UNIT – IV SOCIAL MEDIA MARKETING [9]

Social Media Marketing - Social Media Channels- Leveraging Social media for brand conversations and buzz.Successful /benchmark Social media campaigns. Engagement Marketing- Building Customer relationships - Creating Loyalty drivers - Influencer Marketing.

UNIT – V DIGITAL TRANSFORMATION [9]

Digital Transformation & Channel Attribution- Analytics- Ad-words, Email, Mobile, Social Media, Web Analytics - Changing your strategy based on analysis- Recent trends in Digital marketing.

Total = 45 periods

Text Books :

- 1 Puneet Singh Bhatia, Fundamentals of Digital Marketing, Pearson Education; First edition, July 2017.
- 2 Vandana Ahuja, Digital Marketing, Oxford University Press, April 2015

Reference Books :

- 1 Philip Kotler, Marketing 4.0: Moving from Traditional to Digital, Wiley, First edition, April 2017
- 2 Damian Ryan, Calvin Jones, Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Kogan Page Limited. December 2014
- 3 Joe Pulizzi, Epic Content Marketing: How to Tell a Different Story, Break through the Clutter, and Win More Customers by Marketing Less Hardcover, McGraw Hill, September 2013
- 4 Debra Zahay, Donald L. Barker, Mary Roberts, Melissa Barker, Nicholas Bormann, Social Media Marketing Strategic Approach: A Strategic Approach Paperback, 2E South-Western, Cengage Learning, 2017.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: 20IT864

Regulation:
Course Name:

R 2020
DIGITAL MARKETING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Describe fundamental concepts of software quality assurance.	3	3	2	-	3	2	-	-	-	-	-	2	2	-
CO2:	Illustrate the basic tenets of software quality and quality factors.	3	3	2	-	3	2	-	-	-	-	-	2	2	-
CO3:	Utilize the concepts in software development life cycle.	3	2	2	-	3	2	-	-	-	-	-	2	2	-
CO4:	Explore test planning and its management.	3	3	2	-	3	2	-	-	-	-	-	2	2	-
CO5:	Analyze their capability to adopt quality standards.	3	3	2	-	3	2	-	-	-	-	-	2	2	-
Average		3	3	2		3	2	-	-	-		-	2	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

SEMESTER – VIII

WIRELESS SENSOR NETWORKS

L T P C

20IT865

(PROFESSIONAL ELECTIVE - V)

3 0 0 3

*Prerequisite: Computer networks***Course Outcomes:** *On successful completion of the course, the student will be able to***Cognitive Level**CO1: *Discuss the basis of Sensors networks and its types**Understand*CO2: *Comprehend the architecture and Operating systems of WSN**Understand*CO3: *Illustrate the Medium Access Control of sensor networks**Understand*CO4: *Analyze the Routing protocol used in sensor networks**Analyze*CO5: *Analyze the applications of wireless Sensor Networks**Analyze***UNIT-I OVERVIEW OF WIRELESS SENSOR NETWORK [9]**

Introduction about WSN -Characteristic requirements for WSN - Challenges for WSNs - WSN vs Adhoc Networks -Single Node Architecture - Hardware Components- Network Characteristics, Enabling Technologies for Wireless Sensor Networks- Types of wireless sensor networks

UNIT-II NETWORK ARCHITECTURE OF WSN [9]

Network Architecture - Sensor Networks Scenarios - Design Principle - Physical Layer and Transceiver Design Considerations - Optimization Goals and Figures of Merit - Gateway Concepts - Operating Systems and Execution Environments -Introduction to Tiny OS and NesC - Internet to WSN Communication

UNIT-III MEDIUM ACCESS CONTROL OF WSN [9]

MAC Protocols for Wireless Sensor Networks- Low Duty Cycle Protocols and Wakeup Concepts - SMAC, B-MAC Protocol - IEEE 802.15.4 standards - Mediation Device Protocol - Wakeup Radio Concepts - Address and Name Management - Assignment of MAC Addresses

UNIT-IV ROUTING AND DATA AGGREGATION IN WSN [9]

Routing Challenges and Design Issues in Wireless Sensor Networks - Routing Protocols Energy Efficient Routing - Geographic Routing - Flooding and gossiping - Data centric Routing - Hierarchical Routing- Location Based Routing - Real Time routing Protocols - Data aggregation - Aggregation Techniques

UNIT-V APPLICATIONS OF WSN [9]

Home Control and Building Automation - Industrial Automation - Medical Applications - Reconfigurable Sensor Networks - Highway Monitoring - Military Applications - Civil and Environmental Engineering Applications - Nanoscopic Sensor Applications - Case Study: IEEE 802.15.4 LR - WPANs Standard - Target detection and tracking

Total=45Periods**TextBooks:**

- 1 Waltenege Dargie , Christian Poellabauer, "Fundamentals of Wireless Sensor Networks - Theory and Practice", John Wiley & Sons Publications, 2011
- 2 Anna Forster, Introduction to Wireless Sensor Networks, Wiley, 2017

ReferenceBooks:

- 1 Holger Karl & Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2006
- 2 Kazem Sohraby, Daniel Minoli and Taieb Znati, "Wireless Sensor Networks Technology, Protocols, and Applications ", John Wiley & Sons, 2007
- 3 Feng Zhao & Leonidas J.Guibas, "Wireless Sensor Networks-An Information Processing Approach", Elsevier, 2007

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY

CO-POMAPPING

Course Code: 20IT865

Regulation:

R 2020

Course Name:

WIRELESS SENSOR NETWORKS

CO	CourseOutcomes	ProgrammeOutcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	Comprehend the basis of Sensors networks and its types	3	3	3	2	2	-	-	-	-	-	-	-	3	2
CO2	Recall the architecture and Operating systems of WSN	3	3	3	2	2	-	-	-	-	-	-	-	2	2
CO3	<i>Illustrate</i> the Medium Access Control of sensor networks	3	3	3	2	2	-	-	-	-	-	-	-	3	2
CO4	Analyze the Routing protocol used in sensor networks	3	3	3	2	2	-	-	-	-	-	-	-	2	2
CO5	Analyze the applications of wireless Sensor Networks	3	3	3	2	2	-	-	-	-	-	-	-	3	2
Average		3	3	3	2	2	-	3	2						

1:Slight(Low)

2:Moderate(Medium)

3:Substantial(High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER-VIII

R 2020

20IT866	SOFTWARE PROJECT MANAGEMENT (PROFESSIONAL ELECTIVE-V)	L	T	P	C
		3	0	0	3

Prerequisite: - Software Engineering Principles and Practices

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
C01: Interpret the concept of process discipline in software engineering	<i>Understand</i>
C02: Discuss about software architecture model	<i>Understand</i>
C03: Utilize the concepts in software quality management	<i>Apply</i>
C04: Explore software activity planning techniques	<i>Apply</i>
C05: Analyze the risk involved in software project	<i>Analyze</i>

UNIT – I FUNDAMENTALS [9]

Introduction to software engineering - Conventional software management - Evolution of software economics - Improving software economics -Improving the process discipline - Need for implementing discipline -Conventional Vs Modern software project management

UNIT – II SOFTWARE MANAGEMENT PROCESS FRAMEWORK [9]

Lifecycle phases - Artifacts of the process - Model based software architectures -Workflows of the process - Checkpoints of the process -Umbrella Activities-Architectural styles

UNIT – III QUALITY MANAGEMENT AND SOFTWARE MATURITY MODELS [9]

Quality management- Quality Control - ISO 9000 - Benefits of ISO 9000 - Process improvements - SCI/CMM models - Other process models. Iterative process planning - Organization and Responsibilities - Process automation - Process control and process instrumentation - Tailoring the process

UNIT – IV SOFTWARE EFFORT ESTIMATION [9]

Issues in effort estimation - Software Effort Estimation techniques - Expert judgment - Estimation by Analogy - Albrecht Function Point Analysis - COCOMO Cost Estimation Model - Project planning - Scheduling - Tracking and Control - Time and Cost overruns

UNIT – V SOFTWARE RISK AND STAFFING [9]

Nature of Risk - Managing Risk - Risk Identification - Risk Analysis - Risk Reduction Techniques -Managing people - Organizational behavior - Best methods of staff selection - Motivation - The Oldham-Hackman job characteristic model - Ethical and Programmed concerns - Working in teams

Total (L= 45, T = 0) = 45 Periods

Text Books:

- 1 Bob Hughes, Mike Cotterell, Rajib Mall Software Project Management, Sixth edition, Tata Mc Graw Hill, 2017
- 2 Walker Royce ,Software Project Management A Unified Framework, Pearson Education, 2004

Reference Books:

- 1 Ramesh Gopaldaswamy, Managing Global Software Projects, Tata McGraw Hill, 2017
- 2 Walker Royce, Software Project Management : A Unified Framework, PEARSON Education, 2023
- 3 Ramesh Gopaldaswamy, Managing Global Software Projects, Tata McGraw Hill, 2017
- 4 Rishabh Anand ,Software Project Management S.K. Kataria & Sons, 2013

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637 215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Course Code: 20IT866

Regulation:

R 2020

Course Name:

SOFTWARE PROJECT MANAGEMENT

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Interpret the concept of process discipline in software engineering	3	2	3	2	-	-	-	-	-	2	2	-	2	-
CO2:	Discuss about software architecture model	3	2	2	2	-	-	-	-	-	3	3	-	2	-
CO3:	Utilize the concepts in software quality management	3	3	2	2	2	-	-	-	-	3	3	-	2	-
CO4:	Explore software activity planning techniques	3	3	3	2	2	-	-	-	-	3	3	-	2	-
CO5:	Analyze the risk involved in software project	2	3	3	2	-	-	-	-	-	3	3	-	2	-
Average		3	3	3	2	2	-	-	-	2	3	3	-	2	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20AU901	BASICS OF AUTOMOBILE ENGINEERING (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: -**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Provide basic platform knowledge of automobile engineering

Understand

CO2: Explain the working principal of petrol and diesel engines

Understand

CO3: Interpret the method of power transmission unit

Understand

CO4: Built knowledge of steering and brake

Understand

CO5: Illustrate the knowledge of automotive electrical systems and functioning

Understand

UNIT - I INTRODUCTION [09]

Automobile - Components of an automobile - Classification of automobiles - Layout of chassis - Types of drives front wheel- rear wheel - four wheel.

UNIT - II IC ENGINES [09]

Classification - ignition system - firing order - Otto/ Diesel cycles - Two stroke and four stroke engines - scavenging - Cooling and Lubrication systems - Fuel Supply system - air fuel ratio - Carburetor - types.

UNIT - III TRANSMISSION SYSTEM [09]

Clutch - Function - single plate - multi plate - friction clutches - Centrifugal and semi centrifugal clutch - Gear Box - slidemesh - constant mesh and synchromesh gear box -Torque convertor - overdrive - Propeller shaft and rear axle- Universal joint - Differential - Rear axle drives - Wheels and Tyres.

UNIT - IV STEERING AND BRAKE [09]

Steering system - function and principle - Ackerman and Davis steering principles - wheel alignment -steering gear boxes.Brakes - Mechanical -hydraulic and vacuum brake - master cylinder - wheel cylinder -Bleeding of brakes.

UNIT - V ELECTRICAL SYSTEMS [09]

Battery - types - Dynamo and Alternator - Cut-out relay - Diagram of Wiring system - Lighting System and Accessories -Headlight - switches - Windscreen Wipers - Horn - Speedometer - Heater and Air conditioning.

Total = 45 Periods**Text Books :**

- 1 Kirpal Singh, Automobile Engineering, Vol. I & II, Standard Publishers, New Delhi, Fourteenth Edition, 2018.
- 2 Gupta,S. K., A Textbook of Automobile Engineering, S.Chand Publishing, New Delhi, Second Edition, 2020.

Reference Books :

- 1 Rajput, R K, A Textbook of Automobile Engineering, Laxmi Publications (P) Ltd, New Delhi, Second Edition, 2017.
- 2 Ganesan. V, Internal Combustion Engines, Tata McGraw-Hill Publishing Co., New Delhi, Fourth Edition, 2012.
- 3 Mathur M.L. and Sharma R.P, A Course in Internal Combustion Engines, DhanpatRai and sons, New Delhi, Second Edition, 2016.
- 4 Ramalingam K.K, Automobile Engineering, Scitech Publications (India) Pvt. Ltd, Chennai, Second Edition, 2011.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF AUTOMOBILE ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20AU901

Course Name: Basics of Automobile Engineering

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Provide basic platform knowledge of automobile engineering	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	Explain the working principal of petrol and diesel engines	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	Interpret the method of power transmission unit	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	Built knowledge of steering and brake	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	Illustrate the knowledge of automotive electrical systems and functioning	3	3	2	-	-	-	-	-	-	-	-	-	-	-
Average		3	3	2	-										

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20AU902	AUTOMOTIVE ENGINE TECHNOLOGY		L	T	P	C
		(Open Elective)		3	0	0

Prerequisite: -

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Illustrate the fundamental concepts and functions of an automotive engine and working cycles	Understand
CO2: Explain the combustion phenomena in SI engines	Understand
CO3: Identify the CI engines injection, ignition and combustion phenomena	Understand
CO4: Outline the emission control techniques.	Understand
CO5: Demonstrate the measurement techniques and emission standards.	Understand

UNIT – I CONSTRUCTION AND OPERATION [09]

Constructional details of spark ignition (SI) and compression ignition (CI) engines. Working principles. Two stroke SI and CI engines. Comparison of SI and CI engines and four stroke and two stroke engines. Engine classification, firing order. Otto, diesel and dual cycles. Introduction to Lean burn engine technologies.

UNIT – II SI ENGINES [09]

Air fuel ratio requirements - Carburetion - Throttle body injection, Multi point injection. Function of Components, Spark plug, Ignition System - battery coil, magneto coil, Electronic. Combustion in SI Engines - Combustion Chambers, Stages of Combustion - factors affecting flame propagation, Knock in SI engines, variables affecting knocking. Pollution from SI engines.

UNIT – III CI ENGINES [09]

Diesel fuel injection system, Function of Components, Jerk type pump, Distributor pump, Mechanical and pneumatic Governor, Fuel Injector, Types of nozzles, importance of Swirl, Squish, Turbulence air motion, Combustion in CI Engines - Combustion Chambers, Stages of Combustion, Factors affecting Ignition Delay, Knock in CI engines. Pollution from CI engines.

UNIT - IV EMISSION CONTROL TECHNIQUES [09]

Design of engine, optimum selection of operating variables for control of emissions, EGR, charge stratification, SCR, DPF, Lean NOX catalyst technology. Thermal reactors, secondary air injection, catalytic converters, catalysts, fuel modifications, fuel cells, Two stroke engine pollution and control.

UNIT - V MEASUREMENT TECHNIQUES, EMISSION STANDARDS AND TEST PROCEDURES [09]

NDIR, FID, Chemiluminescent analyzers, Gas Chromatograph, smoke meters, emission standards, driving cycles - USA, Japan, Euro and India. Test procedures - ECE, FTP Tests. SHED Test - Chassis dynamometers, dilution tunnels.

Total = 45 Periods**Text Books :**

- 1 Ganesan. V, Internal Combustion Engines, Tata McGraw-Hill Publishing Co., New Delhi, Fourth Edition, 2012.
- 2 Mathur M.L. and Sharma R.P, A Course in Internal Combustion Engines, Dhanpat Rai and sons, New Delhi, Second Edition, 2016.

Reference Books :

- 1 Ramalingam K.K, Automobile Engineering, Scitech Publications (India) Pvt. Ltd, Chennai, Second Edition, 2011.
- 2 John B. Heywood, Internal Combustion Engine Fundamentals, Tata McGraw Hill Education, New Delhi, Second Edition, 2018.
- 3 Gupta H.N, Fundamentals of Internal Combustion Engines, PHI Learning Private Ltd., New Delhi, Second Edition, 2013.
- 4 Obert, E.F., Internal Combustion Engineering and Air Pollution, Intext Education Publishers, New York, Third Edition, 1988.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF AUTOMOBILE ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20AU902

Course Name: Automotive Engine Technology

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Illustrate the fundamental concepts and functions of an automotive engine and working cycles</i>	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	<i>Explain the combustion phenomena in SI engines.</i>	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	<i>Identify the CI engines injection, ignition and combustion phenomena</i>	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	<i>Outline the emission control techniques.</i>	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	<i>Demonstrate the measurement techniques and emission standards.</i>	3	3	2	-	-	-	-	-	-	-	-	-	-	-
Average		3	3	2	-										

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)		R 2020			
20AU903	AUTOMOTIVE VEHICLE TECHNOLOGY	L	T	P	C
	(Open Elective)	3	0	0	3
Prerequisite: -					
Course Outcomes : On successful completion of the course, the student will be able to					Cognitive Level
CO1: Identify the construction and working of various types of automobile engines.					Understand
CO2: Evaluate the significance of clutch and transmission system.					Understand
CO3: Illustrate the types of axle, suspension and classification of steering system.					Understand
CO4: Discuss the various vehicle control systems.					Understand
CO5: Demonstrate the various new generation vehicles.					Understand
UNIT - I	AUTOMOBILE ENGINE	[09]			
Construction layout, types and components of engines, SI - CI - Wankel engine, working of engines, lubrication system, coolant system, power supply, alternate and dynamo, flywheel and damper.					
UNIT - II	CLUTCH AND TRANSMISSION	[09]			
Types of clutches, construction and working procedure of single plate clutch, multi-plate clutch, cone clutch, gears - types of gears, terminology of spur gear, gear trains, construction and working of manual and automatic gear box.					
UNIT - III	AXLE, SUSPENSION AND STEERING	[09]			
Types of axles, necessity of axle for an automobile, suspension system, types and construction of suspension system, significance of suspension system, steering system and vehicle handling, classification of steering system, merits and demerits of power steering.					
UNIT - IV	VEHICLE CONTROL SYSTEM	[09]			
Cruise control, antilock braking system, tyre slip controller, electronic steering control, global positioning system, autonomous navigation system.					
UNIT - V	NEW GENERATION VEHICLES	[09]			
Electric vehicles, hybrid vehicles, flexible fuel vehicles, solar powered vehicles, high energy and power density batteries, regenerative braking, safety air bags.					
					Total = 45 Periods

Text Books :

- 1 David A. Crolla, Automotive Engineering - Powertrain, Chassis system and Vehicle body, Butterworth-Heinemann, New Delhi, First Edition, 2009.
- 2 Ganesan. V, Internal Combustion Engines, Tata McGraw-Hill Publishing Co., New Delhi, Fourth Edition, 2012.

Reference Books :

- 1 Heinz Heisler, Advance Vehicle Technology, Butterworth-Heinemann, London, Second Edition, 2002.
- 2 Mathur M.L. and Sharma R.P, A Course in Internal Combustion Engines, DhanpatRai and sons, New Delhi, Second Edition, 2016.
- 3 James Larminie and John Lowry, Electric Vehicle Technology Explained, John Wiley & Sons, New York, Second Edition, 2012.
- 4 William B Ribbens, Understanding Automotive Electronics, Butterworth-Heinemann, Woburn, Eighth edition, 2017.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF AUTOMOBILE ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20AU903

Course Name: Automotive Vehicle Technology

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Identify the construction and working of various types of automobile engines.	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO2	Evaluate the significance of clutch and transmission system.	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO3	Illustrate the types of axle, suspension and classification of steering system.	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	Discuss the various vehicle control systems.	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO5	Demonstrate the various new generation vehicles.	3	3	3	-	-	-	-	-	-	-	-	-	-	-
Average		3	3	3	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20AU904	AUTOMOTIVE SAFETY	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite: -**Course Outcomes : On successful completion of the course, the student will be able to**

CO1: Explain the automotive safety and its importance.

CO2: Analyze the safety concepts.

CO3: Illustrate the various safety equipment functions and importance

CO4: Identify the various crash test and impact test mechanics.

CO5: Examine the function of warning and avoidance systems.

Cognitive Level

Understand

Understand

Understand

Understand

Understand

UNIT - I INTRODUCTION [09]

Evolution of automotive safety - Active safety: driving safety, conditional safety, perceptibility safety, operatingsafety-
passive safety: exterior safety, interior safety, safety sandwich construction - NCAP.

UNIT - II SAFETY CONCEPTS [09]

Design of the body for safety -Energy equation - engine location - deceleration of vehicle inside passenger compartment
- deceleration on impact with stationary and movable obstacle.

UNIT - III SAFETY EQUIPMENTS [09]

Seat belt - regulations, automatic seat belt tightener system - collapsible steering column - tiltable steering wheel - air
bags - electronic system for activating air bags - bumper design for safety - Collision warning system - Central Locking
system - Child safety.

UNIT - IV CRASH AND IMPACT MECHANICS [09]

Design of crash crumple zones - Behavior of specific body structures in crash testing - Roll over crash tests - Regulatory
requirements for crash testing & testing procedure - vehicle impacts- Side and Frontal Pole Impact.

UNIT - V COMFORT AND CONVENIENCE SYSTEM [09]

Steering and mirror adjustment - central locking system - Garage door opening system - tyre pressure control system -
rain sensor system - environment information system.

Total = 45 Periods**Text Books :**

- 1 LjuboVlacic, Michel Parent and Fumio Harashima, Intelligent Vehicle Technologies, Butterworth-Heinemann publications, Oxford, First Edition, 2001.
- 2 Robert Bosch GmbH, Safety, Comfort and Convenience Systems, John Wiley& Sons, New Delhi, Third edition, 2007

Reference Books :

- 1 Bosch, Automotive HandBook, SAE International, New York, Eighth Edition, 2011.
- 2 Vivek D. Bhise, Ergonomics in the automotive design process. CRC Press, New York, 2012.
- 3 Ronald K Jurgen, Automotive Electronics Handbook, Tata McGraw-Hill Inc., New York, Second Edition, 1999.
- 4 William B Ribbens, Understanding Automotive Electronics, Butterworth-Heinemann, Woburn, Eighth edition, 2017.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF AUTOMOBILE ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20AU904

Course Name: Automotive Safety

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	
CO1	<i>Explain the automotive safety and its importance.</i>	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2	<i>Analyze the safety concepts.</i>	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	<i>Illustrate the various safety equipment functions and importance</i>	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	<i>Identify the various crash test and impact test mechanics.</i>	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5	<i>Examine the function of warning and avoidance systems.</i>	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
Average		3	3	3	-	-	-	-	-	-	-	-	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20AU905	HYBRID VEHICLES (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: -

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Summarize the electric and hybrid vehicle operation and architectures.	Understand
CO2: Explain the different subsystems of hybrid and electric vehicle	Understand
CO3: Demonstrate the energy requirement for vehicles	Understand
CO4: Model and simulate the vehicle characteristics, operating modes, and performance parameters of the vehicle	Understand
CO5: Design and develop the systems of hybrid and electric vehicles	Understand

UNIT - I NEED FOR ALTERNATIVE SYSTEM [09]

Need for hybrid and electric vehicles - main components and working principles of a hybrid and electric vehicles, Different configurations of hybrid and electric vehicles. Comparative study of diesel, petrol, hybrid and electric Vehicles. Advantages and Limitations of hybrid and electric Vehicles.

UNIT - II SUBSYSTEMS OF HYBRID AND ELECTRIC VEHICLES [09]

Basics - Types, Parameters - Capacity, Discharge rate, State of charge, state of Discharge, Depth of Discharge, Technical characteristics, Battery pack Design, Properties of Batteries.

UNIT - III ENERGY SOURCES [09]

Battery Parameters- - Different types of batteries - Lead Acid- Nickel Metal Hydride - Lithium ion- Sodium based- Metal Air. Battery Modeling- Equivalent circuits, Battery charging- Quick Charging devices. Fuel Cell- Fuel cell Characteristics- Fuel cell types-Half reactions of fuel cell. Ultra capacitors. Battery Management System.

UNIT - IV MOTORS AND CONTROLLERS [09]

Types of Motors, Characteristic of DC motors, AC single phase and 3-phase motor, PM motors, Switched reluctance motors, Motor Drives and speed controllers, Torque Vectoring, Regenerative Braking. Rectifiers, Inverters, DC/DC converters.

UNIT - V DESIGN CONSIDERATIONS FOR ELECTRIC VEHICLES [09]

Design requirement for electric vehicles- Range, maximum velocity, acceleration, power requirement, mass of the vehicle. Various Resistance- Transmission efficiency- Electric vehicle chassis and Body Design, Electric Vehicle Recharging and Refueling Systems, performance of electrical vehicles.

Total = 45 Periods**Text Books :**

- 1 Iqbal Husain, Electric and Hybrid Vehicles-Design Fundamentals, CRC Press, New York, Second Edition, 2010.
- 2 MehrdadEhsani, Modern Electric, Hybrid Electric and Fuel Cell Vehicles, CRC Press, New York, Second Edition, 2009.

Reference Books :

- 1 James Larminie and John Lowry, Electric Vehicle Technology Explained, John Wiley & Sons, New York, Second Edition, 2012.
- 2 Lino Guzzella, Vehicle Propulsion Systems, Springer-Verlag Berlin, Heidelberg, Third Edition, 2013
- 3 Ron Hodkinson, Light Weight Electric/ Hybrid Vehicle Design, Butterworth Heinemann Publication, London, 2001
- 4 Ronald K Jurgen, Electric and Hybrid - Electric Vehicles, SAE International, New York, First Edition, 2011.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF AUTOMOBILE ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20AU905

Course Name: Hybrid Vehicles

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Summarize the electric and hybrid vehicle operation and architectures.	3	3	2	-	-	-	3	-	-	-	-	-	-	-
CO2	Explain the different subsystems of hybrid and electric vehicle	3	3	2	-	-	-	3	-	-	-	-	-	-	-
CO3	Demonstrate the energy requirement for vehicles	3	3	3	-	-	-	3	-	-	-	-	-	-	-
CO4	Model and simulate the vehicle characteristics, operating modes, and performance parameters of the vehicles.	3	3	2	-	-	-	3	-	-	-	-	-	-	-
CO5	Design and develop the systems of hybrid and electric vehicles.	3	2	2	-	-	-	3	-	-	-	-	-	-	-
Average		3	3	2	-	-	-	3	-						

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020			
20AU906	OFF HIGHWAY VEHICLES	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite: -

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Describe the construction and requirement of off road vehicles.	Understand
CO2: Explain the different types of earth moving machines and explain the different sub systems.	Understand
CO3: Describe the specifications, functions, merits and demerits of different types and subsystems of scrappers, graders and ditchers.	Understand
CO4: Discuss the construction and working principle of farm equipment, military and combat vehicles.	Understand
CO5: Explain the vehicle systems and features.	Understand

UNIT - I CLASSIFICATION AND REQUIREMENTS OF OFF ROAD VEHICLES [09]

Construction layout, capacity and applications. Power Plants, Chassis and Transmission, Multi-axle vehicles.

UNIT - II EARTH MOVING MACHINES [09]

Earthmovers like dumpers, loaders - single bucket, Multi bucket and rotary types - bulldozers, excavators, backhoe loaders, scrappers, drag and self-powered types, Bush cutters, stumpers, treedozer, rippers etc. - Power and capacity of earth moving machines.

UNIT - III SCRAPPERS ,GRADERS, SHOVELS AND DITCHERS [09]

Scrappers, elevating graders, motor graders, self-powered scrappers and graders, Power shovel, revolving and stripper shovels - drag lines - ditchers - capacity of shovels.

UNIT - IV FARM EQUIPMENT, MILITARY AND COMBAT VEHICLES [09]

Power take off, special implements. Special features and constructional details of tankers, guncarriers and transport vehicles.

UNIT - V VEHICLE SYSTEMS AND FEATURES [09]

Brake system and actuation - OCDB and dry disc caliper brakes. Body hoist and bucket operational hydraulics. Hydro-pneumatic suspension cylinders. Power steering system. Kinematics for loader and bulldozer operational linkages. Safety features, safe warning system for dumper.

Total = 45 Periods

Text Books :

- 1 Robert L. Peurifoy, Clifford J. Schexnayder, Construction, planning, equipment and methods, Tata McGraw Hill Publishing company Ltd, New Delhi, Ninth Edition, 2018.
- 2 Nakra C.P., Farm machines and equipment, Dhanparai Publishing company, New Delhi, First Edition, 2003.

Reference Books :

- 1 Wong.J.Y., Theory of Ground Vehicles, John Wiley & Sons, New York, Fifth Edition, 2022.
- 2 Ageikin S., Off the road wheeled and combined traction devices - Ashgate Publishing Co. Ltd., New Delhi, First Edition, 1988
- 3 Heinz Heisler, Vehicle and Engine Technology, , SAE International, New York, Second Edition, 1999
- 4 Sean Bennet and Ian Andrew Norman, Heavy Duty Truck systems, Delmar Cengage learning, New York, Fifth Edition, 2011.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF AUTOMOBILE ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20AU906

Course Name: Off Highway Vehicles

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Describe the construction and requirement of off road vehicles.</i>	3	3	2	-	-	-	3	3	-	-	-	-	-	-
CO2	<i>Explain the different types of earth moving machines and explain the different sub systems.</i>	3	3	2	-	-	-	3	-	-	-	-	-	-	-
CO3	<i>Describe the specifications, functions, merits and demerits of different types and subsystems of scrappers, graders and ditchers.</i>	3	3	3	-	-	-	3	3	-	-	-	-	-	-
CO4	<i>Discuss the construction and working principle of farm equipment, military and combat vehicles.</i>	3	3	2	-	-	-	3	3	-	-	-	-	-	-
CO5	<i>Explain the vehicle systems and features.</i>	3	2	2	-	-	-	3	-	-	-	-	-	-	-
Average		3	3	2	-	-	-	3	3	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)		R 2020			
20AU907	MODERN AND INTELLIGENT VEHICLE SYSTEM (Open Elective)	L	T	P	C
		3	0	0	3
Prerequisite: -					
Course Outcomes : On successful completion of the course, the student will be able to					Cognitive Level
CO1: Identify the various systems involved in driver support systems and their working principle.					Understand
CO2: Familiarize with global positioning systems, geographical information systems and navigationsystems.					Understand
CO3: Comprehend the constructional and working features of safety systems and security systems.					Understand
CO4: Recognize about the various comfort systems.					Understand
CO5: Explain the various adaptive control systems.					Understand
UNIT - I	DRIVER ASSISTANCE SYSYEMS	[09]			
Introduction, driver support systems - driver information, driver perception, driver convenience, driver monitoring. Vehicle support systems - general vehicle control, vehicle status monitoring and automated highway systems.					
UNIT - II	TELEMATICS	[09]			
Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition and application of Internet of Things (IoT) in automotive industry.					
UNIT - III	SAFETY SYSTEMS AND SECURITY SYSTEMS	[09]			
Airbags, seat belt tightening system, collision avoidance and warning systems, child lock, antilock braking systems, Anti-theft technologies, smart card system and number plate coding.					
UNIT - IV	COMFORT SYSTEMS	[09]			
Active suspension systems, requirement and characteristics, different types, power steering, collapsible and tiltable steering column and power windows.					
UNIT - V	ADAPTIVE CONTROL SYSTEMS	[09]			
Adaptive cruise control, adaptive noise control, anti-spin regulation, traction control systems and cylinder cut off technology and autonomous driving.					
					Total = 45 Periods

Text Books :

- 1 LjuboVlacic, Michel Parent and Fumio Harashima, Intelligent Vehicle Technologies, Butterworth-Heinemann publications, Oxford, First Edition, 2001.
- 2 Ronald K Jurgen, Navigation and Intelligent Transportation Systems - Progress in Technology, Automotive Electronics Series, SAE, New York, First Edition, 1998.

Reference Books :

- 1 Richard Bishop, Intelligent Vehicle Technology and Trends, Artech House, London, First Edition, 2005.
- 2 William B Ribbens, Understanding Automotive Electronics, Butterworth-Heinemann, Woburn, Eighth edition, 2017.
- 3 Robert Bosch, Automotive Handbook, Bently Publishers, Cambridge, Tenth Edition, 2018.
- 4 Robert Bosch, Bosch Automotive Electrics and Automotive Electronics, Springer Vieweg Wiesbaden, Switzerland, Fifth Edition, 2013.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF AUTOMOBILE ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20AU907

Course Name: Modern and Intelligent Vehicle System

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	Identify the various systems involved in driver support systems and their working principle.	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2	Familiarize with global positioning systems, geographical information systems and navigation systems.	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	Comprehend the constructional and working features of safety systems and security systems	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	Recognize about the various comfort systems.	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5	Explain the various adaptive control systems.	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
Average		3	3	3	-	3	-	-								

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20AU908	VEHICLE MAINTENANCE (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: -**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Describe the importance, types and requirements of vehicle maintenance and related records and schedules.

Understand

CO2: Practice the engine overhauling, reconditioning; methods, procedures, tools of power plants, ignition system, cooling system and other engine components.

Understand

CO3: Demonstrate the maintenance procedures of clutch, gear box, propeller shaft and steering systems.

Understand

CO4: Demonstrate the construction, testing, fault diagnosis and maintenance of body panel and body tinkering.

Understand

CO5: Describe the maintenance procedures of electrical systems.

Understand

UNIT - I MAINTENANCE TOOL, SHOP, SCHEDULE, RECORDS [09]

Standard tool set, torque wrenches, compression and vacuum gauges, engine analyzer and scanner, computerized wheelalignment and balancing, gauges for engine tune up and pollution measurement, spark plug cleaner, cylinder re-boringmachine, fuel injection calibration machine. Importance of maintenance. Schedule and unscheduled maintenance. Scope of maintenance. Equipment downtime. Vehicle inspection. Reports. Log books. Trip sheet. Lay out and requirements of maintenance shop.

UNIT - II ENGINE REPAIR AND OVERHAULING [09]

Dismantling of engine and its components. Cleaning methods. Inspection and checking. Repair and reconditioning methods for all engine components. Maintenance of ignition system, fuel injection system, cooling system - lubricationsystem. Engine trouble shooting chart.

UNIT - III MAINTENANCE, REPAIR AND OVERHAULING OF THE CHASSIS [09]

Maintenance, servicing and repair of clutch, fluid coupling, gearbox, torque converter, propeller shaft. Maintenance of front axle, rear axle, brakes, steering systems.

UNIT - IV MAINTENANCE AND REPAIR OF VEHICLE BODY [09]

Body panel tools for repairing. Tinkering and painting. Use of soldering, metalloid paste. Tyre maintenance, metallic, plastics

UNIT - V MAINTENANCE AND REPAIR OF ELECTRICAL SYSTEMS [09]

Care, maintenance, testing and troubleshooting of battery, starter motor, dynamo, alternator and regulator. Transistorized regulator problems.

Total = 45 Periods**Text Books :**

- 1 John E. Dolce, Analytical Fleet Maintenance Management, SAE International, New York, Third Edition, 2009.
- 2 James D. Halderman, Advanced Engine Performance Diagnosis, Pearson Education, New Delhi, Seventh Edition, 2019.

Reference Books :

- 1 Bosch Automotive Handbook, SAE International, New York, Tenth Edition, 2018
- 2 Willam H. Crouse and Donald L. Anglin, Automotive Mechanics, Tata McGraw Hill Publishing Company, New Delhi, Tenth Edition, 2007.
- 3 Service Manuals from different vehicle manufacturers.
- 4 Judge. A.N, Motor vehicle engine servicing, Pitman Paper pack, London, Third Edition, 1969.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF AUTOMOBILE ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20AU908

Course Name: Vehicle Maintenance

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	<i>Describe the importance, types and requirements of vehicle maintenance and related records and schedules.</i>	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	<i>Practice the engine overhauling, reconditioning; methods, procedures, tools of power plants, ignition system, cooling system and other engine components.</i>	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	<i>Demonstrate the maintenance procedures of clutch, gear box, propeller shaft and steering systems.</i>	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	<i>Demonstrate the construction, testing, fault diagnosis and maintenance of body panel and body tinkering.</i>	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO5	<i>Describe the maintenance procedures of electrical systems.</i>	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
Average		3	3	2	-	3	-	-								

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)		R 2020
20CE901	ARCHITECTURAL HERITAGE OF INDIA (Open Elective)	L T P C 3 0 0 3
<i>Prerequisite: No prerequisites are needed for enrolling into the course</i>		
Course Outcomes : On successful completion of the course, the student will be able to		Cognitive Level
CO1:	Illustrate various materials used and construction style of Indus Valley Civilization	Understand
CO2:	Demonstrate the materials used and construction style of Chera, Chola and Pandya architecture	Understand
CO3:	Describe the materials used and construction style of Mughal architecture	Understand
CO4:	Explain the various materials and construction style of British architecture	Understand
CO5:	Describe various materials and construction style of Portuguese, Dutch, French and Danish	Understand
UNIT - I	INDUS VALLEY CIVILIZATION	[09]
Indus valley civilization - Chronological introduction - Construction style - Materials used - The cities Harappa, lothal and Mohenjo-Daro, The great bath - The granary at Harappa - The assembly hall - Ajanta-Ellora Cave temples - Mahabodhi temple complex		
UNIT - II	SOUTH INDIAN ARCHITECTURE	[09]
Chera-Chola-Pandya architecture - Chronological introduction - Construction style - Materials used - Brihadeeswarar Temple - Meenakshi Temple - Kalinga - Chalukya - Pallava architecture - Mahabalipuram stone temples - Khajuraho - MuskinBhanvi - Konark Sun Temple - Hoysala - Vijayanagara architecture - twin temples Mosale - Virupaksha temple Raya Gopura at Hampi		
UNIT - III	MUGHAL ARCHITECTURE	[09]
Mughal architecture - Chronological introduction - Construction style - Materials used - QutubMinar - TajMahal - Humayun's Tomb - Redfort - Fatehpur Sikri - Agra fort - Jama Masjid - Rajput civil architecture - Chronological introduction - Construction style - Materials used - All hill forts of Rajasthan		
UNIT - IV	BRITISH ARCHITECTURE	[09]
British colonial architecture - Chronological introduction - Construction style - Materials used - Buildings in Chennai, Mumbai, Shimla - Churches - Mountain railways of India-bridges.		
UNIT - V	COLONIAL ARCHITECTURE	[09]
Other colonial architecture - Portuguese-Dutch-French-Danish - Chronological introduction - Construction style - Materials used - Churches - Churches and Convents of Goa and Cochi - French town of Puducherry - Tranquebar fort - Bungalow on the beach		

Total (L= 45, T = 0) = 45 Periods

Text Books :

- 1 Bindia Thapar, Surat Kumar Manto, and Suparna Bhalla., Introduction to Indian Architecture: Arts of Asia, Periplus Editions (HK) Ltd, Hong Kong, First Edition, 2005
- 2 Sandhya Ketkar., The History of Indian Art, Jyotsna Prakashan Publisher, Maharashtra, E - Edition, 2020

Reference Books :

- 1 Christopher Tadgell., The History of Architecture in India, Phaidon Press Ltd, New York, First Edition, 1990
- 2 Mark M. Jarzombek, Vikramaditya Prakash, Francis D. K. Ching., A Global History of Architecture, John Wiley & Sons, Hoboken, Second Edition, 2010
- 3 <https://nptel.ac.in/courses/124106009>
- 4 <https://ncert.nic.in/textbook/pdf/kefa106.pdf>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF CIVIL ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20CE901

Course Name: Architectural Heritage of India

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Illustrate various materials used and construction style of Indus Valley Civilization</i>	3	3	-	2	-	2	2	-	-	-	-	3	-	-
CO2	<i>Demonstrate the materials used and construction style of Chera, Chola and Pandya architecture</i>	3	3	-	2	-	2	2	-	-	-	-	3	-	-
CO3	<i>Describe the materials used and construction style of Mughal architecture</i>	3	3	-	1	-	2	2	-	-	-	-	3	-	-
CO4	<i>Explain the various materials and construction style of British architecture</i>	3	3	-	2	-	2	2	-	-	-	-	3	-	-
CO5	<i>Describe various materials and construction style of Portuguese, Dutch, French and Danish</i>	3	3	-	1	-	2	2	-	-	-	-	3	-	-
Average		3	3	-	2	-	2	2	-	-	-	-	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)		R 2020			
20CE902	BUILDING PLANNING AND CONSTRUCTION (Open Elective)	L	T	P	C
		3	0	0	3
<i>Prerequisite: No prerequisites are needed for enrolling into the course</i>					
Course Outcomes : On successful completion of the course, the student will be able to					Cognitive Level
CO1: Outline the factors to be considered in planning and construction of buildings					Understand
CO2: Infer the different components and Foundations of building in their construction practices.					Understand
CO3: Interpret masonry and alternative materials of wood, aluminum and glass.					Understand
CO4: Discuss different types of floors, roofs and the materials which are commonly used for construction.					Understand
CO5: Explain about dampness and fire resistance in buildings					Understand
UNIT - I	FUNCTIONAL PLANNING OF BUILDINGS	[09]			
Types of Buildings, Aspects and Principles of Building Planning, Building By - laws and Regulations, Site Selection criteria, Orientation of Building and its relation to surrounding environment, Sustainability and Green Buildings - Building Bye - laws and Building code of India 2016.					
UNIT - II	BUILDING COMPONENTS AND FOUNDATIONS	[09]			
Lintels, arches, different types of floors-concrete, mosaic, terrazzo floors, pitched, flat and curved roofs, lean-to roof, coupled roofs, trussed roofs, king and queen post trusses; RCC roofs, madras terrace/shell roofs. Foundations: Shallow foundations, spread, combined, strap and mat footings.					
UNIT - III	ALTERNATIVE MATERIALS AND MASONRY	[09]			
Structure, properties, seasoning of timber; Classification of various types of woods used in buildings, defects in timber; Alternative materials for wood, galvanized iron, fibre-reinforced plastics, steel, aluminum and glass; Types of masonry, English and Flemish bonds, rubble and ashlar masonry, cavity and partition walls - Lightweight concrete blocks - merits and demerits.					
UNIT - IV	FLOORS,ROOFS AND STAIRCASES	[09]			
Components of a floor, materials used for floor construction, Different types of flooring, Ground floor and upper floors, Types of roofs, Basic roofing elements and Roof coverings. Functional requirements of a good stair, type of stairs, planning a stair case.					
UNIT - V	DAMP PROOFING AND FIRE PROTECTION	[09]			
Damp proofing and Fire protection: Causes and effect of dampness on buildings, Materials and methods used for damp proofing, Fire hazards, Grading of buildings according to fire resistance, Fire resisting properties of common building materials, Fire resistant construction.					
					Total (L= 45, T = 0) = 45 Periods

Text Books :

- 1 Varghese P. C., Building construction, PHI Learning Pvt. Ltd, New Delhi ,Second Edition, 2016.
- 2 B. C. Punmia , Ashok Kumar Jain, Arun Kumar Jain, Building Construction, Laxmi Publications, New Delhi ,Eleventh Edition,2019.

Reference Books :

- 1 S. K. Duggal, Building Materials II, New Age International (P) Limited, New Delhi ,Fourth Edition, 2016,
- 2 Bulding Bye-laws 2019
- 3 National Building Code of India, 2016.
- 4 www.nptel.ac.in/courses/105101088/2_home.htm

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF CIVIL ENGINEERING
CO-PO MAPPING

Course Code: **20CE902**Regulation: **R 2020**Course Name: **Building Planning and Construction**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Outline the factors to be considered in planning and construction of buildings</i>	3	2	1	1	-	3	2	-	-	-	-	2	-	-
CO2	<i>Infer the different components and Foundations of building in their construction practices.</i>	3	2	-	2	-	2	3	-	-	-	-	2	-	-
CO3	<i>Interpret masonry and alternative materials of wood, aluminum and glass.</i>	2	-	-	2	-	3	2	-	-	-	-	2	-	-
CO4	<i>Discuss different types of floors, roofs and the materials which are commonly used for construction.</i>	3	2	-	2	-	3	2	-	-	-	-	2	-	-
CO5	<i>Explain about dampness and fire resistance in buildings</i>	3	2	-	2	-	3	3	-	-	-	-	2	-	-
Average		3	2	1	2	1	3	3	-	-	-	-	2	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)		R 2020			
ELEMENTARY CIVIL ENGINEERING		L	T	P	C
20CE903	(Open Elective)	3	0	0	3
Prerequisite: No prerequisites are needed for enrolling into the course					
Course Outcomes : On successful completion of the course, the student will be able to					Cognitive Level
CO1: Provide an overview of civil engineering					Understand
CO2: Explain the basics of surveying , modern tools of surveying and mapping					Understand
CO3: Summarize the fundamentals of building materials in civil engineering					Understand
CO4: Explain the components of building structures.					Understand
CO5: Interpret various infrastructures of civil engineering in construction					Understand
UNIT - I	OVERVIEW OF CIVIL ENGINEERING	[09]			
History of Civil Engineering - Role and Functions of Civil Engineer - Fields of Civil Engineering - Importance of Civil Engineering					
UNIT - II	BASICS OF SURVEYING	[09]			
Introduction - Basic Definitions (Surveying, leveling, Plans, Maps, Scales) - Introduction to divisions of surveying - Classification of surveying - Fundamental principles of surveying - Measurement in Surveying - Phases of Surveying					
MODERN TOOLS OF SURVEYING AND MAPPING:					
Introduction to Global Positioning System - Remote Sensing and Geographic Information System					
UNIT - III	FUNDAMENTALS OF BUILDING MATERIALS	[09]			
Bricks - stones - sand - M-sand - cement - fly ash - silica fume - mortar- concrete - steel - glass - wood -plastics - ceramics					
UNIT - IV	COMPONENTS OF BUILDING	[09]			
Foundations - stone masonry - brick masonry - beams - columns - lintels - roofing - flooring - plastering- damp proofing weathering course					
UNIT - V	STRUCTURES	[09]			
Introduction to dams, weirs, barrages and check dams - Role of transportation in national development - Modes of transportation - Introduction to road traffic and traffic control - Introduction to mass transportation system					
					Total (L= 45, T = 0) = 45 Periods

Text Books :

- 1 Anurag Kandya, Elements of Civil Engineering, Charotar Publishing House Pvt. Ltd, Gujarat, Third Edition, 2017.
- 2 Palanichamy M.S., Basic Civil Engineering, Tata McGraw-Hill, New Delhi, Fourth Edition, 2011.

Reference Books :

- 1 Poonam Sharma & Swati Rajput, Sustainable Smart Cities in India - Challenges and Future Perspectives, Springer, First Edition, 2017.
- 2 Dr.B.C.Punamia, Surveying, Laxmi Publication, New Delhi, Seventh Edition, 2016.
- 3 <https://nptel.ac.in/courses/105102088>
- 4 <https://byjusexamprep.com/civil-engineering-exams/building-materials>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF CIVIL ENGINEERING
CO-PO MAPPING

Course Code: **20CE903**

Regulation: R 2020
Course Name: Elementary Civil Engineering

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	<i>Provide an overview of civil engineering</i>	1	-	-	-	-	1	-	-	-	-	-	-	1	-	-
CO2	<i>Explain the basics of surveying and modern tools of surveying and mapping</i>	2	1	-	-	-	2	-	-	-	-	-	-	1	-	-
CO3	<i>Summarize the fundamentals of building materials in civil engineering</i>	2	1	-	-	-	2	2	-	-	-	-	-	1	-	-
CO4	<i>Explain the components of building structures.</i>	2	1	-	-	-	2	-	-	-	-	-	-	1	-	-
CO5	<i>Interpret various infrastructures of civil engineering in construction</i>	3	2	1	-	-	3	2	-	-	-	-	-	1	-	-
Average		3	2	1	-	-	3	-	-	-	-	-	-	1	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20CE904	ENERGY AND ENVIRONMENT (Open Elective)		R 2020			
			L	T	P	C
			3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes : On successful completion of the course, the student will be able to

- CO1: Outline the earth's energy, environment and the processes leading to climate change.
 CO2: Infer the atmospheric issues related to the chemistry, greenhouse gases
 CO3: Summarize the role of the terrestrial energy-environment-climate system
 CO4: Interpret the Possible effects of Global Warming and climate change.
 CO5: Outline the Natural and Anthropogenic and Green House Gas theory

Cognitive Level

- Understand
 Understand
 Understand
 Understand
 Understand

UNIT - I INTRODUCTION [09]

Overview on the Earth's energy requirements-Climate Change-Origins of the terrestrial atmosphere-Earth's early atmosphere- Introduction to Climate-Layers of the atmosphere.

UNIT - II GLOBAL ATMOSPHERIC ISSUES [09]

Composition of the present day atmosphere-Introduction to Atmospheric chemistry-Green House Gases, and the O3 - depletion problem-Post Industrial Revolution Scenario

UNIT - III ENERGY BALANCE [09]

Earth Atmosphere System- Solar and Terrestrial Radiation- Absorption of Radiation by gases.-Energy balance- Solar variability and the Earth's Energy Balance.

UNIT - IV ATMOSPHERIC CHEMISTRY AND CLIMATE [09]

The Global Temperature Record -Possible effects of Global Warming. - Indian Context. Atmospheric Chemistry and Climate Change- Atmospheric Aerosol and Cloud Effects on Climate.

UNIT - V ENVIRONMENTAL VARIABILITY [09]

Natural (volcanoes, forest fires) and Anthropogenic (Antarctic Ozone Hole, Global Warming).-Green House Gas theory.- Effects of urbanization- Landscape changes-Influence of Irrigation-Desertification and Deforestation

Total (L= 40, T = 5) = 45 Periods**Text Books :**

- 1 Peter E Hodgson, Energy the Environment and Climate Change, Imperial College Press, London, FirstEdition, 2010
- 2 Ahluwalia V K, Energy and Environment, The Energy and Resources Institute, New Delhi, First Edition, 2019

Reference Books :

- 1 Richard Wolfson, Energy, Environment, and Climate, Publisher: W. W. Norton & Company, New York, Second Edition,2011
- 2 Saeed Moaveni ,Energy, Environment, and Sustainability with Mind Tap, Cengage India Private Limited ,New Delhi, First Edition,2017
- 3 Wilbanks, T., Bilello D, Schmalzer D, Scott, Climate Change and Energy Supply and Use: Technical Report for the U.S. Department of Energy inSupport of the National Climate Assessment., Island Press,Washington,2013
- 4 Frank T. Princiotta, Global Climate Change - The Technology Challenge, Springer Publisher, New York, First Edition, 2011

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF CIVIL ENGINEERING
CO-PO MAPPING

Course Code: **20CE904**

Regulation: R 2020
Course Name: Energy and Environment

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Outline The Earth's Energy, Environment and the processes leading to climate change.</i>	3	3	-	-	-	2	2	-	-	-	-	2	-	-
CO2	<i>Infer the Atmospheric issues related to the chemistry, Green House Gases</i>	3	3	-	-	-	2	2	-	-	-	-	2	-	-
CO3	<i>Summarize the role of the Terrestrial Energy-Environment-Climate System</i>	3	3	-	-	-	2	2	-	-	-	-	2	-	-
CO4	<i>Interpret the Possible effects of Global Warming and climate change.</i>	3	3	-	-	-	2	2	-	-	-	-	2	-	-
CO5	<i>Outline the Natural and Anthropogenic and Green House Gas theory</i>	3	3	-	-	-	2	2	-	-	-	-	2	-	-
Average		3	3	-	-	-	2	2	-	-	-	-	2	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)		R 2020			
ENVIRONMENTAL LAWS AND POLICIES		L	T	P	C
(Open Elective)		3	0	0	3
20CE905					
<i>Prerequisite: No prerequisites are needed for enrolling into the course</i>					
Course Outcomes : On successful completion of the course, the student will be able to					Cognitive Level
CO1:	Summarize the basic concepts in environmental laws and its judicial activism				Understand
CO2:	Interpret different water acts and marine laws in India				Understand
CO3:	Summarize various Environment protection laws and acts in the framework of Mega projects				Understand
CO4:	Explain the management and handling of various hazardous waste management				Understand
CO5:	Summarize the International Environmental laws framed at various conferences.				Understand
UNIT - I	BASIC CONCEPTS IN ENVIRONMENTAL LAW				[09]
An introduction to the legal system - Constitution - Acts - Rules - Regulations - Indian Judiciary - Doctrine of precedents - judicial review - Writ petitions - PIL- liberalization of the rule of locus standi - Judicial activism - Introduction to environmental laws in India - Constitutional provisions - Stockholm conference - Bhopal gas tragedy - Rio conference - General principles in Environmental law - Precautionary principle - Polluter pays principle - Sustainable development- Public trust doctrine - Overview of legislations and basic concepts.					
UNIT - II	AIR- WATER - MARINE LAWS				[09]
National Water Policy and some state policies - Laws relating to prevention of pollution, access and management of water and institutional mechanism - Water Act, 1974 - Water Cess Act, 1977 - EPA, 1986 - Pollution Control Boards Ground water and law Judicial remedies and procedures Marine laws of India - Coastal zone regulations - Legal framework on Air pollution - Air Act, 1981 - EPA, 1986					
UNIT - III	ENVIRONMENT PROTECTION LAWS - LARGE PROJECTS				[09]
Legal framework on environment protection - Environment Protection Act as the framework legislation - strength and weaknesses of EIA - National Green tribunal the courts infrastructure projects					
UNIT - IV	HAZARDOUS SUBSTANCES AND ACTIVITIES				[09]
Legal framework - EPA and rules made there under PLI Act, 199 - Principles of strict and absolute liability - Hazardous Wastes (Management, Handling and Transboundary) Rules, 2008 - Biomedical Waste (Management and Handling) Rules, 1998 - Municipal Solid Wastes (Management and Handling) Rules, 2000 - E - Waste (Management and Handling) Rules, 2011 - Batteries (Management & Handling) Rules, 2001					
UNIT - V	INTERNATIONAL ENVIRONMENTAL LAW				[09]
Development of international environmental law, nature and scope of key international environmental law principles and rights (substantive and procedural), Establishment of Environmental Institutions like UNEP, Ozone Protection - Montreal Protocol for the Protection of Ozone Layer, 1987 as amended; U.N. Convention on Climate Change 1992, Kyoto Protocol, 1997; Public Participation in Decision-making and Access to Justice in Environmental Matters, 1998 (Aarhus Convention); Johannesburg Conference, 2002.					
Total (L= 45, T = 0) = 45 Periods					

Text Books :

- 1 Divan, S and Rosencranz, A., Environmental Law and Policy in India, Oxford India Paperbacks, New Delhi, Second edition, 2005.
- 2 Kanchan Chopra., Development and Environmental Policy in India: The Last Few Decades, Springer Publication, New Delhi, First edition, 2017.

Reference Books :

- 1 Birnie, P Boyle, and Red well's., International Law and the Environment, Oxford University Press, United Kingdom, Fourth edition, 2021.
- 2 Upadhyay S. and Upadhyay V., Hand Book on Environmental Law- Forest Laws, Wildlife Laws and the Environment; Vols. I, II and III, Lexis Nexis Butterworths, New Delhi, India, First Edition, 2001.
- 3 Leelakrishnan, P., Environmental Law Case Book, Lexis Nexis, India, Sixth Edition, 2021.
- 4 Sands, P., Principles of International Environmental Law, Cambridge University press, United Kingdom, Second Edition, 2002.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF CIVIL ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20CE905

Course Name: Environmental Laws and Policies

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Summarize the basic concepts in Environmental laws and its judicial activism</i>	3	2	2	-	-	2	-	-	-	-	2	3	-	-
CO2	<i>Interpret different water acts and marine laws in India</i>	3	2	2	-	-	-	-	-	-	-	-	3	-	-
CO3	<i>Summarize Various Environment protection laws and acts in the framework of Mega projects</i>	3	2	3	-	-	2	-	-	-	-	2	3	-	-
CO4	<i>Explain the management and Handling of various hazardous waste management</i>	3	2	3	1	-	3	1	-	-	-	2	3	-	-
CO5	<i>Summarize the International Environmental laws framed at various conferences.</i>	3	2	3	2	-	3	-	-	-	-	2	3	-	-
Average		3	2	3	3	-	3	1	-	-	-	2	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)		R 2020			
20CE907	INTRODUCTION TO DISASTER MANAGEMENT AND MITIGATION (Open Elective)	L 3	T 0	P 0	C 3
Prerequisite: Nil					
Course Outcomes : On successful completion of the course, the student will be able to					Cognitive Level
CO1: Explain the concepts of disaster and its effect in Indian scenario.					Understand
CO2: Elaborate the difference between natural and manmade disasters.					Understand
CO3: Outline the disaster management cycle and its operation.					Understand
CO4: Outline the disaster management in India and its profile.					Understand
CO5: Propose the application of geo-informatics for disaster management and mitigation.					Apply
UNIT - I INTRODUCTION TO DISASTER					[09]
Definition of Disaster, hazard, global and Indian scenario, general perspective, importance of study in human life, Direct and indirect effects of disasters, long term effects of disasters. Introduction to global warming and climate change.					
UNIT - II NATURAL DISASTER AND MANMADE DISASTERS					[09]
Natural Disaster: Meaning and nature of natural disaster, Flood, Flash flood, drought, cloud burst, Earthquake, Landslides, Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozone depletion.					
Manmade Disasters: Chemical, Industrial, Nuclear and Fire Hazards. Role of growing population and subsequent industrialization, urbanization and changing lifestyle of human beings in frequent occurrences of manmade disasters.					
UNIT - III DISASTER MANAGEMENT CYCLE AND FRAMEWORK					[09]
Disaster Management Cycle, Paradigm Shift in Disaster Management Pre-Disaster Risk Assessment and Analysis, Risk Mapping, zonation and Micro zonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development, Awareness During Disaster Evacuation, Disaster Communication, Search and Rescue, Emergency Operation Centre, Incident Command System, Relief and Rehabilitation, Damage and Needs Assessment, Restoration of Critical Infrastructure, Early Recovery, Reconstruction and Redevelopment, IDNDR, Yokohama Strategy, Hyogo Framework of Action.					
UNIT - IV DISASTER MANAGEMENT IN INDIA DISASTER PROFILE OF INDIA					[09]
Mega Disasters of India and Lessons Learnt, Disaster Management Act 2005, Institutional and Financial Mechanism, National Policy on Disaster Management, National Guidelines and Plans on Disaster Management, Role of Government, Non-Government and Inter-Governmental Agencies.					
UNIT - V APPLICATIONS OF SCIENCE AND TECHNOLOGY FOR DISASTER MANAGEMENT & MITIGATION					[09]
Geo-informatics in Disaster Management, Disaster Communication System, Land Use Planning and Development Regulations, Structural and Non Structural Mitigation of Disasters, S&T Institutions for Disaster Management in India.					
Total (L= 45, T = 0) = 45 Periods					

Text Books :

- 1 R B Singh., Disaster Management and Mitigation, World focus Publisher, New Delhi, First Edition, 2016.
- 2 Satish Modh, Introduction to disaster management, Macmillan publishers India Ltd, New Delhi, Second Edition, 2019.

Reference Books :

- 1 R B Singh., Natural Hazards and Disaster Management: Vulnerability and Mitigation, Rawat Publications, New Delhi, Reprint Edition, 2006.
- 2 Pardeep Sahni, Disaster Risk Reduction in South Asia, PHI Learning, New Delhi, Fourth Edition, 2018.
- 3 M. Saravanakumar, Disaster Management, Himalaya Publishing House, Bangalore, First Edition, 2017
- 4 Singh, Disaster Management: Future Challenges, IK International, New Delhi, First Edition, 2017.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF CIVIL ENGINEERING
CO-PO MAPPING

Course Code: 20CE907

Regulation: R 2020

Course Name: Introduction to Disaster Management and Mitigation

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Explain the concepts of disaster and its effect in Indian scenario.</i>	3	3	1	-	-	2	-	-	-	-	-	3	-	-
CO2:	<i>Elaborate the difference between natural and manmade disasters.</i>	3	3	1	-	-	3	-	-	-	-	-	3	-	-
CO3:	<i>Outline the disaster management cycle and its operation</i>	3	3		-	-	2	-	-	-	-	-	3	-	-
CO4:	<i>Outline the disaster management in India and its profile</i>	3	3	1	-	-	3	-	-	-	-	-	3	-	-
CO5:	<i>Propose the application of geoinformatics for disaster management and mitigation.</i>	3	3	3	-	2	3	-	-	-	-	-	3	-	-
Average		3	3	1	-	2	3	-	-	-	-	-	3	-	-

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020
20CE908	INTRODUCTION TO EARTHQUAKE ENGINEERING (Open Elective)	L T P C 3 0 0 3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes : On successful completion of the course, the student will be able to

	Cognitive Level
CO1: Illustrate the causes and effects of earthquake.	Understand
CO2: Explain the basic concepts in seismology and correlate to earthquake engineering.	Understand
CO3: Summarize the theory of vibrations.	Understand
CO4: Outline the design process for earthquake resisting structures	Understand
CO5: Predict the performance of building and structures under the earthquake.	Understand

UNIT - I CAUSES AND EFFECTS OF EARTHQUAKE [09]

Causes of earthquake by natural sources and manmade sources - Earthquake effects on building structure - Liquefaction of soils, effects of liquefaction, methods to reduce liquefaction - Land and rock slides - tsunamis.

UNIT - II ELEMENTS OF ENGINEERING SEISMOLOGY [09]

Plate tectonics, Elastic rebound, seismic zoning map of India, Focus, epicenter, seismic waves, magnitude, intensity, intensity scale and its correlation with ground acceleration, characteristics of strong ground motions.

UNIT - III THEORY OF VIBRATIONS [09]

Basic concepts of vibration - Difference between static loading and dynamic loading - Types of vibration - Vibration measuring instruments - Degrees of freedom -Types of Damping.

UNIT - IV DESIGN METHODOLOGY [09]

Design methodology - Architectural consideration - Geotechnical consideration - Structural design consideration, earthquake design philosophy, importance of ductility - Capacity design - Techniques of aseismic design - Design spectrum.

UNIT - V PERFORMANCE OF BUILDING AND STRUCTURES [09]

Lessons learnt from the past earthquakes - Shear wall, types of shear wall ,function of shear wall - Concepts of seismic base isolation technique - Base isolation devices - Seismic dampers - Seismic active control.

Total (L= 45, T = 0) = 45 Periods

Text Books :

- 1 Juggal,S .K., Earthquake Resistant Design of Structures, Oxford University Press, London, Second Edition, 2013.
- 2 Jamodarasamy, S.R. and Kavitha, S., Basics of structural dynamics and Aseismic design, PHI Learning Pvt. Ltd, New Delhi, Fifth Edition, 2006.

Reference Books :

- 1 Pankaj Agarwal. and Manish Shrikhande., Earthquake Resistant Design of Structures, Prentice Hall of India, New Delhi, Third Edition, 2009.
- 2 Chopra, Anil. K., Dynamics of Structures -Theory and Applications to Earthquake Engineering, Prentice Hall of India (P), New Delhi, Fifth Edition, 2020.
- 3 Murty C.V.R .Earthquake tips, IITK, Building material and technology promotion council, New Delhi, First Edition, 2005.
- 4 <http://nptel.ac.in/syllabus/105101004/>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF CIVIL ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20CE908

Course Name: Introduction to Earthquake Engineering

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Illustrate the causes and effects of earthquake.</i>	3	2	2	-	-	-	2	-	-	-	-	3	-	-
CO2	<i>Explain the basic concepts in seismology and correlate to earthquake engineering.</i>	3	2	2	-	-	-	2	-	-	-	-	3	-	-
CO3	<i>Summarize the theory of vibrations.</i>	3	2	3	-	-	-	2	-	-	-	-	3	-	-
CO4	<i>Outline the design process for earthquake resisting structures</i>	3	2	3	2	-	-	2	-	-	-	-	3	-	-
CO5	<i>Predict the performance of building and structures under the earthquake.</i>	3	2	3	2	-	-	2	-	-	-	-	3	-	-
Average		3	2	3	2	-	-	2	-	-	-	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20CE909

SOLID WASTE MANAGEMENT

(Open Elective)

L	T	P	C
3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course**Course Outcomes :** On successful completion of the course, the student will be able to**Cognitive Level**

CO1: Overview the concept of Solid waste and management.

Understand

CO2: Summarize about on-site storage and processing of solid waste.

Understand

CO3: Summarize about collection and transportation of waste.

Understand

CO4: Summarize about off-Site Processing of solid waste.

Understand

CO5: Interpret about safe disposal of solid waste.

Understand

UNIT - I Solid Waste and its Perspectives**[09]**

Sources - Types - Composition - Properties - Characteristics - Quantities - Generation rates - Types of Sampling - Functional elements - Legislative measures - 3R concept - Participatory waste management.

UNIT - II On-Site Storage and Processing**[09]**

On-site storage methods - materials used for containers -on site segregation of solid wastes -public health & economic aspects of storage - options under Indian conditions - Critical Evaluation of Options.

UNIT - III Collection and Transfer**[09]**

Collection services - Classification of container systems - Analysis of collection system - Collection routes - Guidelines - Transfer station -Site selection - Types - Manpower requirement.

UNIT - IV Off-Site Processing**[09]**

Processing techniques and Equipment; Resource recovery from solid wastes - composting - Factors affecting composting - Indore and Bangalore processes - Vermicomposting, Incineration, Pyrolysis - options under Indian conditions.

UNIT - V Disposal**[09]**

Sanitary landfills - site selection - merits and demerits - methods and operation of sanitary landfills - Leachate collection and control methods - Incinerators - types - hazardous wastes and its effects on environment - case studies.

Total (L= 40, T = 5) = 45 Periods**Text Books :**

- 1 Tchobanoglous, G., Frank Kreith, Hand Book of Solid Waste Management, McGraw-Hill, Inc., California, Second Edition, 2002.
- 2 Ramachandra, T. V., Management of Municipal Solid Waste, TERI Press, New Delhi, First Edition, 2009

Reference Books :

- 1 William A. Worrell, P. Aarne Vesilind, Solid Waste Engineering, Cengage Learning Asia Pte Limited, Second Edition, 2012.
- 2 Rao, M.N., Sultana, Razia Kota, Sri Harsha, Solid and Hazardous Waste Management: Science and Engineering, Butterworth-Heinemann, Burlington, First Edition, 2016
- 3 John Pichtel, Waste Management Practices: Municipal, Hazardous, and Industrial, CRC Press, US, Second Edition, 2014.
- 4 Freeman, H. M., Standard Handbook of Hazardous Waste Treatment and Disposal, McGraw-Hill, Inc., Second Edition, Noida, 1997.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF CIVIL ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20CE909

Course Name: Solid Waste Management

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	Overview the concept of Solid waste and management.	3	3	3	-	-	-	-	-	2	-	-	-	-	-
CO2	Summarize about on-site storage and processing of solid waste.	3	3	3	-	-	-	-	-	2	-	-	-	-	-
CO3	Summarize about Collection and transportation of waste.	3	3	3	-	-	-	-	-	2	-	-	-	-	-
CO4	Summarize about off-Site Processing of solid waste.	3	3	3	-	-	-	-	-	2	-	-	-	-	-
CO5	Interpret about safe disposal of solid waste.	3	3	3	-	-	-	-	-	2	-	-	-	-	-
Average		3	3	3	-	-	-	-	-	2	-	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020
20CE910	WATER AND AIR POLLUTION MANAGEMENT (Open Elective)	L T P C 3 0 0 3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes : On successful completion of the course, the student will be able to

CO1: Explain water and air quality standards

CO2: Discuss water treatment and fundamentals of air pollution

CO3: Demonstrate the particulate of air pollution.

CO4: Classify air pollution control technologies.

CO5: Describe air pollution control equipment.

Cognitive Level

Understand

Understand

Understand

Understand

Understand

UNIT - I INTRODUCTION [09]

Water effluent standards -water quality indices - physical - chemical and biological parameters of water - water quality requirement - potable water standards -Air pollutants - Sources - Classification of air pollutants - Particulates and gaseous pollutants - Effects of air pollutants on human health, vegetation and property - Global issues and air pollution - Global warming - Ozone layer depletion - Ambient air quality and emission standards - Air pollution indices - Air act.

UNIT - II WATER TREATMENT AND FUNDAMENTALS OF ATMOSPHERIC POLLUTANTS [09]

Water purification systems in natural systems- physical processes-chemical processes and biological processes primary, secondary and tertiary treatment-Unit operations-unit processes. Mixing, clarification - sedimentation; Types; aeration and gas transfer - coagulation and flocculation, coagulation processes - stability of colloids -Disinfection - Fundamentals of meteorology - Wind roses - Atmospheric stability - Atmospheric diffusion of pollutants - Transport, transformation and deposition of air contaminants - Plume behaviour - Atmospheric diffusion theories - Plume rise.

UNIT - III PARTICULATE AIR POLLUTION [09]

Control principles - Principles and equipment description of control technologies - Particulates control by Gravitation, centrifugal, filtration, scrubbing, electrostatic precipitation - Absorption, adsorption, condensation, incineration and biofiltration for control of gaseous air pollutants.

UNIT - IV AIR POLLUTION CONTROL TECHNOLOGIES [09]

Biological air pollution control technologies - Bioscrubbers, biofilters. Air pollutants in indoor environments - Levels of pollutants in indoor and outdoor air - Indoor air pollution from outdoor sources - Measurement methods - Control Technologies.

UNIT - V AIR POLLUTION CONTROL EQUIPMENT [09]

Introduction - Installation of Settling chambers, Inertial separators, Dust trap, Involute cyclone, Multiple cyclone, Filters, Electrostatic precipitators, Scrubbers, Separating devices - Efficiency of equipment.

Total (L= 45, T = 0) = 45 Periods

Text Books :

- 1 Rao, C. S., Environmental Pollution Control Engineering, New Age International, New Delhi, First Edition, 2006.
- 2 Davis M. L. and Cornwell D. A., Introduction to Environmental Engineering, Tata McGraw Hill Education Pvt. Ltd, New Delhi, First Edition, 2010.

Reference Books :

- 1 Rao, C. S., Environmental Pollution Control Engineering, New Age International, New Delhi, First Edition, 2006.
- 2 Anjaneyulu, D., Air Pollution and Control Technologies, Allied Publishers, Mumbai, First Edition 2002.
- 3 S.K. Garg, "Water Supply Engineering", Khanna Publishers, New Delhi, Thirty three Edition, 2010.
- 4 <https://nptel.ac.in/courses/122106030>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF CIVIL ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20CE910

Course Name: Water and Air Pollution Management

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Explain water and air quality standards</i>	3	3	-	-	-	-	2	-	-	-	-	3	-	-
CO2	<i>Discuss water treatment and fundamentals of air pollution</i>	3	3	-	-	-	-	-	-	-	-	-	2	-	-
CO3	<i>Demonstrate the particulate of air pollution.</i>	3	2	-	-	-	-	2	-	-	-	-	3	-	-
CO4	<i>Classify air pollution control technologies</i>	3	3	-	-	-	-	2	-	-	-	-	3	-	-
CO5	<i>Describe air pollution control equipment.</i>	3	3	-	-	-	-	2	-	-	-	-	3	-	-
Average		3	3	-	-	-	-	-	-	-	-	-	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20CS901	PROGRAMMING IN JAVA	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite: NIL**Course Outcomes : On successful completion of the course, the student will be able to**

CO1: Discover java programming fundamentals to solve real world problem.

CO2: Implement the concept of class and constructor.

CO3: Examine important features of java like inheritance and interfaces.

CO4: Illustrate the features of package and exception handling.

CO5: Apply the concepts of string manipulations.

Cognitive Level

Understand

Apply

Understand

Understand

Apply

UNIT - I JAVA FUNDAMENTALS [09]

The Java Buzzwords - Data Types - Variables - Local Variable - Instant Variable - Static variable - Array-Single Dimensional Array-Multi Dimensional Array - Operators - Control Statements -if - if else - nested if- else if- for - for each - while - do while - Switch - Break- Continue.

UNIT - II CLASS FUNDAMENTALS AND CONSTRUCTORS [09]

Class Fundamentals -Declaring Objects -Methods- Instant Method- Static Method- Method Overloading- Recursion - this keyword - Garbage Collection-Constructors - Argument constructor- No-Argument Constructor - Constructor Overloading - Access Control.

UNIT - III INHERITANCE AND INTERFACES [09]

Inheritance -Single - Multilevel - Hierarchical - Super keyword- Method Overriding - Abstract class - Final variable- Final class- Interfaces - Default Interface Methods - Static Methods in Interface.

UNIT - IV PACKAGES AND EXCEPTION HANDLING [09]

Packages -User define Package - Predefine Package - Access Protection - Importing Packages -Array List- Wrapper Classes - Exception Handling Fundamentals - Exceptions Types -Try and Catch - Multiple Catch - Nested Try - Throw - Throws - Finally.

UNIT - V STRING AND STRINGBUFFER [09]

The String Constructors - String Length - Character Extraction - String Comparison - Searching Strings - Modifying a String - Data Conversion usingvalueOf method - Methods in StringBuffer - append - delete - replace - insert - reverse - capacity.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Herbert Schildt, Java - The Complete Reference, Oracle Press, McGraw-Hill Education, New Delhi, Eleventh Edition, 2018.
- 2 Cay S. Horstmann, Core Java Volume 1 - Fundamentals, Prentice Hall, India, Tenth Edition, 2015.

Reference Books :

- 1 Herbert Schildt, Java - A Beginner Guide, Oracle Press, McGraw-Hill Education, New Delhi, Sixth Edition, 2014.
- 2 Joshua Bloch, Effective Java: A Programming Language Guide, Addison-Wesley Professional, USA, Third Edition, 2018.
- 3 Allen B. Downey and Chris Mayfield, Think Java: How to Think Like a Computer Scientist, O'Reilly, California, First Edition, 2016.
- 4 https://onlinecourses.nptel.ac.in/noc19_cs07/preview

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20CS901

Course Name: PROGRAMMING IN JAVA

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Discover java programming fundamentals to solve real world problem.</i>	3	3	2	3	3	-	-	-	-	-	-	3	-	-
CO2:	<i>Implement the concept of class and constructor.</i>	3	3	2	3	2	-	-	-	-	-	-	3	-	-
CO3:	<i>Examine important features of java like inheritance and interfaces.</i>	3	3	1	3	2	-	-	-	-	-	-	2	-	-
CO4:	<i>Illustrate the features of package and exception handling.</i>	3	3	2	2	3	-	-	-	-	-	-	3	-	-
CO5:	<i>Apply the concepts of string manipulations.</i>	3	3	2	3	2	-	-	-	-	-	-	3	-	-
Average		3	3	2	3	2	-	-	-	-	-	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20CS902	BASIC CONCEPTS OF DATA STRUCTURE	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite: NIL**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Elaborate the different linear data structure to solve simple problems.

Understand

CO2: Build the various tree structures with its operations.

Understand

CO3: Describe the concept of AVL tree, splay tree, B tree and B+ tree.

Understand

CO4: Apply graph data structure to solve real time problems.

Apply

CO5: Discover various sorting, hashing and searching techniques.

Apply

UNIT- I ARRAY AND LINKED LIST**[09]**

Abstract Data Types (ADT) - List ADT - Array Based Implementation - Linked List Implementation - Singly Linked Lists - Doubly Linked Lists - Circularly Linked Lists - Applications of Lists: Polynomial Manipulation-Radix sort.

UNIT- II STACK AND QUEUE**[09]**

Stack ADT - Implementation of Stack using Array and Linked List -Applications of Stack :Evaluating arithmetic expressions- Conversion of Infix to postfix expression Recursion- Queue ADT- Implementation of Queue using Array and Linked List - Applications of Queues

UNIT – III TREE STRUCTURES**[09]**

Tree ADT - Binary Tree ADT -Binary Tree Traversal - Expression Trees - Applications of Trees - Binary Search Tree- AVL Trees - B Tree - B+ Tree.

UNIT – IV GRAPHS**[09]**

Introduction to Graphs and its Types - Breadth First Traversal - Depth First Traversal - Topological Sorting - Minimum Spanning Tree: Prim's and Kruskal's algorithms – Shortest Path Algorithms:Dijkstra's Algorithm - Applications of Graphs.

UNIT – V SEARCHING,HASHING AND SORTING**[09]**

Searching: Linear and Binary Search - Hashing: Hash function - Separate Chaining - Open Addressing - Sorting: Bubble Sort - Selection Sort - Insertion Sort - Heap Sort - Merge Sort.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 M. A. Weiss, Data Structures and Algorithm Analysis in C, Pearson Education, India, Second Edition, 2015.
- 2 Reema Thareja, Data Structures Using C, Oxford University Press, England, Second Edition, 2011

Reference Books :

- 1 R. F. Gilberg, B. A. Forouzan, Data Structures, Thomson,India, Second Edition, 2005.
- 2 A.K. Sharma, Data Structures using C, Pearson Education, India, FirstEdition, 2011.
- 3 Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Fundamentals of Data Structures in C++,University Press, United States,Second Edition, 2008
- 4 <http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html>

CO-PO MAPPING

Regulation: R 2020

Course Code: 20CS902

Course Name: BASIC CONCEPTS OF DATA
STRUCTURE

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Elaborate the different linear data structure to solve simple problems.	3	2	3	-	2	-	-	-	-	-	-	2	-	-
CO2:	Build the various tree structures with its operations.	3	2	3	-	2	-	-	-	-	-	-	2	-	-
CO3:	Describe the concept of AVL tree, splay tree, B tree and B+ tree.	3	3	2	-	2	-	-	-	-	-	-	2	-	-
CO4:	Apply graph data structure to solve real time problems.	3	2	2	-	2	-	-	-	-	-	-	2	-	-
CO5:	Discover various sorting, hashing and searching techniques.	3	2	2	-	2	-	-	-	-	-	-	2	-	-
Average		3	2	2	-	2	-	-	-	-	-	-	2	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020			
20CS903	FUNDAMENTALS OF DATABASE CONCEPTS	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite: NIL**Course Outcomes : On successful completion of the course, the student will be able to**

CO1: Outline database architecture and the E-R Model for Database design.

CO2: Apply Structured query language to create and manipulate a relational database.

CO3: Build functions, triggers and recursive queries.

CO4: Demonstrate the purpose of normalization.

CO5: Discover about transaction and query processing concepts.

Cognitive Level

Understand

Apply

Apply

Understand

Understand

UNIT – I BASIC CONCEPTS AND E-R MODEL [09]

Database System Applications - Purpose of Database Systems - Views of Data - Database Languages -Database and Application Architecture. Overview of the Design Process - The Entity-Relationship model - Complex Attributes - Mapping Cardinalities and Keys.

UNIT – II RELATIONAL MODEL AND SQL FUNDAMENTALS [09]

Introduction to Relational Model: Structure of Relational Databases - Database Schema -Keys - Schema Diagrams. Overview of the SQL Query Language - SQL Data Definition - Basic Structure of SQL Queries - Additional Basic Operations - Set operations - Null values - Aggregate functions - Modification of the Database.

UNIT - III INTERMEDIATE SQL AND ADVANCED SQL [09]

Join Expressions - Views - Transactions - Integrity Constraints - Authorization -Accessing SQL from Programming Language - Functions and Procedures - Triggers -Recursive Queries.

UNIT - IV NORMALIZATION [09]

Functional Dependencies - Non-loss Decomposition - First, Second and Third Normal Forms, Dependency Preservation - Boyce/Codd Normal Form - Multi-valued Dependencies and Fourth Normal Form - Join Dependencies and Fifth Normal Form.

UNIT - V TRANSACTIONS AND QUERY PROCESSING [09]

Transaction Concept - A Simple Transaction Model-Storage Structure - Transaction Atomicity and Durability - Transaction Isolation - Serializability - Concurrency Control - Lock-Based protocols - Query Processing overview

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Abraham Silberschatz, Henry F. Korth and S. Sudharshan, Database System Concepts, Tata McGraw Hill, New Delhi, Seventh Edition, 2019.
- 2 RamezElmasri and Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education, New Delhi, Seventh Edition, 2016.

Reference Books :

- 1 Abraham Silberschatz, Henry F. Korth and S. Sudharshan, Database System Concepts, Tata McGraw Hill, New Delhi, Sixth Edition, 2015.
- 2 S.K.Singh, Database Systems Concepts, Design and Applications, Pearson Education, New Delhi, Second Edition, 2011.
- 3 C.J.Date, A.Kannan and S.Swamynathan, An Introduction to Database Systems, Pearson Education, New Delhi Eighth Edition, 2006.
- 4 <http://freevideolectures.com/course/2668/database-management-system#>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CO-PO MAPPING

Regulation: R 2020

Course Code: 20CS903

Course Name: FUNDAMENTALS OF DATABASE CONCEPTS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Outline database architecture and the E-R Model for Database design.</i>	3	3	3	-	2	2	-	-	-	-	-	2	-	-
CO2:	<i>Apply Structured query language to create and manipulate a relational database.</i>	3	3	3	-	2	2	-	-	-	-	-	2	-	-
CO3:	<i>Build functions, triggers and recursive queries.</i>	3	3	3	-	2	2	-	-	-	-	-	2	-	-
CO4:	<i>Demonstrate the purpose of normalization.</i>	3	3	3	-	2	2	-	-	-	-	-	2	-	-
CO5:	<i>Discover about transaction and query processing concepts.</i>	3	3	3	-	2	2	-	-	-	-	-	2	-	-
Average		3	3	3	-	2	2	-	-	-	-	-	2	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20CS904	INTERNET PROGRAMMING (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: NIL**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Summarize the technologies around the internet.	Understand
CO2: Construct the idea of web designing at user interface.	Apply
CO3: Discuss the concept of data processing on client and server side.	Understand
CO4: Construct the web oriented response at server side in PHP and XML format	Apply
CO5: Illustrate the web service architecture and to enable rich client presentation using AJAX.	Understand

UNIT - I INTRODUCTION TO WEB [09]

Web Essentials: Clients, Servers, and Communications. The Internet - History - Basic Internet Protocols: TCP and IP - DNS - URL. The World Wide Web - HTTP: Request Message - Response Message - Web Clients - Web Servers - Case Study.

UNIT - II BASICS OF HTML AND CSS [09]

HTML. An Introduction to HTML History and Version - Structure of HTML Page - HTML tags for data formatting - Tables - Links - Images - List - Frames - Forms - HTML 5 Tags and Validation. Style Sheets: CSS Syntax and Structure - CSS Rules for Backgrounds, Colours, and Properties - Manipulating Texts, Fonts, borders and Boxes - Margin - Padding Lists - CSS Positioning.

UNIT - III CLIENT SIDE SCRIPTING [09]

JavaScript: Syntax and Execution - Internal, embedded and External JavaScript. JavaScript: Variables - Arrays - Functions - Conditions - Loops - Type Conversion - Objects and DOM - Inbuilt Functions - Validation and Regular Expressions - Event Handling.

UNIT - IV SERVER SIDE SCRIPTING [09]

PHP: Introduction - Using PHP - variables - Program Control. Built-in Functions: Connecting to Database - Using cookies - Regular Expression. XML: Basics - DTD - XML Scheme - DOM and Presenting XML - XML parsers and validation.

UNIT - V AJAX and WEB SERVICE [09]

AJAX: Introduction - Ajax Client Server Architecture, XML http Request Object - Call Back Methods. Introduction to Web Services - Java web services: Basics - SOAP - WSDL: Creating, Publishing and Describing a web service - Consuming a web service - Database Driven Web Service from an application.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Randy Connolly and Ricardo Hoar, Fundamentals of Web Development, Pearson Education New Delhi, First Edition, 2016.
- 2 Paul Deitel, Harvey Deitel and Abbey Deitel , Internet and World Wide Web - How to Program, Pearson Education, New Delhi, Fifth Edition, 2012.

Reference Books :

- 1 Chris Bates, Web Programming - Building Internet Applications, John Wiley & Sons Ltd, USA, Third Edition, 2007.
- 2 John Dean, Web Programming With HTML5, CSS and JavaScript, Jones and Bartlett Publishers, Inc, United States, Third Edition, 2008.
- 3 Jon Duckett, Beginning Web Programming With HTML, XHTML and CSS, Wiley Publishing Inc, India, Second Edition, 2008.
- 4 www.tutorialspoint.com

CO-PO MAPPINGCourse Code: **20CS904**Regulation: **R 2020**Course Name: **INTERNET PROGRAMMING**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Summarize the technologies around the internet.</i>	3	3	3	-	3	2	-	-	-	-	-	3	-	-
CO2:	<i>Construct the idea of web designing at user interface.</i>	3	3	3	-	3	2	-	-	-	-	-	3	-	-
CO3:	<i>Discuss the concept of data processing on client and server side.</i>	3	3	3	-	3	1	-	-	-	-	-	2	-	-
CO4:	<i>Construct the web oriented response at server side in PHP and XML format</i>	3	3	3	-	3	1	-	-	-	-	-	2	-	-
CO5:	<i>Illustrate the web service architecture and to enable rich client presentation using AJAX.</i>	3	2	3	-	3	2	-	-	-	-	-	3	-	-
Average		3	3	3	-	3	2	-	-	-	-	-	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20CS905	FUNDAMENTALS OF MOBILE APPLICATION DEVELOPMENT (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: NIL**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

C01:	Identify various concepts of mobile programming that make it unique from programming for other platforms.	Understand
C02:	Critique mobile applications on their design pros and cons.	Understand
C03:	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.	Apply
C04:	Program mobile applications for the Android operating system that use basic and advanced phone features.	Understand
C05:	Deploy applications to the Android marketplace for distribution.	Apply

UNIT - I OVERVIEW OF THE ANDROID PLATFORM [09]

Introducing Android - Setting Up Your Android Development Environment - Writing Your First Android Application - Mastering the Android Development Tools

UNIT - II ANDROID APPLICATION BASICS [09]

Understanding the Anatomy of an Android Application - Defining Your Application Using the Android Manifest File - Managing Application Resources

UNIT - III ANDROID USER INTERFACE DESIGN ESSENTIALS [09]

Exploring User Interface Screen Elements - Designing User Interfaces with Layouts - Working with Fragments - Working with Dialogs

UNIT - IV ANDROID APPLICATION DESIGN ESSENTIALS [09]

Android application design: Using Android Preferences - Working with Files and Directories -Using Content Providers - Designing Compatible Applications

UNIT- V PUBLISHING AND DISTRIBUTING ANDROID APPLICATIONS [09]

The Android Software Development Process - Designing and Developing Bulletproof Android Applications - Testing Android Applications - Publishing Your Android Application

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Lauren Darcey, Shane Conder, Android Wireless Application Development, Pearson Education, India, Second Edition, 2011.
- 2 Ed Burnette, Hello Android: Introducing Google's Mobile Development Platform, The Pragmatic Publishers, North Carolina USA, Third Edition, 2010.

Reference Books :

- 1 Google Developer Training, Android Developer Fundamentals Course - Concept Reference, Google Developer Training Team, 2016.
- 2 ZigurdMednieks, Laird Dornin, Blake Meike G, Masumi Nakamura, Programming Android: Java Programming for the New Generation of Mobile Devices, OReilly Media, USA, Second Edition, 2011.
- 3 2016Reto Meier, Professional Android 4 Application Development, WroxPublications, John Wiley, New York, First Edition, 2012.
- 4 <https://developer.android.com/training/basics/firstapp>

CO-PO MAPPING

Regulation: R 2020

Course Code: 20CS905

Course Name: FUNDAMENTALS OF MOBILE
APPLICATION DEVELOPMENT

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1:	Identify various concepts of mobile programming that make it unique from programming for other platforms.	3	2	2	-	1	-	-	-	-	-	-	1	-	-
CO2:	Critique mobile applications on their design pros and cons.	3	2	3	-	2	-	-	-	-	-	-	2	-	-
CO3:	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.	3	2	3	-	2	-	-	-	-	-	-	2	-	-
CO4:	Program mobile applications for the Android operating system that use basic and advanced phone features.	3	2	2	-	2	-	-	-	-	-	-	1	-	-
CO5:	Deploy applications to the Android marketplace for distribution.	3	2	3	-	2	-	-	-	-	-	-	2	-	-
Average		3	2	2	-	2	-	-	-	-	-	-	2	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020
20CS906	PRINCIPLES OF ETHICAL HACKING	L T P C
	(Open Elective)	3 0 0 3

Prerequisite: NIL**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1.	Discuss the basics of hacking with its ethics	Understand
CO2.	Extend the possibilities and types of Attacks	Understand
CO3.	Summarize the testing process with programming Language.	Understand
CO4.	Infer about the impact of hacking wireless network	Understand
CO5.	Outline about the protection scheme.	Understand

UNIT - I ETHICAL HACKING OVERVIEW [09]

Introduction to Ethical Hacking - What You Can Do Legally - What You Cannot Do Legally - TCP/IP Concepts Review - IP Addressing - Overview of Numbering Systems

UNIT - II NETWORK ATTACKS AND ITS IMPACT [09]

Malicious Software - Protecting Against Malware Attacks - Intruder Attacks on Networks and Computers - Addressing Physical Security - Using Web Tools for Foot printing - Conducting Competitive Intelligence - Introduction to Social Engineering - Using Port-Scanning Tools - Conducting Ping Sweeps - Understanding Scripting.

UNIT - III SECURITY TESTING [09]

Enumerating Operating Systems - Introduction to Computer Programming - Understanding C,HTML, Pearl and Object Oriented Programming Basics - Windows OS Vulnerabilities - Tools for Identifying Vulnerabilities in Windows - Windows and Other Embedded Operating Systems - Vulnerabilities of Embedded OSs.

UNIT - IV WEB APPLICATION AND WIRELESS NETWORK [09]

Understanding Web Applications - Understanding Web Application Vulnerabilities - Tools for Web Attackers and Security Testers - Hacking Wireless Networks

UNIT - V PROTECTION SYSTEM [09]

Understanding Cryptography Basics - Understanding Symmetric and Asymmetric Algorithms - Understanding Public Key Infrastructure - Understanding Cryptography Attacks - Understanding Routers and Firewalls - Understanding Intrusion Detection and Prevention Systems - Understanding Honey pots

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Michael T. Simpson and Nicholas Antill, Ethical Hacking and Network defense, Cengage Learning, New Delhi, Third Edition, 2017.
- 2 Ankit Fadia, Ethical Hacking, Macmillan India Ltd, India, Second Edition, 2006.

Reference Books :

- 1 Steven Defino, Barry Kaufman and Nick Valenteen, Official Certified Ethical Hacker review guide, Cengage Learning New Delhi, Second Edition, 2012.
- 2 Ankit Fadia, The Ethical Hacking Guide to Corporate Security, Macmillan Publishers, India, Second Edition, 2010.
- 3 James S. Tiller, The Ethical Hack: A Framework for Business value Penetration Testing, CRC Press, Florida, First Edition, 2005.
- 4 https://onlinecourses.nptel.ac.in/noc22_cs13

CO-PO MAPPINGCourse Code: **20CS906**Regulation: **R 2020**
Course Name: **PRINCIPLES OF ETHICAL HACKING**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Discuss the basics of hacking with its ethics</i>	3	3	3	-	3	3	-	3	-	-	-	2	-	-
CO2:	<i>Extend the possibilities and types of Attacks</i>	3	3	2	-	1	2	-	1	-	-	-	1	-	-
CO3:	<i>Summarize the testing process with programming Language.</i>	3	3	2	-	3	3	-	2	-	-	-	3	-	-
CO4:	<i>Infer about the impact of hacking wireless network</i>	3	3	2	-	3	2	-	1	-	-	-	2	-	-
CO5:	<i>Outline about the protection scheme.</i>	3	3	2	-	3	2	-	1	-	-	-	3	-	-
Average		3	3	2	-	3	2	-	1	-	-	-	2	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20CS907	GREEN TECHNOLOGY (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: NIL**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Identify Green IT with its different dimensions and Strategies.	Understand
CO2: Describe Green data centres and storage along with its green software methodologies.	Understand
CO3: Outline the concepts o to manage the green IT with necessary components.	Understand
CO4: Recognize various green enterprise activities, functions and their role with IT.	Understand
CO5: Categorize various laws, standards and protocols for regulating green IT.	Understand

UNIT - I GREEN IT [09]

Environmental Concerns and Sustainable Development - Environmental Impacts of IT - Green IT -Holistic Approach to Greening IT - Greening IT - Applying IT for enhancing Environmental sustainability - Green IT Standards and Eco- Labelling of IT - Enterprise Green IT strategy - Life Cycle of a device or hardware - Reuse, Recycle and Dispose.

UNIT - II SUSTAINABLE SOFTWARE DEVELOPMENT AND GREEN DATA CENTRES [09]

Current Practices - Sustainable Software - Attributes - Metrics - Methodology - Defining Actions - Data Centres: Associated Energy Challenges - IT Infrastructure - Management - Green Data Centre Metrics - Green Data Storage - Storage Media Power Characteristics - Energy Management Techniques for Hard Disks.

UNIT - III ENTERPRISE GREEN IT STRATEGY [09]

Approaching Green IT Strategies - Business Drivers - Business Dimensions for Green IT Transformation - Organizational Considerations - Steps to Develop Green IT Strategy - Metrics and Measurements - Multilevel Sustainable Information - Sustainability Hierarchy Models.

UNIT - IV GREEN ENTERPRISE READINESS AND THE ROLE OF IT [09]

Readiness and Capability - Development and Measuring of an Organization's G-Readiness Framework - Organizational and Enterprise Greening - Information systems in Greening Enterprises - IT Usage and Hardware - Inter-Organizational Enterprise activities and Green Issues - Enablers and making the case for IT and Green Enterprise.

UNIT - V LAWS, STANDARDS AND PROTOCOLS [09]

The regulatory environment and IT manufacturers - Non regulatory government initiatives - Industry associations and standards bodies - Green building standards - Green data centres - Social movements and Greenpeace - Cloud Computing - Energy Usage Model.

Total (L= 45, T = 0) = 45 Periods**Text Books :ENERGY MANAGEMENT**

- 1 San Murugesan, G.R. Gangadharan, Harnessing Green IT - Principles and Practices, Wiley Publication, India, First Edition, 2012.
- 2 BhuvanUnhelkar, Green IT Strategies and Applications - Using Environmental Intelligence, CRC Press, Florida, First Edition, 2016.

Reference Books :

- 1 Woody Leonhard, Katherrine Murray, Green Home computing for dummies, Wiley Publication, India, First Edition, 2009.
- 2 Bud E. Smith, Green Computing: Tools and Techniques for Saving Energy, Money and Resources, CRC Press, Florida, Second Edition, 2014.
- 3 Jason Harris, Green Computing and Green IT - Best Practices on regulations and industry, Lulu.com, First edition, 2008.
- 4 <https://nptel.ac.in/courses/106/105/106105167/>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CO-PO MAPPING

Course Code: 20CS907

Regulation: R 2020

Course Name: GREEN TECHNOLOGY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1:	Identify Green IT with its different dimensions and Strategies.	3	3	3	-	3	-	-	-	-	-	-	2	-	-
CO2:	Describe Green data centres and storage along with its green software methodologies.	3	2	2	-	3	-	-	-	-	-	-	1	-	-
CO3:	Outline the concepts o to manage the green IT with necessary components.	3	3	2	-	3	-	-	-	-	-	-	2	-	-
CO4:	Recognize various green enterprise activities, functions and their role with IT.	3	3	3	-	3	-	-	-	-	-	-	1	-	-
CO5:	Categorize various laws, standards and protocols for regulating green IT.	3	3	3	-	3	-	-	-	-	-	-	2	-	-
Average		3	3	3	-	3	-	-	-	-	-	-	2	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20CS908	ARTIFICIAL INTELLIGENCE AND ROBOTICS		R 2020			
	(Open Elective)		L	T	P	C
			3	0	0	3

Prerequisite:NIL**Course Outcomes :** On successful completion of the course, the student will be able to

CO1: Describe agents structure and predict uninformed search algorithms for any AI problem

CO2: Illustrate appropriate AI methods to solve a given problem.

CO3: Explain a problem using first order and predicate logic.

CO4: Identify planning algorithms and illustrate about learning

CO5: Infer about robotics concept.

Cognitive Level

Understand

Apply

Understand

Apply

Understand

UNIT - I FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE [9]

Intelligent Agents -Agents and environments - Good behavior-The Nature of Environments-The Structure of Agents-Solving Problems by Searching: Problem-Solving Agents- Example problems - Searching for solutions -Uninformed search strategies.

UNIT -II INFORMED SEARCHING TECHNIQUES [9]

Informed (Heuristic) Search Strategies- Heuristic functions-Local Search and Optimization Problems- Adversarial Search - Games - Optimal decisions in games - Alpha-Beta Pruning- Constraint Satisfaction Problems-Defining Constraint Satisfaction Problems.

UNIT - III LOGICAL REASONING [9]

First order logic - Representation revisited - Syntax and semantics for first order logic - Using first order logic - Knowledge engineering in first order logic - Inference in First order logic - Propositional versus first order logic - Unification and lifting - Forward chaining - Backward chaining.

UNIT - IV PLANNING AND LEARNING [9]

Classical Planning: Definition of Classical Planning-Algorithm for Planning as State - Space Search-Planning graphs-Analysis of Planning Approaches- Learning from Examples: Forms of Learning-Supervised learning - Learning Decision trees - Ensemble Learning - Explanation-Based Learning.

UNIT - V ROBOTICS [9]

Introduction - Robot Hardware - Robot Perception - Planning to Move - Planning Uncertain Movements - Moving - Robotic Software Architectures - Application Domains.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Stuart Russell and Peter Norvig, Artificial Intelligence - A Modern Approach, Pearson Education, New Delhi, Third Edition, 2016
- 2 Kevin Night and Elaine Rich, Nair B., Artificial Intelligence (SIE) , McGraw Hill, New Delhi, Third Edition, 2008

Reference Books :

- 1 Dan W. Patterson, Introduction to AI and ES, Pearson Education, New Delhi, Third Edition, 2007.
- 2 Peter Jackson, Introduction to Expert Systems, Pearson Education, New Delhi, Third Edition, 2007.
- 3 Deepak Khemani, Artificial Intelligence, Tata McGraw Hill, New Delhi, Third Edition, 2013.
- 4 David L. Poole and Alan K. Mackworth, Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, England, First Edition, 2010.

CO-PO MAPPING

Regulation: R 2020

Course Code: 20CS908

Course: ARTIFICIAL INTELLIGENCE AND
Name: ROBOTICS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1:	Describe agents structure and predict uninformed search algorithms for any AI problem	3	3	3	-	3	2	-	-	-	-	-	3	-	-
CO2:	Illustrate appropriate AI methods to solve a given problem.	3	3	3	-	3	2	-	-	-	-	-	3	-	-
CO3:	Explain a problem using first order and predicate logic.	3	3	3	-	3	2	-	-	-	-	-	3	-	-
CO4:	Identify planning algorithms and illustrate about learning	3	3	3	-	3	2	-	-	-	-	-	3	-	-
CO5:	Infer about robotics concept.	3	3	3	-	3	2	-	-	-	-	-	3	-	-
Average		3	3	3	-	3	2	-	-	-	-	-	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20CS909	BIG DATA AND ANALYTICS (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: NIL**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Discover the insights of big data analytics

Understand

CO2: Identify the file systems and to know the mapreduce technique

Understand

CO3: Summarize data by utilizing various statistical and data mining approaches

Understand

CO4: Deploy and Perform analytics on real-time streaming data

Understand

CO5: Comprehend the various NoSql alternative database models

Understand

UNIT - I INTRODUCTION TO BIG DATA [9]

Big Data - Definition, Characteristic Features - Big Data Applications - Big Data vs Traditional Data - Risks of Big Data -Structure of Big Data -Web Data - Evolution of Analytic Scalability - Evolution of Analytic Processes, Tools and methods - Analysis Vs Reporting - Modern Data Analytic Tools.

UNIT - II HADOOP FRAMEWORK [9]

Distributed File Systems - Large-Scale File System Organization - HDFS concepts - MapReduce Execution, Algorithms using MapReduce, Matrix-Vector Multiplication - Hadoop YARN.

UNIT - III DATA ANALYSIS [9]

Statistical Methods : Regression modelling- Multivariate Analysis - Classification: SVM & Kernel Methods - Rule Mining - Cluster Analysis- Types of Data in Cluster Analysis - Predictive Analytics - Data analysis using R.

UNIT - IV MINING DATA STREAMS [9]

Streams: Concepts - Stream Data Model and Architecture - Sampling data in a stream - Mining Data Streams and Mining Time-series data - Real Time Analytics Platform Applications - Real Time Sentiment Analysis- Stock Market Predictions.

UNIT - V BIG DATA FRAMEWORKS [9]

Introduction to NoSQL - Aggregate Data Models - Hbase: Data Model and Implementations - Hbase Clients - Examples - Cassandra: Data Model - Examples - Cassandra Clients - Hadoop Integration. Pig - Grunt - Pig Data Model - Pig Latin - developing and testing Pig Latin scripts.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & Sons, Incorporated, United States, First Edition, 2012.
- 2 David Loshin, Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph, Elsevier Science, Netherlands, First Edition, 2013.

Reference Books :

- 1 Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, Germany, Second Edition, 2014.
- 2 Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley, United States, First Edition, 2013.
- 3 P. J. Sadalage and M. Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Addison-Wesley Professional, United States, Third Edition, 2013.
- 4 Richard Cotton, Learning R - A Step-by-step Function Guide to Data Analysis, O_Reilly Media, California, Third Edition, 2018.

CO-PO MAPPINGCourse Code: **20CS909**Regulation: **R 2020**Course Name: **BIG DATA AND ANALYTICS**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Discover the insights of big data analytics	3	3	2	-	3	2	-	-	-	-	-	1	-	-
CO2:	Identify the file systems and to know the mapreduce technique	3	2	1	-	3	3	-	-	-	-	-	1	-	-
CO3:	Summarize data by utilizing various statistical and data mining approaches	3	3	2	-	3	2	-	-	-	-	-	1	-	-
CO4:	Deploy and Perform analytics on real-time streaming data	3	3	2	-	3	2	-	-	-	-	-	1	-	-
CO5:	Comprehend the various NoSql alternative database models	3	3	1	-	3	2	-	-	-	-	-	1	-	-
Average		3	3	2	-	3	2	-	-	-	-	-	1	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20CS910	HARDWARE AND TROUBLE SHOOTING	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite: NIL**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

<i>CO1: Identify with the Basic functional units of a computer system.</i>	<i>Understand</i>
<i>CO2: Discover the working Concepts of I/O devices in computer.</i>	<i>Understand</i>
<i>CO3: Examine the interfaces and controllers connected to PC.</i>	<i>Understand</i>
<i>CO4: Outline the system configuration, Installation and maintenance of PC.</i>	<i>Understand</i>
<i>CO5: Summarize about faults, diagnostics and troubleshooting in PC.</i>	<i>Understand</i>

UNIT – I INTRODUCTION [9]

Introduction - Computer Organization - Number Systems and Codes - Memory - ALU - CU - Instruction prefetch - Interrupts - I/O Techniques - Device Controllers - Error Detection Techniques - Microprocessor - Personal Computer Concepts - Advanced System Concepts - Microcomputer Concepts - OS - Multitasking and Multiprogramming - Virtual Memory - Cache Memory - Modern PC and User.

UNIT – II PERIPHERAL DEVICES [9]

Introduction - Keyboard - CRT Display Monitor - Printer - Magnetic Storage Devices - FDD - HDD - Special Types of Disk Drives - Mouse and Trackball - Modem - Fax Modem - CD ROM Drive - Scanner - Digital Camera - DVD - Special Peripherals.

UNIT – III PC HARDWARE OVERVIEW [9]

Introduction - Hardware BIOS DOS Interaction - The PC family - PC hardware - Inside the System Box - Motherboard Logic - Memory Space - Peripheral Interfaces and Controllers - Keyboard Interface - CRT Display interface - FDC - HDC - Microprocessors in PC.

UNIT – IV INSTALLATION AND PREVENTIVE MAINTENANCE [9]

Introduction - system configuration - pre installation planning - Installation practice - routine checks - PC Assembling and integration - BIOS setup - Engineering versions and compatibility - preventive maintenance - DOS - Virus - Data Recovery.

UNIT – V TROUBLESHOOTING [9]

Introduction - computer faults - Nature of faults - Types of faults - Diagnostic programs and tools - Microprocessor and Firmware - Programmable LSI's - Bus Faults - Faults Elimination process - Systematic Troubleshooting - Symptoms observation and analysis - fault diagnosis - fault rectification - Troubleshooting levels - FDD, HDD, CD ROM Problems.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 B. Govindarajalu, IBM PC Clones Hardware, Troubleshooting and Maintenance, McGraw-Hill, New Delhi, Second Edition, 2003.
- 2 K.L. James, Computer Hardware Installation, Interfacing, Troubleshooting and maintenance, PHI Learning Private Limited, India, First Edition, 2013.

Reference Books :

- 1 Craig Zacker and John Rourke, PC Hardware: The Complete Reference, McGraw-Hill, New Delhi, Fifth Edition, 2001.
- 2 Jean Andrews, Guide to Hardware Managing, Maintaining and Troubleshooting, Cengage Learning (Course Technology), Boston, Fifth Edition, 2010
- 3 Cheryl A. Schmidt, Complete A+ guide to IT Hardware and Software, Pearson Education, India, Eighth Edition, 2020.
- 4 Scott M. Mueller, Upgrading and Repairing PCs, Pearson Education, India, Twenty Second Edition, 2012.

CO-PO MAPPINGCourse Code: **20CS910**Regulation: **R 2020**Course Name: **HARDWARE AND TROUBLE SHOOTING**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1:	Identify with the Basic functional units of a computer system.	3	2	-	-	2	-	-	-	-	-	-	2	-	-
CO2:	Discover the working Concepts of I/O devices in computer.	3	2	-	-	2	-	-	-	-	-	-	2	-	-
CO3:	Examine the interfaces and controllers connected to PC.	3	2	-	-	2	-	-	-	-	-	-	2	-	-
CO4:	Outline the system configuration, Installation and maintenance of PC.	3	2	-	-	2	-	-	-	-	-	-	2	-	-
CO5:	Summarize about faults, diagnostics and troubleshooting in PC.	3	2	-	-	2	-	-	-	-	-	-	2	-	-
Average		3	2	-	-	2	-	-	-	-	-	-	2	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20EE901	ELECTRICAL DRIVES AND CONTROL	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite:**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Categorize and explain the operation of electrical drives	Understand
CO2: Explain the characteristics of various electrical drives	Understand
CO3: Interpret the operation of starting and braking methods of AC and DC machines	Understand
CO4: Choose the appropriate speed control techniques for DC motor drives	Understand
CO5: Choose the appropriate speed control techniques for AC motor drives	Understand

UNIT - I INTRODUCTION [09]

Electrical drives - Need - Advantage of electrical drives - Basic elements of electrical drives - Factors influencing the choice of electrical drives - Four quadrant operation of a motor driving a hoist load - Load torques - Selection of motors with regard to thermal overloading - Classes of motor duty.

UNIT - II CHARACTERISTICS OF ELECTRIC DRIVES [09]

DC Motors: DC shunt, DC series, DC compound and Permanent Magnet DC motors - AC Motors: Single phase and three phase Induction motors - Speed-Torque characteristics of various types of loads and drive motors.

UNIT - III MOTOR STARTING AND BRAKING METHODS [09]

Types of Starters: Two Point Starter, Three Point Starter, Four Point Starter, DOL Starter, Y-Δ Starter. Braking of Electrical Motors: Shunt Motor, Series Motor, Single Phase Induction Motor.

UNIT - IV DC DRIVES [09]

Speed control of DC series and shunt motors - Armature and field control - Ward-Leonard control system - Controlled Rectifiers Fed DC motor Drive - Chopper fed DC motor Drive: Buck, Boost and Buck-Boost - Applications.

UNIT - V AC DRIVES [09]

Speed control of three phase induction motor - Voltage control, voltage / frequency control, slip power recovery scheme - Inverter and AC Voltage Controller Based Induction Drives - Applications.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Dubey G.K, Fundamentals of Electrical Drives, Narosa Publishing House, New Delhi, Second Edition, 2019.
- 2 Vedam Subramaniam, Electric Drives: Concepts and Applications, Tata McGraw Hill Publishing Company, New Delhi, Second Edition, 2010.

Reference Books :

- 1 Krishnan. R, Electric Motor Drives: Modeling, Analysis and Control, Prentice Hall Pvt. Ltd, New Delhi, Second Edition, 2003.
- 2 Pillai.S.K, A First Course on Electric Drives, Wiley Eastern Limited, New Delhi, Fourth Edition, 2012.
- 3 Nagrath I.J and Kothari D. P, Electrical machines, Tata McGraw Hill Publishing Company Ltd, New Delhi, Fifth Edition, 2017.
- 4 M.D. Singh and K.B. Khanchandani, Power Electronics, Tata McGraw Hill Publishing Co Ltd., New Delhi, Second Edition, 2013.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20EE901

Course Name: Electrical Drives and Control

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1:	<i>Categorize and explain the operation of electrical drives</i>	3	-	1	-	-	2	2	1	-	-	-	2	-	-
CO2:	<i>Explain the characteristics of various electrical drives</i>	3	-	1	-	-	2	2	1	-	-	-	2	-	-
CO3:	<i>Interpret the operation of starting and braking methods of AC and DC machines</i>	3	-	1	-	-	2	2	1	-	-	-	2	-	-
CO4:	<i>Choose the appropriate speed control techniques for DC motor drives</i>	3	-	1	-	-	2	2	1	-	-	-	2	-	-
CO5:	<i>Choose the appropriate speed control techniques for AC motor drives</i>	3	-	1	-	-	2	2	1	-	-	-	2	-	-
Average		3	-	1	-	-	2	2	1	-	-	-	2	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020			
20EE902	POWER SEMICONDUCTOR DEVICES	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite:

Course Outcomes : On successful completion of the course, the student will be able to	Cognitive Level
CO1: Explain the power diode characteristics and applications for adjustable speed motor control	Understand
CO2: Infer the static and dynamic characteristics of current controlled power semiconductor devices	Understand
CO3: Realize the static and dynamic characteristics of voltage controlled power semiconductor devices	Understand
CO4: Examine the gate drive requirements for power devices and isolation techniques between the gate and power circuits	Understand
CO5: Discuss the electrical analogy of thermal models and the methods for cooling power devices	Understand

UNIT - I POWER SEMICONDUCTOR DIODES AND CIRCUITS [09]

Power diode: Structure, V-I and reverse recovery characteristics-types of power diodes - Series and parallel connected diodes - Diode rectifiers: Single phase half wave and full wave rectifiers with R,RL load.

UNIT - CURRENT CONTROLLED DEVICES [09]

BJT's: Construction, operation, static and switching characteristics, Negative temperature coefficient and secondary breakdown, on-state losses, safe operating area. Thyristors: Construction, working, Two transistor analogy, V-I and switching characteristics, series and parallel operation; comparison of BJT and Thyristor - Basics of TRIAC, RCT,GTO, MCT.

UNIT - III VOLTAGE CONTROLLED DEVICES [09]

Power MOSFETs and IGBTs - Principle of voltage controlled devices, construction, types, static and switching characteristics, Comparison of Power MOSFET and IGBTs - Applications.

UNIT - IV FIRING AND PROTECTING CIRCUITS [09]

Gate drives circuit: SCR, MOSFET, IGBTs and base driving for power BJT - Necessity of isolation, Isolation of gate and base drives: pulse transformer and optocoupler - Overvoltage and overcurrent protections for power devices - Design of snubber circuits.

UNIT - V THERMAL PROTECTION [09]

Heat transfer - conduction, convection and radiation; Cooling - liquid cooling, vapour and phase cooling; Guidance for heat sink selection - Thermal resistance and impedance - Electrical analogy of thermal components, heat sink types and design - Mounting types- switching loss calculation for power device.

Total (L= 45, T = 0) = 45 Periods

Text Books :

- 1 Rashid.M.H, Power Electronics Circuits Devices and Applications, PHI learning private limited, New Delhi, Fourth Edition, 2017.
- 2 Bimbhra.P.S, Power Electronics, Khanna Publishing, New Delhi, Fifth Edition, 2013.

Reference Books :

- 1 M.D. Singh and K.B. Khanchandani, Power Electronics, Tata McGraw Hill Publishing Co Ltd., New Delhi, 2013.
- 2 Ned Mohan Tore. M. Undeland, William. P. Robbins, Power Electronics: Converters, Applications and Design, John Wiley and sons Ltd, United States, Second Edition, 2013.
- 3 Sen.P.C, Power Electronics, Tata McGraw Hill Publishing Co Ltd., New Delhi, Thirtieth reprint, 2008.
- 4 Joseph Vithayathil, Power Electronics: Principles and Applications, Delhi, Tata McGraw-Hill, 2010.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
CO-PO MAPPING

Course Code: **20EE902**Regulation: **R 2020**Course Name: **Power Semiconductor Devices**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Explain the power diode characteristics and applications for adjustable speed motor control</i>	3	2	-	-	-	-	-	-	-	-	-	2	-	-
CO2:	<i>Infer the static and dynamic characteristics of current controlled power semiconductor devices</i>	3	2	-	-	-	-	-	-	-	-	-	2	-	-
CO3:	<i>Realize the static and dynamic characteristics of voltage controlled power semiconductor devices</i>	3	2	-	-	-	-	-	-	-	-	-	2	-	-
CO4:	<i>Examine the gate drive requirements for power devices and isolation techniques between the gate and power circuits</i>	3	2	-	-	-	-	-	-	-	-	-	2	-	-
CO5:	<i>Discuss the electrical analog of thermal models and the methods for cooling power devices</i>	3	2	-	-	-	-	-	-	-	-	-	2	-	-
Average		3	2	-	2	-	-								

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20EE903	ELECTRICAL POWER GENERATION SYSTEMS (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite:**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Describe the layout and function of various parts inside the thermal power plant.	Remember
CO2: Outline the layout, construction, working of the components inside the hydro power plant.	Understand
CO3: Explain the principle of operation, layout and types of nuclear reactor in a nuclear power plant.	Understand
CO4: Discuss about the types, performance and layout of gas and diesel power plants.	Understand
CO5: Infer the basic concepts of different non-conventional energy sources.	Understand

UNIT - I Thermal power plant [09]

Basic thermodynamic laws - various components of steam power plant - layout - pulverized coal burners - Fluidized bed combustion - coal handling and ash handling systems - Forced draft and induced draft fans - Boilers - feed pumps - superheater - regenerator - condenser - deaerators - cooling tower.

UNIT - II Hydro power plant [09]

Hydel power plant classifications- essential elements, selection of water turbines - selection of site for a hydel power plant - layout - dams - pumped storage power plants - micro hydel developments.

UNIT - III Nuclear power plant [09]

Principles of nuclear energy - nuclear fission - nuclear reactor, types - pressurized water reactor, boiling water reactor, gas cooled reactor, liquid metal fast breeder reactor-nuclear power plants

UNIT - IV Gas and diesel power plant [09]

Fuels - gas turbine material, open and closed cycle gas turbine, work output & thermal efficiency, methods to improve performance - advantages and disadvantages- types of diesel engine power plant- components and layout.

UNIT - V Renewable energy [09]

Solar energy collectors - OTEC - wind power plants, tidal power plants and geothermal resources, fuel cell, MHD power generation principle.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Domkundwa, Arora Domkundwar, A Course in Power Plant Engineering, Dhanpat Rai and Co. Pvt. Ltd., New Delhi, Eighth edition, 2016.
- 2 P.K. Nag, Power Plant Engineering, Tata McGraw Hill Publishing Co Ltd., New Delhi, Third Edition, 2010.

Reference Books :

- 1 Philip Kiameh, Power Generation Handbook, Tata McGraw Hill Publishing Co Ltd., New Delhi, Third Edition, 2013.
- 2 P.C. Sharma, Power Plant Engineering, S.K. Kataria and Sons, New Delhi, First Edition, 2013.
- 3 Raja, A.K., Amit Prakash Manish Dwivedi, Power Plant Engineering, New Age International, New Delhi, First Edition, 2012.
- 4 Gupta, Manoj Kumar, Power Plant Engineering, PHI learning private limited, New Delhi, First Edition, 2012.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
CO-PO MAPPING

Regulation: R 2020

Course Code: 20EE903

Course Name: Electrical Power Generation Systems

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Describe the layout and function of various parts inside the thermal power plant.</i>	3	1	-	-	-	2	3	2	-	-	-	1	-	-
CO2:	<i>Outline the layout, construction, working of the components inside the hydro power plant.</i>	3	2	-	-	-	2	3	1	-	-	-	1	-	-
CO3:	<i>Explain the principle of operation, layout and types of nuclear reactor in a nuclear power plant.</i>	3	2	-	-	-	3	3	2	-	-	-	1	-	-
CO4:	<i>Discuss about the types, performance and layout of gas and diesel power plants.</i>	3	2	-	-	-	2	3	1	-	-	-	1	-	-
CO5:	<i>Infer the basic concepts of different non-conventional energy sources.</i>	3	1	-	-	-	3	3	2	-	-	-	1	-	-
Average		3	2	-	-	-	2	3	2	-	-	-	1	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20EE904	CONTROL ENGINEERING	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite: Applied Mathematics

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

CO1: Obtain the transfer function of electrical and mechanical systems.	Apply
CO2: Determine the time-domain response of first and second order systems.	Apply
CO3: Examine the stability of open loop system using bode / polar plot.	Apply
CO4: Analyze the stability of the system by Root locus and Routh Hurwitz criterion.	Apply
CO5: Design lag, lead, lag-lead compensator using bode plot.	Apply

UNIT - I SYSTEM AND THEIR REPRESENTATION [09]

Basic elements in control system - Classification of control systems: Open and closed loop systems- Electrical, Mechanical translational and rotational system - Block diagram reduction techniques - Signal flow graphs.

UNIT - II TIME RESPONSE ANALYSIS [09]

Types and order of systems - Types of test signal - First and second order time response -Time domain specification of second order under damped systems - Generalized error series-Steady state error and error constants.

UNIT - III FREQUENCY RESPONSE ANALYSIS [09]

Frequency response of the system - Bode plot - Polar plot - Constant M and N circles - Determination of closed loop response from open loop response.

UNIT - IV STABILITY OF CONTROL SYSTEM [09]

Characteristics equation - Routh Hurwitz criterion - Root locus construction - Effect of pole, zero addition.

UNIT - V COMPENSATOR AND CONTROLLER [09]

Lag, lead and lag-lead networks - Lag, lead and lag-lead compensator using bode plots - P, PI, PID controllers.

Total (L= 45, T = 0) = 45 Periods

Text Books :

- 1 Nagrath, J., and Gopal,V., Control Systems Engineering, New Age International (p) Limited, Publishers, New Delhi, Fourth Edition, 2007.
- 2 Benjamin C. Kuo, Automatic Control systems, PHI Learning, New Delhi, Seventh Edition, 2009.

Reference Books :

- 1 Ogata,K., Modern Control Engineering, PHI, New Delhi, Fifth Edition, 2009.
- 2 Norman S. Nise, Control Systems Engineering, John Wiley, New Delhi, Seventh Edition, 2014.
- 3 Smarajit Ghosh, Control systems, Pearson Education, New Delhi, Second Edition, 2009.
- 4 Roychoudhury,D., Modern control engineering, Prentice Hall of India, Second Edition, 2005.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
CO-PO MAPPING

Course Code: **20EE904**

Regulation: R 2020
Course Name: Control Engineering

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Obtain the transfer function of electrical and mechanical systems.</i>	3	3	2	2	-	-	-	-	-	-	-	2	-	-
CO2:	<i>Determine the time-domain response of first and second order systems.</i>	3	3	2	2	-	-	-	-	-	-	-	2	-	-
CO3:	<i>Examine the stability of open loop system using bode / polar plot.</i>	3	3	3	2	-	-	2	-	-	-	-	2	-	-
CO4:	<i>Analyze the stability of the system by Root locus and Routh Hurwitz criterion.</i>	3	3	3	2	-	-	2	-	-	-	-	2	-	-
CO5:	<i>Design lag, lead, lag-lead compensator using bode plot.</i>	3	3	3	2	-	-	2	-	-	-	-	2	-	-
Average		3	3	3	2	-	-	2	-	-	-	-	2	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20EE905	INDUSTRIAL AUTOMATION (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite:**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Explain the major components of Programmable Logic Controller and its applications.	Understand
CO2: Summarize the logical functions, timers and counters of PLC	Understand
CO3: Discuss the various instructions and modes of operation related to PLC.	Understand
CO4: Realize the architecture and various interfacing techniques of Distributed Control Systems	Understand
CO5: Examine the different applications of PLC and Distributed Control Systems (DCS).	Understand

UNIT - I INTRODUCTION TO PROGRAMMABLE LOGIC CONTROLLER (PLC) [09]

Introduction - PLC Evolution - PLC Vs Computers - Block Diagram of PLC - Parts of a PLC- Principles of Operation- Modifying the Operation- PLC Hardware Components: I/O modules, Power Supply, CPU - PLC size and Applications.

UNIT - II LOGIC FUNDAMENTALS, TIMER AND COUNTER [09]

Logic functions - Boolean instructions and functions - Hardwired logic Vs Programmed Logic - Developing circuits from Boolean instructions – PLC timer: classification and instructions - PLC counter: classification, instructions and applications

UNIT - III PLC PROGRAMMING [09]

PLC-memory map - Program scan - Relay type instructions - Instruction addressing - Branch instructions - Internal relay instructions - EXAMINE IF CLOSED and EXAMINE IF OPEN instructions - Modes of operation - Basic relay ladder logic and its control flow chart

UNIT - IV DISTRIBUTED CONTROL SYSTEM [09]

Distributed control system : Evolution - Architectures - Comparison - Local control unit - Process interfacing issues - Communication facilities - HMI Interface - Low and high level operator interfaces - Operator displays - Low and high level engineering interfaces - Introduction to SCADA.

UNIT - V APPLICATIONS OF PLC AND DCS [09]

PLC applications: Automatic Control of WareHouse Door - Automatic Lubricating Oil Supplier - Conveyor Belt motor Control - Automatic Car Washing Machine - DCS applications: Pulp and paper environment, Petroleum and refining environment.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Frank D. and Petruzella, Programmable Logic controllers, Tata McGraw Hill Publishing Company Limited, New Delhi, Fifth Edition, 2017
- 2 Lucas ,M.P., Distributed Control System, Van Nostrand and Reinhold Co., New york, First Edition, 1986.

Reference Books :

- 1 Gary Dunning, Introduction to Programmable Logic Controllers, Delmar Thomson Learning, New york, Third Edition, 2010
- 2 John W.Webb and Ronald A.Reis, Programmable Logic Controllers: Principles and Applications, PHI Private Ltd., New Delhi, Fifth Edition, 2003
- 3 Krishna Kant, "Computer - Based Industrial Control", Prentice Hall, New Delhi, Second Edition(Revised), 2011
- 4 Madhuchhanda Mitra and Smarajit Sen Gupta, Programmable Logic Controllers and Industrial Automation, Penram International Publishing (India) Pvt. Ltd, Mumbai, Second Edition, 2009

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
CO-PO MAPPING

Course Code: **20EE905**

Regulation: **R 2020**
 Course Name: **Industrial Automation**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Explain the major components of Programmable Logic Controller and its applications.</i>	3	2	3		2	-	-	-	-	-	-	1	-	-
CO2:	<i>Summarize the logical functions, timers and counters of PLC</i>	3	2	3		2	-	-	-	-	-	-	1	-	-
CO3:	<i>Discuss the various instructions and modes of operation related to PLC.</i>	3	2	3		2	-	-	-	-	-	-	1	-	-
CO4:	<i>Realize the architecture and various interfacing techniques of Distributed Control Systems</i>	3	2	3		1	-	-	-	-	-	-	1	-	-
CO5:	<i>Examine the different applications of PLC and Distributed Control Systems (DCS)</i>	3	2	3		2	-	-	-	-	-	-	1	-	-
Average		3	2	3		2	-	-	-	-	-	-	1	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020
20EE906	ELECTRICAL INSTRUMENTS AND MEASUREMENTS	L T P C
	(Open Elective)	3 0 0 3

Prerequisite:**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1:	Explain the construction and calibration of moving coil and Moving iron meters	Understand
CO2:	Discuss the operation and error correction method of wattmeter and Energy meter.	Understand
CO3:	Describe the various types of potentiometer and their limitations	Understand
CO4:	Determine the values of resistor, inductor, capacitor and frequency using bridges.	Understand
CO5:	Explain the concepts of storage and display devices.	Understand

UNIT - I MEASUREMENT OF VOLTAGE AND CURRENT [09]

Galvanometers - Ballistic, D'Arsonval galvanometer - Principle, construction, operation and comparison of moving coil, moving iron meter - Extension of range and calibration of voltmeter and ammeter - Errors and compensation.

UNIT - II MEASUREMENT OF POWER AND ENERGY [09]

Wattmeters: Induction, Electro-dynamometer - Theory & its errors - Methods of correction - Calibration of wattmeter - Energy meter: Single Phase Energy Meter - Construction, Theory, Errors - Adjustment of Errors - Construction and principle of working of single phase dynamometer type power factor meter.

UNIT - III POTENTIOMETERS & INSTRUMENT TRANSFORMERS [09]

DC potentiometer - Basic circuit, standardization - Laboratory type (Crompton's) - AC potentiometer - Drysdale (polar type) type - Gall-Tinsley (coordinate) type - Limitations & applications - C.T and P.T construction, theory, operation, phasor diagram- Applications.

UNIT - IV BRIDGE MEASUREMENT [09]

Measurement of resistance: Wheatstone bridge, Kelvin double bridge, Megger - Measurement of Inductance: Maxwell Bridge, Anderson bridge - Measurement of Capacitance: Schering bridge, Desauty's Bridge - Determination of frequency using Wein Bridge.

UNIT - V STORAGE AND DISPLAY DEVICES [09]

Recorders: Strip Chart, X-Y Recorders - Digital Plotters - Digital Storage Oscilloscope - Digital multimeters - LED - DLP - Dot Matrix Display - Data Loggers

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Golding, E.W and Widdis F.C, Electrical Measurements & Measuring Instruments, A.H.Wheeler & Co, Allahabad,India, Sixth Edition,2019.
- 2 Sawhney, A.K., A course in Electrical & Electronic Measurements and Instrumentation, Dhanpat Rai & Co (P) Ltd, Delhi, Nineteenth Edition, 2021.

Reference Books :

- 1 Gupta, J.B, Electrical Measurements and Measuring Instruments, S.K. Kataria & Sons, Delhi, Third edition, 2012.
- 2 Singh, S.K, Industrial Instrumentation and control, Tata McGraw Hill, New york, Second Edition, 2003.
- 3 Kalsi H.S, Electronic Instrumentation, Tata McGraw Hill, New york, Second Edition, 2004.
- 4 Martia U. Reissland, Electrical Measurement, New Age International (P) Ltd., New Delhi, Second Edition, 2001.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
CO-PO MAPPING

Course Code: 20EE906

Regulation: R 2020
 Course Name: Electrical Instruments and Measurements

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Explain the construction and calibration of moving coil and Moving iron meters</i>	3	3	2	-	-	1	1	-	-	-	-	3	2	3
CO2:	<i>Discuss the operation and error correction method of wattmeter and Energy meter.</i>	3	3	2	-	-	1	1	-	-	-	-	3	2	3
CO3:	<i>Describe the various types of potentiometer and their limitations</i>	3	3	2	-	-	1	1	-	-	-	-	3	2	3
CO4:	<i>Determine the values of resistor, inductor, capacitor and frequency using bridges.</i>	3	3	2	-	-	1	1	-	-	-	-	3	2	3
CO5:	<i>Explain the concepts of storage and display devices.</i>	3	3	2	-	-	1	1	-	-	-	-	3	2	3
Average		3	3	2	-	-	1	1	-	-	-	-	3	2	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20EE907	ENERGY CONSERVATION AND MANAGEMENT		L	T	P	C
		(Open Elective)		3	0	0

Prerequisite:**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Give the introduction about energy conservation principle and practices	Remember
CO2: Describe the concept of energy efficiency in the building.	Understand
CO3: Explain the concept of energy efficiency in the industry	Understand
CO4: Illustrate the concept of energy efficiency in the power plant	Understand
CO5: Describe the importance energy management and Demand Control Techniques	Understand

UNIT - I ENERGY CONSERVATION PRINCIPLES AND PRACTICES [09]

Energy scenario - Principles and imperatives of energy conservation - Energy consumption pattern - Resource availability - Need for energy saving - Overview of energy consumption and its effects -Energy Monitoring, targeting and reporting - Role of Bureau of Energy Efficiency - Standards and labeling.

UNIT - II ENERGY EFFICIENCY IN BUILDINGS [09]

Introduction, definition and concepts - Energy and water as a resource - Electrical energy conservation: Opportunities and techniques for energy conservation in buildings - Green buildings, Intelligent buildings, Rating of buildings, Efficient use of buildings - Solar passive architecture - Eco-housing concepts.

UNIT - III ENERGY EFFICIENCY IN INDUSTRIES [09]

Potential areas for electrical energy conservation in various industries - Conservation methods - Energy management opportunities in electrical heating, cable selection - Energy efficient motors - Adjustable AC drives - Application and its use - Energy efficiency in lighting.

UNIT - IV ENERGY EFFICIENCY IN POWER PLANTS [09]

Captive power generation systems - Sequence operation of power plants - Gas Insulated Substation - Bus ducts - Types and working principle - Energy management opportunities in transformer - Power transformer - Types of switchgear (HT and LT switchgear) GCB and generator.

UNIT - V ENERGY MANAGEMENT AND AUDIT [09]

Energy Management: Definition, Objective, Importance of energy management, Load management: Demand control techniques - Utility monitoring control system. Energy Audit: definition, types of energy audit, Methodology, Need for energy Audit, Steps involved in energy auditing.

Total (L= 45, T = 0) = 45 Periods**Text Books :ENERGY MANAGEMENT**

- 1 Mehmet Kanoglu and Yunus A. Cengel Dr, Energy Efficiency and Management for Engineers, Tata Mcgrow Hill, New Delhi, First Edition, 2019
- 2 Craig B. Smith, Energy Management Principles, Pergamon Press, United Kingdom, Second Edition, 2015.

Reference Books :

- 1 Wayne C Turner, Energy Management Handbook, The Fairmount Press, Newyork, Eighth Edition, 2006.
- 2 Bureau of Energy Efficiency Study material for Energy Managers and Auditors Examination: Paper I to IV
- 3 G. G. Rajan, Optimizing Energy Efficiencies in Industry", Tata McGraw Hill, New Delhi , Fourth Edition, , 2004
- 4 Frank Kreith and Yogi Goswami D, Energy Management and Conservation Handbook, Taylor & Francis, New Delhi Second Edition, 2016.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
CO-PO MAPPING

Course Code: **20EE907**Regulation: **R 2020**Course Name: **Energy Conservation and Management**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Give the introduction about energy conservation principle and practices</i>	2	1	2	-	-	-	1	3	1	-	-	3	-	-
CO2:	<i>Describe the concept of energy efficiency in the building.</i>	2	2	2	-	-	-	1	3	1	-	-	3	-	-
CO3:	<i>Explain the concept of energy efficiency in the industry</i>	2	2	2	-	-	-	1	3	1	-	-	3	-	-
CO4:	<i>Illustrate the concept of energy efficiency in the power plant</i>	2	2	2	-	-	-	1	3	1	-	-	3	-	-
CO5:	<i>Describe the importance energy management and Demand Control Techniques</i>	2	2	2	-	-	-	1	3	-	-	-	3	-	-
Average		2	2	2	-	-	-	1	3	1	-	-	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20EE908	ELECTRICAL WIRING, ESTIMATION AND COSTING (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite:**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Describe the various wiring materials and protective devices.	Understand
CO2: Discuss the internal wiring system and illumination.	Understand
CO3: Outline the external wiring system and installations.	Understand
CO4: Apply the knowledge to prepare electrical estimation for domestic installation.	Apply
CO5: Apply the knowledge to prepare the electrical estimation details for industrial installation.	Apply

UNIT - I INTRODUCTION TO WIRING AND PROTECTIVE DEVICES [09]

Wiring accessories - main switch - isolator and load break duty - classification of main switches - functional switches - one way, two way, intermediate switches - knife switches - specification of switches - function and specification of socket outlets, ceiling roses, fan regulators - Fuses, need, classification, Neutral link - Miniature circuit breaker, classification, function and specification - ELCB - RCCB.

UNIT - II INTERNAL WIRING SYSTEM [09]

Design and Drawing of Internal wiring system for various types of Residential, Commercial and Industrial buildings - Electrical layout - Clearance of line - Different types of circuits, Light circuit, Power circuit, Sub-main wiring, Main wiring, Single Line diagram - Different types of Lamps used in Residential, Commercial and Industrial buildings.

UNIT - III EXTERNAL WIRING SYSTEM AND EARTHING [09]

Different types of Under Ground (UG) Cables - Cable Laying - Electrical Control Panels - External Electrical Distribution System - Single Line Diagram - Load Calculations - General Specifications of Generating Set, Transformer - Street Lighting - Earthing, Different types of earthing system - Plate earthing, Pipe Earthing.

UNIT - IV ESTIMATION OF DOMESTIC INSTALLATION [09]

Selection of cables for internal wiring - Cable size calculation - Selection criteria for control switches - main switch - size of earth continuity conductor and earthing conductor - Preparation of schematic diagrams and wiring diagrams - Estimation problems regarding Electrification of domestic buildings - Relevant rules regarding electrification of high rise buildings.

UNIT - V ESTIMATION OF INDUSTRIAL INSTALLATIONS [09]

Installation of motor pump set - Estimation problem regarding domestic and irrigation pump sets - Estimation problems in small workshops below 50kW connected load - Service connection, definition, classification - use of weather proof cables - estimation problems for single phase and three phase overhead service connections.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Raina, K.B. and Bhattacharya, S.K., Electrical Design Estimating and Costing, New Age International, Bengaluru, Second Edition, 2017.
- 2 Gupta, J.B., A Course in Electrical Installation Estimating and Costing, S K Kataria & Sons, New Delhi, First Edition Reprint, 2013.

Reference Books :

- 1 Surjith Singh, Electrical estimating and costing, Dhanpat Rai Publishing Company, New Delhi, First Edition, 2016.
- 2 Uppal, S.L., Electrical Wiring, Estimating and Costing, Khanna Publisher, New Delhi, Sixth Edition, 1987.
- 3 Soni, P.M. and Upadhyay, P.A., Wiring, Estimating, Costing & Contracting, ATUL PRAKASHAN, Gujarat, First Edition, 2017.
- 4 Bureau of Indian Standards, I.E. rules for wiring, Electricity Supply Act-1948.

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
CO-PO MAPPING

Course Code: 20EE908

Regulation: R 2020
Course Name: Electrical Wiring, Estimation and Costing

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1:	Describe the various wiring materials and protective devices.	3	-	1	-	-	-	-	-	-	-	-	-		
CO2:	Discuss the internal wiring system and illumination.	3	-	1	-	-	-	-	-	-	-	-	-		
CO3:	Outline the external wiring system and installations.	3	-	1	-	-	-	-	-	-	-	-	-		
CO4:	Explain the electrical estimation for domestic installation.	3	2	1	-	1	-	-	-	-	-	-	-		
CO5:	Describe the electrical estimation details for industrial installation.	3	2	1	-	1	-	-	-	-	-	-	-		
Average		3	2	1	-	1	-								

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20EE909	FUNDAMENTALS OF ELECTRICAL MACHINERY (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite:**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Discuss fundamentals in various electrical circuits.	Understand
CO2: Explain the operation and characteristics of DC machines.	Understand
CO3: Determine the efficiency and regulation of the transformer.	Understand
CO4: Explain the operation and starting methods of Induction Motors.	Understand
CO5: Describe the applications of Synchronous Machines.	Understand

UNIT - I INTRODUCTION [09]

Electromagnetic Induction- Faraday's Laws - Series and Parallel circuits - Self and Mutual Inductance-Numerical problems - Purpose of Earthing - Methods of Earthing - Merits of Earthing - Different types of Electrical Machines.

UNIT - II DC MACHINES [09]

Principle of operation of DC generator - Types of DC machines - EMF equation - Open Circuit Characteristics - Principle of operation of DC Motor - Torque Equation - Speed control methods of DC motor - Losses in DC machines - Performance Characteristics.

UNIT - III TRANSFORMERS [09]

Principle of operation and construction Details - Classification of Transformers - EMF equation - Losses in a Transformer - Calculation of efficiency and regulation - Autotransformer.

UNIT - IV INDUCTION MOTORS [09]

Principle of operation - Constructional Details - Classification - Revolving Magnetic Fields - Starting Methods - Principle of operation of Single Phase Induction Motor - Starting Methods - Applications.

UNIT - V SYNCHRONOUS MACHINES [09]

Principle of operation and construction of alternators - EMF Equation - Regulation of alternator by Synchronous Impedance Method - Principle of operation of synchronous motor - Synchronous Condenser - Applications.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Rajendra Prasad, Fundamentals of Electrical Engineering, PHI Publications, New Delhi, Second Edition, 2005
- 2 B L Theraja and AK Theraja, A Textbook of Electrical Technology: Volume 2 AC and DC Machines, S. Chand & Co Ltd, New Delhi, Twenty Third Edition, 2006

Reference Books :

- 1 D. P. Kothari and I. J. Nagrath, Electric Machines, Tata McGraw Hill Publishing Company Ltd, Noida, Fourth Edition, 2017
- 2 Stephen J.Chapman, Electric Machinery Fundamentals, Tata McGraw Hill, New Delhi, Fourth Edition, 2018.
- 3 P. S. Bimbhra, Electrical Machinery, Khanna Publishers, New Delhi, Seventh Edition, 2018
- 4 J.B. Gupta, Theory & Performance of Electrical Machines, S.K. Kataria & Sons, New Delhi, First Edition Reprint, 2013.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
CO-PO MAPPING

Course Code: **20EE909**Regulation: **R 2020**Course Name: **Fundamentals of Electrical Machinery**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1:	<i>Discuss fundamentals in various electrical circuits.</i>	3	1	-	-	-		-	-	-	-	-	-	-	-
CO2:	<i>Explain the operation and characteristics of DC machines.</i>	3	1	-	-	-		2	-	-	-	-	-	-	-
CO3:	<i>Determine the efficiency and regulation of the transformer.</i>	3	1	-	-	-		2	-	-	-	-	-	-	-
CO4:	<i>Explain the operation and starting methods of Induction Motors.</i>	3	1	-	-	-		2	-	-	-	-	-	-	-
CO5:	<i>Describe the applications of Synchronous Machines.</i>	3	1	-	-	-		2	-	-	-	-	-	-	-
Average		3	1	-	-	-		2	-						

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20EE910	PRINCIPLES OF SOFT COMPUTING TECHNIQUES (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite:**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Describe the concepts of artificial neural network	Understand
CO2: Summarize the various types of neural network	Understand
CO3: Discuss the basic concepts of fuzzy logic system	Understand
CO4: Illustrate various methods used in fuzzy systems	Understand
CO5: Outline the genetic algorithm and hybrid genetic algorithm concepts	Understand

UNIT - I Introduction artificial neural network [09]

Artificial neural networks - biological neurons, Basic models of artificial neural networks - Connections, Learning, Activation Functions, McCulloch and Pitts Neuron, Hebb network.

UNIT - II Neural network architecture and algorithms [09]

Perceptron networks - Learning rule - Training and testing algorithm, Adaptive Linear Neuron, Back propagation Network - Architecture, Training algorithm.

UNIT - III Introduction to fuzzy logic [09]

Fuzzy logic - fuzzy sets - properties - operations on fuzzy sets, fuzzy relations - operations on fuzzy relations.

UNIT - IV Fuzzy logic system [09]

Fuzzy membership functions, fuzzification, Methods of membership value assignments - intuition - inference - rank ordering, Lambda -cuts for fuzzy sets, Defuzzification methods.

UNIT - V Genetic and hybrid algorithms [09]

Introduction to genetic algorithm, operators in genetic algorithm - coding - selection - crossover - mutation, Stopping condition for genetic algorithm , Genetic neuro hybrid systems, Genetic-Fuzzy rule based system

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 S.N.Sivanandam and S.N.Deepa, Principles of soft computing, Wiley India, New Delhi, Third edition, 2011.
- 2 Timothy J. Ross, Fuzzy Logic with engineering applications, Wiley India, New Delhi, Third edition, 2010.

Reference Books :

- 1 N. K. Sinha and M. M. Gupta, Soft Computing & Intelligent Systems: Theory & Applications, Academic Press /Elsevier, Massachusetts, First edition, 2009.
- 2 Simon Haykin, Neural Network, A Comprehensive Foundation, Prentice Hall International, New Jersey, Third edition, 2009.
- 3 Bart Kosko, Neural Network and Fuzzy Systems, Prentice Hall, New Jersey, First edition, 1992.
- 4 Goldberg D.E., Genetic Algorithms in Search, Optimization, and Machine Learning, Addison Wesley, Boston ,First edition, 1989

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
CO-PO MAPPING

Course Code: **20EE910**Regulation: **R 2020**Course Name: **Principles of Soft Computing Techniques**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1:	<i>Describe the concepts of artificial neural network</i>	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2:	<i>Summarize the various types of neural network.</i>	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3:	<i>Discuss the basic concepts of fuzzy logic system.</i>	3	2	-	-	3	-	-	-	-	-	-	1	-	-
CO4:	<i>Illustrate various methods used in fuzzy systems</i>	3	2	-	-	3	-	-	-	-	-	-	1	-	-
CO5:	<i>Outline the genetic algorithm and hybrid genetic algorithm concepts</i>	3	2	-	-	3	-	-	-	-	-	-	1	-	-
Average		3	2	-	-	3	-	-	-	-	-	-	1	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20EE911	EMBEDDED SYSTEM TECHNOLOGY (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite:**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Illustrate the fundamentals of embedded systems.	Understand
CO2: Outline the various types of embedded communication protocols	Understand
CO3: Explain the concept of software development process and tools	Understand
CO4: Describe the functions of real time operating systems	Understand
CO5: Discuss the applications of real time embedded systems	Understand

UNIT – I INTRODUCTION TO EMBEDDED SYSTEMS [09]

Embedded System Vs General Computing System - Classification of embedded systems - Functional building blocks of embedded systems - Structural units in embedded processor - Selection of processor & memory devices - Processor interfacing with memory and I/O units - Embedded hardware unit.

UNIT - II EMBEDDED NETWORKS [09]

Introduction to I/O device ports & buses - Serial communication using I²C, CAN, SPI and USB bus - Parallel communication using PCI, PCI-X buses, ARM bus.

UNIT – III EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT [09]

Introduction to embedded software development process and tools - Host and target machines - linking and locating software - Embedded Product Development Life Cycle - objectives, different phases of EDLC, Modeling of EDLC.

UNIT – IV REAL TIME OPERATING SYSTEMS [09]

Introduction to basic concepts of RTOS - Task, process & threads - Context switching - Multiprocessing and Multitasking - Preemptive and nonpreemptive scheduling - Round Robin scheduling - Task communication - shared memory, message passing - Interprocess communication - semaphores, Message queue, Mailbox, pipes.

UNIT – V RTOS BASED EMBEDDED SYSTEM DESIGN [09]

Basic Functions and Types of RTOS - Interrupt routines in RTOS - Case Study of Washing Machine - Automotive Application - Smart card system - ATM machine - Digital camera.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Rajkamal.P, Embedded System - Architecture, Programming, Design, Tata McGraw Hill Education Private Limited, New Delhi, Third Edition, 2016.
- 2 John B.Peatman, Design With PIC microcontroller, Pearson Education, India, First Edition, 2009.

Reference Books :

- 1 Frank Vahid and Tony Givargi, Embedded System Design - A Unified Hardware & Software Introduction, John Wiley, New Jersey, Third Edition, 2011.
- 2 David E.Simon, An Embedded software primer, Pearson Education, India, First Edition, 2007.
- 3 Steve Heath, Embedded System Design, Elsevier, India, Second Edition, 2003.
- 4 Wayne wolf, Computers as components: Principles of embedded computing system design, Morgan Kaufmann publishers, USA, Third Edition, 2012.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
CO-PO MAPPING

Course Code: **20EE911**Regulation: **R 2020**Course Name: **Embedded System Technology**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1:	<i>Illustrate the fundamentals of embedded systems</i>	3	2	3	-	3	3	-	-	-	-	-	3	-	-
CO2:	<i>Outline the various types of embedded communication protocols</i>	3	2	3	-	3	3	-	-	-	-	-	3	-	-
CO3:	<i>Explain the concept of software development process and tools.</i>	3	2	3	-	3	3	-	-	-	-	-	3	-	-
CO4:	<i>Describe the functions of real time operating systems.</i>	3	2	3	-	3	3	-	-	-	-	-	3	-	-
CO5:	<i>Discuss the applications of real time embedded systems</i>	3	2	3	-	3	3	-	-	-	-	-	3	-	-
Average		3	2	3	-	3	3	-	-	-	-	-	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20EC901	BASICS OF MEDICAL ELECTRONICS (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite:

Course Outcomes : On the successful completion of the course, students will be able to

Cognitive Level

CO1 Describe the recording methods of various bio-potentials.

Understand

CO2 Illustrate the working of various equipment that deal with bio-chemical and non-electrical parameter measurement.

Understand

CO3 Discuss the different types of therapeutic equipment.

Understand

CO4 Interpret the principles of various medical imaging modalities.

Understand

CO5 Outline the recent trends in medical instrumentation.

Understand

UNIT – I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING [09]

The origin of bio-potentials - Bio-potential electrodes - Carrier, chopper and isolation amplifiers -Transducers for biomedical applications: Strain gauge, piezoelectric transducer, thermocouple, thermistor, biosensors - ECG, EEG, EMG, PCG, ERG and EOG: Lead systems, recording methods.

UNIT - II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT [09]

Blood gas analyzers - Electrophoresis - Colorimeter & Photometer - Auto analyzer - Blood flow meter - Cardiac output - Respiratory measurement - Blood pressure measurement - Temperature measurement - Pulse measurement -Blood cell counters: Coulter counters.

UNIT - III THERAPEUTIC EQUIPMENTS [09]

Cardiac pacemakers - DC defibrillator - Dialyzers - Surgical diathermy - Physiotherapy and electrotherapy equipment - Oxygenators - Heart lung machine.

UNIT - IV MEDICAL IMAGING [09]

X-Ray - Computer Axial Tomography - Positron Emission Tomography - MRI and NMR - Ultrasonic Imaging systems.

UNIT - V RECENT TRENDS IN MEDICAL INSTRUMENTATION - [09]

Thermograph - Endoscopy unit - LASER in medicine - Biomedical telemetry - Radio-pill - Cardiac catheterization laboratory - Electrical safety of medical equipment.

Total (L: 45) = 45 Periods

Text Books :

- 1 R.S.Khandpur, Handbook of Biomedical Instrumentation, Tata McGraw Hill, New Delhi, Third Edition, 2014
- 2 Leslie Cromwel, Fred J.Weibel, Erich A. Pfeiffer, Biomedical Instrumentation and Measurements, Pearson/Prentice Hall India, New Delhi, Second Edition, 2011.

Reference Books :

- 1 John G.Webster, Medical Instrumentation Application and Design, John Wiley & Sons Inc, New Jersey, Fourth Edition, 2009.
- 2 Joseph J.Carr and John M.Brown, Introduction to Biomedical Equipment Technology, John Wiley & Sons, New Jersey, Fourth Edition, 2008.
- 3 M. Arumugam, Biomedical Instrumentation, Anuradha Publications, Chennai, Second Edition, Reprint 2009.
- 4 R.L. Reka & C. Ravikumar, Biomedical Instrumentation/ Medical Electronics, Lakshmi Publications, Chennai, Second Edition, Reprint 2010.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
CO PO MAPPING

Regulation: R 2020

Course Code : 20EC901

Course Name: Basics of Medical Electronics

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	<i>Describe the recording methods of various bio-potentials.</i>	2	1	2	-	-	1	-	-	-	-	-	1	-	-
2	<i>Illustrate the working of various equipment that deal with bio-chemical and non-electrical parameter measurement.</i>	2	1	2	-	-	1	-	-	-	-	-	1	-	-
3	<i>Discuss the different types of therapeutic equipment.</i>	2	1	2	-	-	1	-	-	-	-	-	1	-	-
4	<i>Interpret the principles of various medical imaging modalities.</i>	2	1	2	-	-	1	-	-	-	-	-	1	-	-
5	<i>Outline the recent trends in medical instrumentation.</i>	2	1	2	-	-	1	-	-	-	-	-	1	-	-
Average		2	1	2			1	-	-	-	-	-	1		-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020			
20EC902	NANO TECHNOLOGY	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite:**Course Outcomes: On completion of this course, the student will be able to****Cognitive Level**

CO1 Describe the evolution and associated techniques of Nano science.

Understand

CO2 Interpret the diversities in Nano systems.

Understand

CO3 Classify different Nano particles, shells and their Characterization.

Understand

CO4 Illustrate the importance of nanotechnology in biotechnology.

Understand

CO5 Outline the applications of nanotechnology in industry and society.

Understand

UNIT – I INTRODUCTION [09]

Nano science - Evolution - Electron microscopes - Scanning probe microscopes - Optical microscopes for nanotechnology - X ray diffraction - Associated techniques.

UNIT – II DIVERSITY IN NANO SYSTEMS [09]

Fullerenes - Synthesis and purification - Mass spectrometry and ion/molecule reactions - Chemistry of fullerenes - Endo-hedral chemistry - Conductivity and super conductivity in doped fullerenes - Carbon nanotubes - Synthesis and purification - Electronic structure - Transport - Mechanical - Physical properties applications - Semiconductor quantumdots - Synthesis and applications.

UNIT – III METAL NANO PARTICLES AND NANO SHELLS [09]

Method of preparation - Characterization - Functions and applications - Core shell nanoparticles: Types of system - Characterization - Functions and applications - Nano shells: Types, characterization, properties and applications.

UNIT – IV EVOLVING INTERFACES IN NANO [09]

Nano biology - Interaction between bio molecules and nano particle surfaces - Applications of nano in biology - Microprobes for medical diagnosis and biotechnology - Current status - Nano sensors - Order from chaos - Applications - Smart dust sensors - Nano medicines various kinds - Future directions.

UNIT – V IMPACT OF NANO TECHNOLOGY ON SOCIETY [09]

Introduction - Industrial revolution to Nano revolution - Implications of Nano sciences and Nano technology on society - Issues - Nano policies and institutions - Nanotech and war - Nano arms race - Harnessing nano technology for economic and social development.

Total = 45 Periods**Text Books :**

- 1 PradeepT, Nano: The Essentials, Understanding Nano Science and Nano technology, TMH, New Delhi, FirstEdition, 2007.
- 2 Mick Wilson, Kamali Kannargare., Geoff Smith, Nano technology: Basic Science and Emerging technologies, Overseas Press, New Delhi, FirstEdition, 2005.

Reference Books :

- 1 Nalwa H S, Encyclopedia of Nanoscience and Nanotechnology, Vol 1-10, American Scientific Publishers, California, FirstEdition 2004.
- 2 Rao C N R and Govindaraj A, Nanotubes and Nanowires, Royal Society of Chemistry, London, Third Edition, 2005.
- 3 Richard A L Jones, Soft Machines: Nanotechnology and Life, Oxford University Press, Oxford, FirstEdition, 2007
- 4 Charles P. Poole, Frank J. Owens, Introduction to Nanotechnology, Wiley Inter science, New Jersey, First Edition, 2003.
- 5 Mark A. Ratner, Daniel Ratner, Nanotechnology: A gentle introduction to the next Big Idea, Pearson Education, London, 2003.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
CO PO MAPPING

Regulation: R 2020

Course Code: 20EC902

Course Name: Nano Technology

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	<i>Describe the evolution and associated techniques of Nano science.</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
2	<i>Interpret the diversities in Nano systems.</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
3	<i>Classify different Nano particles, shells and their Characterization.</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
4	<i>Illustrate the importance of nanotechnology in biotechnology.</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
5	<i>Outline the applications of nanotechnology in industry and society.</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
Average		3	3	3	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20EC903	ELECTRONICS AND MICROPROCESSOR			
	L	T	P	C
(Open Elective)	3	0	0	3

Prerequisite:**Course Outcomes: On the successful completion of the course, students will be able to****Cognitive Level**

CO1 Interpret the fundamental concepts of semiconductor device.

Understand

CO2 Explain the various characteristics of amplifiers.

Understand

CO3 Outline the fundamental concepts of Digital Electronics

Understand

CO4 Describe about 8085 microprocessors

Understand

CO5 Explain the applications using microprocessor

Understand

UNIT – I SEMICONDUCTORS AND RECTIFIERS**[09]**

Classification of solids based on energy band theory - Intrinsic semiconductors - Extrinsic semiconductors - PN junction diode: Characteristics - Half wave and full wave rectifiers - Zener diode: Characteristics - Voltage regulator.

UNIT – II TRANSISTORS AND AMPLIFIERS**[09]**

Bipolar junction transistor: Construction and characteristics - CE configuration and characteristics - Transistor biasing: Fixed and voltage divider biasing - Construction and characteristics: FET, SCR and UJT - Concept of feedback: Negative feedback - Application in temperature and motor speed control - Common Emitter Amplifier (Qualitative treatment only).

UNIT – III DIGITAL ELECTRONICS**[09]**

Number system: Binary, Octal, Hexadecimal - Boolean algebra - Logic gates - Half adder and full adder - Flip flops - Shift Registers: SISO, SIPO, PISO, PIPO - Counters: 3-bit Synchronous up & down, 3-bit Asynchronous up & down - A/D conversion: Single slope, Successive approximation - D/A conversion: Binary weighted resistor type.

UNIT – IV 8085 MICROPROCESSOR**[09]**

Block diagram of Microcomputer - 8085: Architecture, Pin configuration, Addressing modes, Instruction set and Simple programs using arithmetic and logical operations.

UNIT – V INTERFACING AND APPLICATIONS OF MICROPROCESSOR**[09]**

Basic interfacing concepts - Interfacing of Input and Output devices - Applications of microprocessor: Temperature control, Stepper motor control, Traffic light control - Case study: Mining problem, Turbine monitor using 8085.

Total (L: 45) = 45 Periods**Text Books :**

- 1 Jacob Millman and Christos C. Halkias, Integrated Electronics, Tata McGraw-Hill publishers, US, Second Edition, 2011.
- 2 Ramesh Gaonkar, Microprocessor Architecture ||, Programming and Applications with 8085, Penram International Publishing, USA, Sixth Edition, 2013.

Reference Books :

- 1 Malvino Leach and Saha, Digital Principles and Applications, Tata McGraw-Hill Education, New Delhi, Eighth Edition, 2014.
- 2 Mehta V.K, Principles of Electronics, S. Chand and Company Ltd., New Delhi, Seventh Edition, 2014.
- 3 Salivahanan S, Suresh Kumar N, Vallavaraj A, Electronic Devices and Circuits, Tata McGraw-Hill Education, New Delhi, Third Edition, 2012.
- 4 Krishna Kant, Microprocessors and Microcontrollers, PHI Learning Private Ltd., New Delhi, Second Edition, 2013.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
CO PO MAPPING

Course Code: 20EC903

Regulation: R 2020

Course Name: Electronics and Microprocessor

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	<i>Interpret the fundamental concepts of semiconductor device.</i>	3	3	2	-	-	-	-	-	-	-	-	-	-	-
2	<i>Explain the various characteristics of amplifiers.</i>	3	3	2	-	-	-	-	-	-	-	-	-	-	-
3	<i>Outline the fundamental concepts of Digital Electronics</i>	3	3	2	-	-	-	-	-	-	-	-	-	-	-
4	<i>Describe about 8085 microprocessors</i>	3	3	2	-	-	-	-	-	-	-	-	-	-	-
5	<i>Explain the applications using microprocessor</i>	3	3	2	-	-	-	-	-	-	-	-	-	-	-
Average		3	3	2	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20EC904	ANALOG AND DIGITAL COMMUNICATION (Open Elective)		L	T	P	C
			3	0	0	3

Prerequisite:**Course Outcomes: On the successful completion of the course, students will be able to****Cognitive Level**

CO1 Describe analog communication techniques

Understand

CO2 Describe Digital communication techniques

Understand

CO3 Use data and pulse communication techniques

Understand

CO4 Explain Source and Error control coding

Understand

CO5 Utilize multi-user radio communication

Understand

UNIT – I ANALOG COMMUNICATION**[09]**

Noise: Source of Noise - External Noise- Internal Noise- Noise Calculation. Introduction to Communication Systems: Modulation - Types - Need for Modulation. Theory of Amplitude Modulation - Evolution and Description of SSB Techniques - Theory of Frequency and Phase Modulation - Comparison of various Analog Communication System (AM - FM - PM).

UNIT – II DIGITAL COMMUNICATION**[09]**

Amplitude Shift Keying (ASK) - Frequency Shift Keying (FSK) Minimum Shift Keying (MSK) -Phase Shift Keying (PSK) - BPSK - QPSK - 8 PSK - 16 PSK - Quadrature Amplitude Modulation (QAM) - 8 QAM - 16 QAM - Bandwidth Efficiency- Comparison of various Digital Communication System (ASK - FSK - PSK - QAM).

UNIT – III DATA AND PULSE COMMUNICATION**[09]**

Data Communication: History of Data Communication - Standards Organizations for Data Communication- Data Communication Circuits - Data Communication Codes - Error Detection and Correction Techniques - Data communication Hardware - serial and parallel interfaces. Pulse Communication: Pulse Amplitude Modulation (PAM) - Pulse Time Modulation (PTM) - Pulse code Modulation (PCM) - Comparison of various Pulse Communication System (PAM - PTM - PCM).

UNIT – IV SOURCE AND ERROR CONTROL CODING**[09]**

Entropy, Source encoding theorem, Shannon fano coding, Huffman coding, mutual information, channel capacity, channel coding theorem, Error Control Coding, linear block codes, cyclic codes, convolution codes, viterbi decoding algorithm.

UNIT – V MULTI-USER RADIO COMMUNICATION**[09]**

Advanced Mobile Phone System (AMPS) - Global System for Mobile Communications (GSM) - Code division multiple access (CDMA) - Cellular Concept and Frequency Reuse - Channel Assignment and Hand - Overview of Multiple Access Schemes - Satellite Communication - Bluetooth.

Total (L: 45) = 45 Periods**Text Books :**

- 1 Wayne Tomasi, Advanced Electronic Communication Systems, Pearson Education, London, Sixth Edition 2009.
- 2 Simon Haykin, Communication Systems, John Wiley & Sons, New Jersey, Fourth Edition, 2004.

Reference Books :

- 1 H.Taub, D L Schilling and G Saha, Principles of Communication, McGraw Hill Education, New York, Fourth Edition, 2017.
- 2 B. P.Lathi, Modern Analog and Digital Communication Systems, Oxford University Press, Oxford, Third Edition, 2007.
- 3 Rappaport T.S, Wireless Communications: Principles and Practice, Pearson Education, London, Third Edition 2007.
- 4 Blake, Electronic Communication Systems, Thomson Delmar Publications, USA, Second Edition, 2001.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
CO PO MAPPING

Course Code: 20EC904

Regulation: R 2020

Course Name: Analog and Digital Communication

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	<i>Describe analog communication techniques</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
2	<i>Describe Digital communication techniques</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
3	<i>Use data and pulse communication techniques</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
4	<i>Explain Source and Error control coding</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
5	<i>Utilize multi-user radio communication</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
Average		3	3	3	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20EC905	PRINCIPLES OF COMMUNICATION	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite:**Course Outcomes: On the successful completion of the course, students will be able to****Cognitive Level**

CO1	Determine the performance of analog modulation schemes in time and frequency domains.	Understand
CO2	Determine the performance of systems for generation and detection of modulated analog signals.	Understand
CO3	Characterize analog signals in time domain as random processes and in frequency domain using Fourier transforms	Understand
CO4	Determine the performance of analog communication systems in the presence of Noise	Understand
CO5	Interpret the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems.	Understand

UNIT – I AMPLITUDE MODULATION [09]

Introduction, Amplitude Modulation: Time & Frequency - Domain description, switching modulator, Envelop detector. Time and Frequency - Domain description, Ring modulator, Coherent detection, Costas Receiver, Quadrature Carrier Multiplexing. SSB Modulation, VSB Modulation, Frequency Translation, Frequency- Division Multiplexing, Theme Example: VSB Transmission of Analog and Digital Television.

UNIT – II ANGLE MODULATION [09]

Basic definitions, Frequency Modulation: Narrow Band FM, Wide Band FM, Transmission bandwidth of FM Signals, Generation of FM Signals, Demodulation of FM Signals, FM Stereo Multiplexing, Phase-Locked Loop: Nonlinear model of PLL, Linear model of PLL, Nonlinear Effects in FM Systems. The Superheterodyne Receiver

UNIT - III RANDOM VARIABLES & PROCESS [09]

Introduction, Probability, Conditional Probability, Random variables, Several Random Variables. Statistical Averages: Function of a random variable, Moments, Random Processes, Mean, Correlation and Covariance function: Properties of autocorrelation function, Cross-correlation functions

UNIT – IV NOISE IN ANALOG MODULATION [09]

Shot Noise, Thermal noise, White Noise, Noise Equivalent Bandwidth (refer Chapter 5 of Text), Noise Figure. Introduction, Receiver Model, Noise in DSB-SC receivers, Noise in AM receivers, Threshold effect, Noise in FM receivers, Capture effect, FM threshold effect, FM threshold reduction, Pre-emphasis and De-emphasis in FM.

UNIT – V DIGITAL REPRESENTATION OF ANALOG SIGNALS [09]

Introduction, Why Digitize Analog Sources?, The Sampling process, Pulse Amplitude Modulation, Time Division Multiplexing, Pulse-Position Modulation, Generation of PPM Waves, Detection of PPM Waves, The Quantization Process, Quantization Noise, Pulse-Code Modulation: Sampling, Quantization, Encoding, Regeneration, Decoding, Filtering, Multiplexing.

Total (L: 45) = 45 Periods**Text Books :**

- Wayne Tomasi, Advanced Electronic Communication Systems, Pearson Education, London, Sixth Edition, 2009.
- Simon Haykin, Communication Systems, John Wiley & Sons, New Jersey, Fourth Edition 2004.

Reference Books :

- H.Taub & D.L.Schilling, Principles of Communication Systems, TMH, New Delhi, First Edition, 2011.
- H.Taub, D L Schilling and G Saha, Principles of Communication, Pearson Education, London, Fourth Edition, 2017.
- B. P.Lathi, Modern Analog and Digital Communication Systems, Oxford University Press, Oxford, Third Edition 2007.
- Blake, Electronic Communication Systems, Thomson Delmar Publications, USA, First Edition, 2002.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
CO PO MAPPING

Regulation: R 2020

Course Code: 20EC905

Course Name: Principles of Communication

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	Determine the performance of analog modulation schemes in time and frequency domains.	3	3	3	-	-	-	-	-	-	-	-	-	-	-
2	Determine the performance of systems for generation and detection of modulated analog signals.	3	3	3	-	-	-	-	-	-	-	-	-	-	-
3	Characterize analog signals in time domain as random processes and in frequency domain using Fourier transforms	3	3	3	-	-	-	-	-	-	-	-	-	-	-
4	Determine the performance of analog communication systems in the presence of Noise	3	3	3	-	-	-	-	-	-	-	-	-	-	-
5	Interpret the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems.	3	3	3	-	-	-	-	-	-	-	-	-	-	-
Average		3	3	3	-										

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20EC906	FUNDAMENTALS OF ROBOTICS (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite:

Course Outcomes: On completion of this course, the students will be able to

Cognitive Level

CO1 Describe the basis of Robotics

Understand

CO2 Describe the technologies applicable for Robotics in computer based vision

Understand

CO3 Interpret the different sensing elements of robot

Understand

CO4 Develop the algorithms applicable for robotics

Apply

CO5 Develop 4-axis and 6-axis robot

Apply

UNIT – I INTRODUCTION TO ROBOTICS [09]

Motion - Potential function - Road maps - Cell decomposition sensor and sensor planning - Kinematics - Forward and inverse kinematics - Transformation matrix and DH transformation - Geometric methods and algebraic methods.

UNIT – II COMPUTER VISION [09]

Projection - Optics, projection on the Image plane and radiometry - Image processing - Connectivity - Images - Gray Scale and binary images - Blob filling - Histogram - Convolution - Digital convolution and filtering and Masking techniques - Edge detection - Face detection.

UNIT - III SENSORS AND SENSING DEVICES [09]

Introduction to various types of sensor - Resistive sensors - Range sensors - Radar and Infra-red - Introduction to sensing - Light sensing - Heat sensing - Touch sensing and position sensing.

UNIT – IV ARTIFICIAL INTELLIGENCE [09]

Uniform Search strategies - Breadth first, Depth first, Depth limited - Iterative and deepening depth first search and bidirectional search - The A* algorithm - Planning - State-space planning - Plan - space planning - Graph plan/Sat plan and their comparison - Multi-agent planning 1 and Multi-agent planning 2 - Probabilistic reasoning

UNIT – V INTEGRATION TO ROBOT [09]

Building of 4 axis or 6 axis robot - Vision system for pattern detection - Sensors for obstacle detection - AI algorithms for path finding - Decision making.

Total (L: 45) = 45 Periods

Text Books :

- 1 Duda, Hart and Stork, Pattern Recognition, Wiley-Inter science, New Jersey, First Edition, 2000.
- 2 Mallot, Computational Vision: Information Processing in Perception and Visual Behavior, MIT Press, USA, First Edition, 2000.

Reference Books :

- 1 Stuart Russell and Peter Norvig, Artificial Intelligence-A Modern Approach, Pearson Education Series in Artificial Intelligence, USA, First Edition, 2004.
- 2 Robert Schilling and Craig., Fundamentals of Robotics, Analysis and control, PHI, New Delhi, First Edition 2003.
- 3 Forsyth and Ponce, Computer Vision, A modern Approach, Pearson Education, USA, First Edition 2003.
- 4 <https://nptel.ac.in/courses/112/108/112108093/>

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
CO PO MAPPING

Course Code: 20EC906

Regulation: R 2020

Course Name: Fundamentals of Robotics

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	<i>Describe the basis of Robotics</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
2	<i>Describe the technologies applicable for Robotics in computer based vision</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
3	<i>Interpret the different sensing elements of robot</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
4	<i>Develop the algorithms applicable for robotics</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
5	<i>Develop 4-axis and 6-axis robot</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
Average		3	3	3	-	-	-	-	-	-	-	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020			
20EC907	INTERNET OF THINGS SENSING AND ACTUATOR DEVICES	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite:**Course Outcomes: On completion of this course, the student will be able to****Cognitive Level**

CO1	Describe what IoT is and how it works today.	Understand
CO2	Design and program IoT devices.	Understand
CO3	Describe the functions and characteristics of IoT sensors.	Understand
CO4	Illustrate the wireless, energy, power, RF and sensing modules.	Understand
CO5	Describe the applications and technological challenges faced by IoT devices.	Understand

UNIT - I BASICS OF IOT**[09]**

Definitions and Functional Requirements -Motivation - Architecture - Web 3.0 View of IoT- Ubiquitous IoT Applications - Four Pillars of IoT - DNA of IoT - The Toolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT: Overview - Communication middleware for IoT -IoT Information Security

UNIT - II IOT PROTOCOLS**[09]**

Protocol Standardization for IoT - Efforts - M2M and WSN Protocols - SCADA and RFID Protocols - Issues with IoT Standardization - Unified Data Standards - Protocols - IEEE 802.15.4 - BAC Net Protocol - Modbus - KNX - Zigbee Architecture - Network layer - APS layer - Security

UNIT - III IOT SENSORS**[09]**

Industrial sensors - Description & Characteristics-First Generation - Description &Characteristics- Advanced Generation - Description & Characteristics-Integrated IoT Sensors - Description & Characteristics-Polytronics Systems - Description &Characteristics-Sensors' Swarm - Description & Characteristics-Printed Electronics -Description & Characteristics-IoT Generation Roadmap.

UNIT - IV TECHNOLOGICAL ANALYSIS**[09]**

Wireless Sensor Structure-Energy Storage Module-Power Management Module - RF Module- Sensing Module

UNIT - V APPLICATIONS**[09]**

The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronization and Software Agents. Applications - Smart Grid - Electrical Vehicle Charging

Total = 45 Periods**Text Books:**

- 1 David Easley and Jon Kleinberg, Networks, Crowds, and Markets: Reasoning About a Highly Connected World, Cambridge University Press, London, First Edition, 2010.
- 2 Guillaume Girardin, Antoine Bonnabel, Dr. Eric Mounier, Technologies & Sensors for the Internet of Things Businesses & Market Trends, First Edition, 2014.

Reference Books:

- 1 Honbo Zhou, Dieter Uckelmann; Mark Harrison, The Internet of Things in the Cloud: A Middleware Perspective - CRC Press,USA,First Edition,2012.
- 2 Florian Michahelles, Architecting the Internet of Things -- Springer, Berlin, First Edition, 2011.
- 3 Ida N, Sensors,Actuators and Their Interfaces, Scitech Publishers, 2014.
- 4 Olivier Hersent, Omar Elloumi and David Boswarthick, The Internet of Things: Applications to the Smart Grid and Building Automation, Wiley, New Jersey, First Edition, 2012.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
CO PO MAPPING

Regulation: R 2020
Course Code: 20EC907 **Course Name:** Internet of Things Sensing and Actuator Devices

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Describe what IoT is and how it works today.</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO2	<i>Design and program IoT devices.</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO3	<i>Describe the functions and characteristics of IoT sensors.</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	<i>Illustrate the wireless, energy, power, RF and sensing modules.</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO5	<i>Describe the applications and technological challenges faced by IoT devices.</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
Average		3	3	3	-										

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20EC908	CONSUMER ELECTRONICS (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite:**Course Outcomes: On completion of this course, the student will be able to****Cognitive Level**

CO1	Describe the evolution and fundamentals of consumer electronics	Understand
CO2	Discuss various entertainment electronics appliances	Understand
CO3	Demonstrate various smart home systems	Understand
CO4	Outline various home appliances	Understand
CO5	Illustrate various communication equipment's used In day to day life	Understand

UNIT - I CONSUMER ELECTRONICS FUNDAMENTALS [09]

History of Electronic Devices- Vacuum Tubes, Transistors, Integrated Circuits- Moore's Law, Semiconductor Devices, Diodes, Rectifiers, Transistors, Logic Gates, Combinational Circuits, ADC, DAC and Microprocessors, Microprocessor Vs Microcontrollers, Microcontrollers in consumer electronics, Energy management, Intelligent Building Perspective.

UNIT - II ENTERTAINMENT ELECTRONICS [09]

Audio systems: Construction and working principle of: Microphone, Loud speaker, AM and FM receiver, stereo, 2.1 home theatres, 5.1 home theatres, Display systems: CRT, LCD, LED and Graphics display Video Players: DVD and Blue RAY. Recording Systems: Digital Cameras and Camcorders.

UNIT - III SMART HOME [09]

Technology involved in Smart home, Home Virtual Assistants- Alexa and Google Home. Home Security Systems - Intruder Detection, Automated blinds, Motion Sensors, Thermal Sensors and Image Sensors, PIR, IR and Water Level Sensors.

UNIT- IV HOME APPLIANCES [09]

Home Enablement Systems: RFID Home, Lighting control, Automatic Cleaning Robots, Washing Machines, Kitchen Electronics- Microwave, Dishwasher, Induction Stoves, Smart Refrigerators, Smart alarms, Smart toilet, Smart floor, Smart locks.

UNIT - V COMMUNICATION SYSTEMS [09]

Cordless Telephones, Fax Machines, PDAs - Tablets, Smart Phones and Smart Watches, Introduction to Smart OS - Android and iOS. Video Conferencing Systems - Web/IP Camera, Video security, Internet Enabled Systems, Wi-Fi, IoT, Li-Fi, GPS and Tracking Systems.

Total = 45 Periods**Text Books:**

- 1 Dennis C Brewer, Home Automation, Que Publishing, London, First Edition, 2013.
- 2 Jordan Frith, Smartphones as Locative Media, Wiley, New Jersey, First Edition, 2014.

Reference Books:

- 1 Lyla B Das, Embedded Systems-An Integrated Approach, Pearson, London, First Edition, 2013
- 2 Marilyn Wolf, Computers as Components - Principles of Embedded Computing System Design, Third Edition Morgan Kaufmann Publisher (An imprint from Elsevier), 2012
- 3 Peckol, Embedded system Design, John Wiley & Sons, USA, First Edition, 2010
- 4 Thomas M. Coughlin, Digital Storage in Consumer Electronics, Elsevier and Newness, Amsterdam, Netherlands First Edition, 2012.
- 5 Philip Hoff, Consumer Electronics for Engineers, Cambridge University Press. London, First Edition, 1998.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
CO PO MAPPING

Course Code: 20EC908 Regulation: R 2020
Course Name: Consumer Electronics

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Describe the evolution and fundamentals of consumer electronics</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO2	<i>Discuss various entertainment electronics appliances</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO3	<i>Demonstrate various smart home systems</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	<i>Outline various home appliances</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO5	<i>Illustrate various communication equipment's used In day to day life</i>	3	3	3	-	-	-	-	-	-	-	-	-	-	-
Average		3	3	3	-										

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20IT901	DATA SCIENCE USING R (Open Elective)	L T P C 3 0 0 3
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Prerequisite: -**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Explain the life cycle of data science.

Understand

CO2: Interpret the data manipulation statements and functional programming in R.

Understand

CO3: Outline the packages to implement machine learning techniques.

Understand

CO4: Explore the concepts of object-oriented programming in R.

Understand

CO5: Discuss the data visualization packages in R.

Understand

UNIT – I DATA SCIENCE**[09]**

Data Science : Data Science Lifecycle - Dealing with Missing Values - Using R Packages - Expression - Data Types - Control Structures - Functions - Recursive Functions - Simple Programs.

UNIT – II DATA MANIPULATION AND FUNCTIONAL PROGRAMMING**[09]**

Data Manipulation - Data Import and Export - Manipulation Data - Vectoring Functions - Infix Operator - Replacement Functions - Function with arguments and return statement.

UNIT – III MACHINE LEARNING**[09]**

Dealing with large Dataset - Sampling - Supervised Learning Methods: Linear Regression - Logistic Regression - Evaluating and Validating Models - Decision Trees - Neural Network - Support Vector Machine - Unsupervised Learning - Clustering - Association Rule Mining.

UNIT – IV CLASS AND OBJECTS**[09]**

Immutable objects and Polymorphic functions - Data structures - Classes - Programming with New Classes - Inheritance and Inter-Class Relations - Virtual Classes - Creating and Validating Objects.

UNIT – V DATA VISUALIZATION AND PACKAGES**[09]**

Data Visualization: XY Plot - Graphics Package - ggplot2 - Package concept and tools - Creating R package - Namespace - R Oxygen - Adding data to Package - Documentation for Packages.

Total (L= 45, T = 0) = 45 Periods**Text Book:**

- 1 Thomas Mailund, Beginning Data Science in R - Data Analysis, Visualization and Modeling for the Data Scientist, Apress Publication, New York, First Edition, 2017.
- 2 Hadley Wickham and Garrett Golemund ,R for Data Science, Import, Tidy, Transform, Visualize, and Model Data, O'Reilly, India, First Edition ,2017.

Reference Books :

- 1 Nicholas J. Horton, Ken Kleinman, Using R and RStudio for Data Management, Statistical Analysis, and Graphics, CRC Press, United States , Second Edition, 2015.
- 2 Sara Baase and Allen Van Gelder, Computer Algorithms - Introduction to Design and Analysis, Pearson Education, India , Third Edition, 2010.
- 3 K.G.Srinivasa, G M Siddesh, Chetan Shetty, Statistical Programming in R, Oxford University Press, New Delhi, First Edition , 2017.
- 4 John Maindonald, W. John Braun, Data Analysis and Graphics Using R: An Example-Based Approach, University Press, Cambridge, Third Edition, 2010.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation: R 2020

Course Code: 20IT901

Course Name: DATA SCIENCE USING R

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1:	Explain the life cycle of data science.	3	2	3	-	2	-	-	-	-	-	-	-	3	-	-
CO2:	Interpret the data manipulation statements and functional programming in R	3	2	3	-	2	-	-	-	-	-	-	-	3	-	-
CO3:	Outline the packages to implement machine learning techniques	3	2	3	-	2	-	-	-	-	-	-	-	3	-	-
CO4:	Explore the concepts of object-oriented programming in R	3	2	3	-	2	-	-	-	-	-	-	-	3	-	-
CO5:	Discuss the data visualization packages in R	3	2	3	-	2	-	-	-	-	-	-	-	3	-	-
Average		3	2	3	-	2	-	-	-	-	-	-	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20IT902	PRINCIPLES OF CYBER SECURITY (Open Elective)	L T P C 3 0 0 3
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Prerequisite: -**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Describe the basic concepts in cyber security and cybercrime.	Remember
CO2: Explore about classification of cyber forensics.	Understand
CO3: Summarize the latest trends in ethical hacking.	Understand
CO4: Discuss the fundamentals of computer forensics and evidence collection.	Understand
CO5: Describe the vulnerabilities in cyber security.	Remember

UNIT – I CYBER CRIME**[09]**

Cyber Crime - Types of Cyber Crime - Classification of Cyber Criminals - Tools used in Cyber Crime - Challenges - Strategies - Crypto Currency - Bitcoin and Block chain - Ransomware.

UNIT – II CYBER FORENSICS**[09]**

Cyber Forensics: Definition - Disk Forensics - Network Forensics - Wireless Forensics - Database Forensics - Malware Forensics - Mobile Forensics - Email Forensics.

UNIT – III ETHICAL HACKING**[09]**

Ethical Hacking- Hacking Windows - Network Hacking - Web Hacking - Password Hacking - Malware - Scanning - Cracking.

UNIT – IV DIGITAL EVIDENCE IN CRIMINAL INVESTIGATIONS**[09]**

Digital Evidence in Criminal Investigations: The Analog and Digital World - Training and Education - Evidence Collection and Data Seizure: Collection Options Obstacles - Types of Evidence -Rules of Evidence -Volatile Evidence.

UNIT – V CYBER SECURITY VULNERABILITIES**[09]**

Vulnerabilities in software - System administration - Complex Network Architectures - Open Access to Organizational Data – Unprotected Broadband communications - Poor Cyber Security Awareness - Encryption Tool: KeePass.

Total (L= 45, T = 0) = 45 Periods**Text Books:**

- 1 Dejey, Dr.Murugan, Cyber Forensics, Oxford University Press, India, First Edition, 2018.
- 2 William Stallings and Lawrie Brown, Computer Security: Principles and Practice, Prentice Hall, United States, Third Edition, 2017.

Reference Books :

- 1 John W. Rittinghouse, William M. Hancock, Cyber Security Operations Handbook, Elsevier Publications, India, First Edition, 2008
- 2 Deborah G Johnson, Computer Ethics, Pearson Education Publication, India, Fourth Edition, 2014
- 3 https://onlinecourses.swayam2.ac.in/cec20_cs15/preview
- 4 <https://www.simplilearn.com/tutorials/cyber-security-tutorial/cyber-security-for-beginners>

CO-PO MAPPING

Regulation: R 2020

Course Code: 20IT902

Course Name: PRINCIPLES OF CYBER SECURITY

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1:	<i>Describe the basic concepts in cyber security and cybercrime.</i>	3	3	3	-	2	-	-	-	-	-	-	-	3	-	-
CO2:	<i>Explore about classification of cyber forensics.</i>	3	3	3	-	2	-	-	-	-	-	-	-	3	-	-
CO3:	<i>Summarize the latest trends in ethical hacking.</i>	3	3	3	-	2	-	-	-	-	-	-	-	3	-	-
CO4:	<i>Discuss the fundamentals of computer forensics and evidence collection.</i>	3	3	3	-	2	-	-	-	-	-	-	-	3	-	-
CO5:	<i>Describe the vulnerabilities in cyber security.</i>	3	3	3	-	2	-	-	-	-	-	-	-	3	-	-
Average		3	3	3	-	2	-	-	-	-	-	-	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20IT903	FUNDAMENTALS OF BUSINESS INTELLIGENCE (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: -

Course Outcomes : On successful completion of the course, the student will be able to **Cognitive Level**

CO1: Summarize the nuances of extracting information from the various sources of digital data	Understand
CO2: Infer the techniques involved in Online Transaction Processing and Online Analytical processing systems.	Understand
CO3: Discuss the concept of data integration.	Remember
CO4: Summarize the various methods of data integration.	Understand
CO5: Describe the various process involved in the Enterprise Reporting.	Understand

UNIT – I DIGITAL DATA [09]

Digital Data: Sources and Characteristics -Structured- Unstructured- Semi-Structured - Business Intelligence(BI) : Definition - BI Component Framework - BI Users - BI Applications - BI Tools.

UNIT – II OLTP AND OLAP [09]

OLTP: Advantages - Challenges - OLAP: Types of Data - OLAP Architectures: MOLAP - ROLAP - HOLAP - OLAP and OLTP - Data models for OLTP - Data models for OLAP.

UNIT – III DATA INTEGRATION [09]

Data Integration : Approaches and Advantages - Technologies - Data Quality - Data Profiling - Data Warehouse : Goals and Sources - Data Mart -Operational Data Store - Ralph Kimball's Approach- Data Mapping -Staging.

UNIT – IV MULTIDIMENSIONAL DATA MODELING [09]

Data Modeling: Entity and Attribute - Cardinality of Relationship - Types of Data Model - Data Modeling Techniques - Fact Table - Dimension table - Dimensional Models -Dimensional Modeling Life Cycle.

UNIT – V ENTERPRISE REPORTING [09]

Enterprise Reporting: Reporting Perspectives- Report Standardization and Presentation Practices - Enterprise Reporting Characteristics in OLAP -Balanced Scorecards - Create Dashboards - Scorecards Vs Dashboards.

Total (L= 45, T = 0) = 45 Periods

Text Books:

- 1 R. N. Prasad, Seema Acharya, Fundamentals of Business Analytics, Wiley Publication Hoboken, New Jersey, Second Edition, 2016.
- 2 Regi Mathew, Business Analytics for Decision Making, Pearson Education, India , First Edition,2020.

Reference Books :

- 1 David Stephenson, Big Data Demystified, FT Publishing International, United States, First Edition, 2018.
- 2 Wayne Winston, Microsoft Excel 2019 Data Analytics and Business Modeling, Microsoft Press, United States, Sixth Edition, 2019.
- 3 Soheil Bakhshi, Expert Data Modelling with Power BI, Packt Publishing , Mumbai, First Edition, 2021.
- 4 <https://nptel.ac.in/courses/110107092>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation: R 2020

Course Code: 20IT903

Course Name: FUNDAMENTALS OF BUSINESS INTELLIGENCE

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1:	<i>Summarize the nuances of extracting information from the various sources of digital data</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2:	<i>Infer the techniques involved in Online Transaction Processing and Online Analytical processing systems.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3:	<i>Discuss the concept of data integration.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4:	<i>Summarize the various methods of data integration.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5:	<i>Describe the various process involved in the Enterprise Reporting.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
Average		3	2	3	-	-	-	-	-	-	-	-	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20IT904	BLOCKCHAIN TECHNOLOGIES (Open Elective)	L T P C 3 0 0 3
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Prerequisite: -**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Infer the theoretical aspects of blockchain and apply in real cas escenarios.

Understand

CO2: Discuss the core components and working of blockchain.

Remember

CO3: Explain the technical concepts of bit coin.

Understand

CO4: Interpret the Ethereum blockchain for different use cases.

Understand

CO5: Outline the end-to-end development of a decentralized application.

Understand

UNIT – I BLOCKCHAIN ARCHITECTURE**[09]**History - Blockchain -Centralized vs. Decentralized Systems-Layers of Blockchain-Versions of Blockchain:3.0 and 4.0
- Blockchain Uses and Use Cases -Laying the Blockchain Foundation - Cryptography.**UNIT – II WORKING OF BLOCKCHAIN****[09]**

Game Theory -Prisoner’s Dilemma -Byzantine Generals’ Problem - The Blockchain - Merkle Trees - Properties of Blockchain Solutions - Blockchain Transactions - Distributed consensus mechanisms - Blockchain applications.

UNIT – III BITCOIN**[09]**

History of Money - Working with Bitcoins - Bitcoin Blockchain - The Bitcoin Network - Bitcoin Scripts - Full Nodes vs SPVs- Bitcoin Wallets.

UNIT – IV ETHEREUM AND HYPERLEDGER**[09]**

Bitcoin to Ethereum - Ethereum Blockchain - Ethereum Smart Contracts - Ethereum Virtual Machine and Code Execution- Ethereum Ecosystem - Swarm - Whisper - DApp - Development components - Hyperledger: Iroha - Blockchain Explorer - Fabric Chain tool.

UNIT – V APPLICATIONS OF BLOCKCHAIN**[09]**

Decentralized Applications - Blockchain Application Development - Interacting with Bitcoin Blockchain - Sending Transactions-Creating a Smart Contract - Executing Smart Contract Functions - Public vs. Private Blockchains.

Total (L= 45, T = 0) = 45 Periods**Text Books:**

- 1 Bikramaditya Singhal, Gautam Dhameja, Priyansu Sekhar Panda, Beginning Blockchain: A Beginner’s Guide to Building Blockchain Solutions, APress, New York, First Edition, 2018.
- 2 Brenn Hill, Samanyu Chopra, Paul Valencourt, Blockchain Quick Reference: A guide to exploring decentralized blockchain application development, Packt Publishing, Mumbai, First Edition, 2018.

Reference Books :

- 1 Imran Bashir, Mastering Blockchain Distributed Ledgers, Decentralization and Smart Contracts Explained, Packt Publishing, Mumabi , First Edition, 2017.
- 2 Pethuru Raj, Chellammal SuriaNarayanan, Kavita Saini, Blockchain Technology and Applications, CRC Press, United States, First Edition ,2021.
- 3 E. Golden Julie, J. Jesu Vedha Nayahi, Noor Zaman Jhanjhi, Blockchain Technology Fundamentals, Applications, and Case Studies, CRC Press , United States, First Edition, 2021.
- 4 https://onlinecourses.nptel.ac.in/noc20_cs01/preview

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation: R 2020

Course Code: 20IT904

Course Name: BLOCKCHAIN TECHNOLOGIES

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	P011	P012	PS01	PS02	
CO1:	<i>Infer the theoretical aspects of blockchain and apply in real case scenarios.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2:	<i>Discuss the core components and working of blockchain.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3:	<i>Explain the technical concepts of bit coin.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4:	<i>Interpret the Ethereum blockchain for different use cases.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5:	<i>Outline the end-to-end development of a decentralized application.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
Average		3	2	3	-	-	-	-	-	-	-	-	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20IT905	INTERNET OF THINGS AND APPLICATIONS (Open Elective)	L T P C 3 0 0 3
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Prerequisite: -**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Explain the physical and logical design of IoT.

Understand

CO2: Summarize the various design methodologies of IoT.

Understand

CO3: Outline the various packages in Python for IoT real world application.

Understand

CO4: Discuss IoT applications using Raspberry Pi and Python.

Remember

CO5: Infer the knowledge on design of smart IoT applications.

Understand

UNIT-I FUNCTIONAL BLOCKS OF IoT**[09]**

Definition and Characteristics of IoT - Physical Design: Layers and Protocols - Logical Design: IoT Functional Blocks - IoT Communication models and APIs - IoT Enabling Technologies - IoT Levels and Deployment Templates.

UNIT- II IoT DESIGN METHODOLOGY**[09]**

M2M - M2M Vs IoT - Software Defined Networks - Network function Virtualization - IoT Platform Design Methodologies - Domain Specific IoT.

UNIT – III PYTHON PACKAGES FOR IOT AND RASPBERRY PI**[09]**

JSON - XML - HTTPLib and URLLib - SMTPLib. Raspberry Pi : Pin Configurations - Interfaces : Serial, SPI, 12C Programming - Python program with Raspberry Pi - Controlling Output - Reading input from pins.

UNIT – IV IoT APPLICATIONS USING RASPBERRY PI**[09]**

LED Controlling - Traffic Light controller - Integrating Sensors - Developing web application to control IoT device - Uploading the sensor values onto the cloud for analysis - Sending SMS - Sending images and video via mail.

UNIT-V IoT USE CASES**[09]**

Smart and Connected Cities - An IoT Strategy for Smarter Cities - Architecture - Use Cases: Street Lighting - Smart Parking - Smart Traffic - Smart Home Automation - Smart Agriculture - Weather Monitoring.

Total (L= 45, T = 0) = 45 Periods**Text Books:**

- 1 ArshdeepBahga and Vijay Madiseti, Internet of Things -A Hands-on Approach, Orient Blackswan Private Limited, New Delhi, First Edition, 2015.
- 2 David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Pearson Education, First Edition, 2017.

Reference Books :

- 1 Francis daCosta, Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, Apress Publications, New York, First Edition, 2013.
- 2 Rajkamal, Internet of Things: Architecture, Design Principles And Applications, McGraw Hill Education, New York, First Edition, 2017.
- 3 Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things - Key Applications and Protocols, Wiley, New York, 2015.
- 4 https://onlinecourses.nptel.ac.in/noc22_cs53/preview

CO-PO MAPPING

Regulation: R 2020

Course Code: 20IT905

Course Name: INTERNET OF THINGS AND APPLICATIONS

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	P011	P012	PS01	PS02	
CO1:	<i>Explain the physical and logical design of IoT.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2:	<i>Summarize the various design methodologies of IoT.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3:	<i>Outline the various packages in Python for IoT real world application.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4:	<i>Discuss IoT applications using Raspberry PI and Python.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5:	<i>Infer the knowledge on design of smart IoT applications.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
Average		3	2	3	-	-	-	-	-	-	-	-	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20IT906	PRINCIPLES OF SOFTWARE TESTING (Open Elective)	L T P C 3 0 0 3
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Prerequisite: -**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Outline the strategies for software testing.

Understand

CO2: Infer the need and conduct of testing levels.

Understand

CO3: Discuss the various techniques used in testing.

Understand

CO4: Interpret the various types of testing used in real world application.

Understand

CO5: Explain the test case templates and reviews process.

Understand

UNIT - I SOFTWARE TESTING**[09]**

Software Testing - Definition of Software Testing - Objective and limits of testing - Testing Strategy - Roles and Responsibilities of a Software Tester - Independent Verification and Validation.

UNIT - II SOFTWARE TESTING REQUIREMENTS**[09]**

Software Testing Requirements - Analyzing the requirements - Functional and Non-Functional Requirements. Software Testing Review Process - Types of Reviews: Peer Review - Walkthrough - Inspection - Checklists of Review Process.

UNIT - III WHITE AND BLACK BOX TESTING**[09]**

White Box Testing Techniques: Decision/Branch Coverage - Basic Path Testing - Control Flow Graph Coverage - Conditional Coverage .Black Box Test Techniques: Boundary Value Analysis - Equivalent Class Partition - Cause-Effect Analysis - State Transition Table.

UNIT - IV TESTING TECHNIQUES**[09]**

Functional Testing: Smoke Testing - Integration and System Testing User Acceptance Testing - Non-Functional Testing: - Performance Testing - Recovery Testing - Security Testing - Compatibility Testing - Usability Testing - Ad Hoc Testing.

UNIT - V TEST CASE DESIGN**[09]**

Test Case :Standards, Characteristics , Guidelines and Naming Conventions - Test Case Templates - Creation of Test Case - Requirement Coverage -Traceability Matrix - Test Case Review Process - Test Execution - Test Log - Reporting of Test Execution

Total (L= 45, T = 0) = 45 Periods**Text Books:**

- 1 S.Subashni, N.Satheesh Kumar, Dr.B.G.Geetha, Dr.G.Singaravel, Software Testing, Umayam Publications, First Edition, 2013.
- 2 Srinivasan Desikan, Gopaldaswamy Ramesh, Software Testing: Principles and Practice, Pearson Education, India, Second Edition , 2017.

Reference Books :

- 1 MarnieL.Hutchson, Software Testing Fundamentals Methods and Metrics, Wiley, India, Second Edition,2003.
- 2 Glenford J.Myess, The Art of Testing, Wiley, India, Third Edition, 2003.
- 3 https://onlinecourses.nptel.ac.in/noc22_cs12/preview
- 4 <https://www.digimat.in/nptel/courses/video/106105150/L01.html>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation: R 2020

Course Code: 20IT906

Course Name: PRINCIPLES OF SOFTWARE TESTING

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1:	<i>Outline the strategies for software testing.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO2:	<i>Infer the need and conduct of testing levels.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3:	<i>Discuss the various techniques used in testing.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4:	<i>Interpret the various types of testing used in real world application.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5:	<i>Explain the test case templates and reviews process.</i>	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
Average		3	2	3	-	-	-	-	-	-	-	-	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20IT907	FOUNDATION SKILLS IN LOGIC BUILDING (Open Elective)	L T P C 3 0 0 3
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Prerequisite: -**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Summarize the various approaches in problem solving.

Understand

CO2: Discuss the different algorithm design techniques.

Remember

CO3: Demonstrate the various array based problem.

Understand

CO4: Summarize the concept of sorting and searching.

Understand

CO5: Outline the various methods to solve number based problem.

Understand

UNIT – I PROBLEM SOLVING PROCESS**[09]**

Problem Solving Process - Approaches in Problem Solving: System Centric- Problem Centric- Solution Centric and Solver Centric Approach - Algorithm - Pseudocode - Flowchart- Important Problem Types.

UNIT – II ALGORITHMIC PROBLEM SOLVING**[09]**

Notion of the Algorithm - Algorithm Design and Analysis Process - Time and Space Complexity - Algorithm Design Techniques: Divide and Conquer - Dynamic Programming - Greedy Technique - Backtracking.

UNIT – III ARRAY BASED PROBLEMS**[09]**

Array Order Reversal - Array Counting - Removal duplicates - Finding the kth smallest element - Swapping of elements - Subarray with given Sum - Find the longest consecutive subsequence.

UNIT – IV SORTING AND SEARCHING**[09]**

Searching: Linear Search - Binary Search. Sorting: Bubble Sort - Selection Sort - Insertion Sort - Merge Sort - Quicksort - Heap Sort.

UNIT – V NUMBER BASED PROBLEMS**[09]**

Swapping the values - Summation of Set of Number - Fibonacci Sequence and Factorial Computation -Integer Reversal - Euclid's algorithm - Prime Numbers Generation.

Total (L= 45, T = 0) = 45 Periods**Text Books:**

- 1 R.G.Dromey, How to Solve it by Computer, Pearson Education, India, Fifth Edition, 2008.
- 2 ISRD GROUP, Programming and Problem Solving Using C Language, McGraw Hill Education, India , First Edition 2017.

Reference Books :

- 1 ITL Educational Solutions Limited, Introduction to Information Technology, Pearson Education, India, Second Edition, India, 2012.
- 2 G. Polya, How to Solve It : A New Aspect of Mathematical Method, Princeton University Press, New Jersey, Second Edition, 2008
- 3 Ellis Horowitz, Fundamentals of Programming languages, Galgotia Publications, New Delhi, Second Edition, 2012.
- 4 www.nptel.ac.in/courses/106104074

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation: R 2020

Course Code: 20IT907

Course Name: FOUNDATION SKILLS IN LOGIC
BUILDING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Summarize the various approaches in problem solving.</i>	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO2:	<i>Discuss the different algorithm design techniques.</i>	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO3:	<i>Demonstrate the various array based problem.</i>	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO4:	<i>Summarize the concept of sorting and searching.</i>	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO5:	<i>Outline the various methods to solve number based problem.</i>	3	3	3	-	-	-	-	-	-	-	-	3	-	-
Average		3	3	3	-	-	-	-	-	-	-	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20IT908	PRINCIPLES OF CLOUD COMPUTING (Open Elective)	L T P C 3 0 0 3
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Prerequisite: -**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Explain the characteristics of cloud computing.

Understand

CO2: Interpret the performance of cloud computing in various computing environment.

Understand

CO3: Discuss the concept of cloud architecture.

Understand

CO4: Infer the knowledge on cloud simulators.

Understand

CO5: Outline the usage of simulators like VMWare simulator.

Understand

UNIT – I**CLOUD COMPUTING****[09]**

Origins of Cloud Computing - Cloud Components - Essential Characteristics - Broad Network Access - Location Independent Resource Pooling - Rapid Elasticity - Measured Service - Roots of Cloud Computing.

UNIT – II**CLOUD INSIGHTS****[09]**

Architectural Influences - High-Performance Computing - Utility and Enterprise Grid Computing - Cloud Scenarios - Benefits - Application Development - Security level of Third Party - Security Benefits - Regularity Issues.

UNIT – III**CLOUD ARCHITECTURE****[09]**

Layers in Cloud Architecture - Software as a Service - Features of SaaS and benefits - Platform as a Services - Features of PaaS and benefits - Infrastructure as a Service - Features of IaaS and benefits - Cloud Service Providers - Challenges and risks in cloud adoption - Types of Cloud.

UNIT – IV**CLOUD SIMULATORS****[09]**

CloudSim Simulator - Architecture - User code - CloudSim - GridSim - SimJava - Working platform for CloudSim - GreenCloud.

UNIT-V**VMWARE SIMULATOR****[09]**

VMWare- Advantages of VMWare virtualization-VMWare workstation-Virtual Machines - Create a new virtual machine on local host - Cloning virtual machine - Recent Trends.

Total (L= 45, T = 0) = 45 Periods**Text Book:**

- 1 Anthony T.Velte , Toby J. Velte Robert Elsenpeter, Cloud computing : A Practical Approach, Tata McGraw- Hill , New Delhi ,Second Edition, 2017.
- 2 Dan C Marinescu,Cloud Computing: Theory and Practice, MK Elsevier, Second Edition, United States,2017.

Reference Books :

- 1 Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, Cloud computing for Dummies, Wiley, India, Second Edition,2020.
- 2 Rajkumar Buyya, James Broberg, Andrzej Goscinski, Cloud Computing: Principles and Paradigms, Wiley, India, First Edition,2011.
- 3 https://onlinecourses.nptel.ac.in/noc22_cs20/preview
- 4 <https://archive.nptel.ac.in/courses/106/105/106105167/>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation: R 2020

Course Code: 20IT908

Course Name: PRINCIPLES OF CLOUD
COMPUTING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Explain the characteristics of cloud computing.</i>	3	3	3	-	2	-	-	-	-	-	-	3	-	-
CO2:	<i>Interpret the performance of cloud computing in various computing environment.</i>	3	3	3	-	2	-	-	-	-	-	-	3	-	-
CO3:	<i>Discuss the concept of cloud architecture.</i>	3	3	3	-	2	-	-	-	-	-	-	3	-	-
CO4:	<i>Infer the knowledge on cloud simulators.</i>	3	3	3	-	2	-	-	-	-	-	-	3	-	-
CO5:	<i>Outline the usage of simulators like VMWare simulator.</i>	3	3	3	-	2	-	-	-	-	-	-	3	-	-
Average		3	3	3	-	2	-	-	-	-	-	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20IT909	OPEN SOURCE TECHNOLOGIES (Open Elective)	L T P C 3 0 0 3
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Prerequisite: -**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Outline the need and importance of Linux Open Source Software.	Understand
CO2: Discuss the manipulations on Array and String using PHP.	Remember
CO3: Summarize various functions in String and Date object	Understand
CO4: Describe simple code segment using list and tuple in Python.	Understand
CO5: Outline the usage of decision and looping statements in PERL.	Remember

UNIT - I LINUX [09]

Open Sources: Need, Advantages and Applications - Open Source Operating Systems : LINUX - Kernel Mode and - Process - Scheduling - Personalities - Cloning and Signals.

UNIT - II PHP [09]

PHP :Syntax of PHP -Common PHP Script Elements -Variables and Constants - Data types - Operators and Statements -Arrays and Functions -String Manipulations- Regular Expression.

UNIT - III MySQL [09]

Setting up an account - Starting, Terminating and writing your own MySQL Programs - Record Selection Technology - Strings - Date and Time - Sorting Query Results module - DDL - DDL -DCL -TDL.

UNIT - IV PYTHON [09]

Syntax and Style - Python Objects - Numbers - Sequences - Strings - Lists and Tuples - Dictionaries - Decision and Loops - Files - Input and Output Statements - Errors and Exceptions - Functions.

UNIT - V PERL [09]

Perl : Perl Parsing Rules - Variables and Data - Statements and Control Structures - Subroutines - Packages and Modules - Files and Data Manipulation.

Total (L= 45, T = 0) = 45 Periods**Text Book:**

- 1 Martin C.Brown, Python: The Complete Reference, McGraw Hill Education, India, Fourth Edition, 2018.
- 2 Richard Petersen, The Complete Reference Linux, TataMcGraw Hill, New Delhi, Sixth Edition, 2017.

Reference Books :

- 1 Frank M. Kromann, Beginning PHP and MySQL, Apress, New York, Fifth Edition ,2018.
- 2 Martin C. Brown, Perl: The Complete Reference, Tata McGraw-Hill, New Delhi, Fifth, 2017.
- 3 Steven Holzner, PHP: The Complete Reference, Tata McGraw-Hill, New Delhi, Sixth Edition, 2017.
- 4 <https://nptel.ac.in/courses/106106145>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation: R 2020

Course Code: 20IT909

Course Name: OPEN SOURCE TECHNOLOGIES

CO	Course Outcomes	Programme Outcomes														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	P011	P012	PS01	PS02	
CO1:	<i>Outline the need and importance of Linux Open Source Software.</i>	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2:	<i>Discuss the manipulations on Array and String using PHP.</i>	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3:	<i>Summarize various functions in String and Date object</i>	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4:	<i>Describe simple code segment using list and tuple in Python.</i>	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5:	<i>Outline the usage of decision and looping statements in PERL.</i>	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
Average		3	3	3	-	-	-	-	-	-	-	-	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20IT910	PRINCIPLES OF SOFTWARE ENGINEERING (Open Elective)	L T P C 3 0 0 3
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Prerequisite: -**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

CO1: Explain the software engineering process and its various models	Understand
CO2: Summarize how requirements may be organized in software requirements document	Understand
CO3: Illustrate the architectural design decisions and apply real time systems.	Understand
CO4: Outline the methods rely on documented specifications and Design.	Understand
CO5: Discuss the process involved in verification and validation.	Understand

UNIT - I SYSTEMS ENGINEERING**[09]**

Professional and Ethical Responsibility - Systems Engineering - Legacy Systems - Critical System - Software Process Models - Process Iteration - The Rational Unified Process - Project Planning - Project Scheduling.

UNIT - II REQUIREMENTS ANALYSIS**[09]**

Software Requirements: Functional and Non-Functional Requirements - User Requirements - System Requirements - Requirements Validation - Requirements Management - System Models: Context Models, Behavioral Models, Data Models, Object Models, Structured Methods- Risk-Driven Specification, Safety Specification.

UNIT - III ARCHITECTURAL DESIGN**[09]**

Architectural Design Decisions - System Organization - Multiprocessor Architectures - Client - Server Architectures - Data Processing Systems - Objects and Object Classes - Real-Time Operating Systems - Monitoring and Control Systems - User Interface Design : Issue, Process, Analysis.

UNIT - IV CRITICAL SYSTEMS**[09]**

Agile Methods - Rapid Application Development - Software Prototyping - Components and Component Models - Fault Tolerance - Fault-Tolerance Architectures - Software Maintenance - Evolution Processes - Legacy System Evolution .

UNIT - V VERIFICATION AND VALIDATION**[09]**

Planning Verification and Validation - Software Inspections - Verification and Formal Methods - Systems Testing - Component Testing - Test Case Design - Test Automation - Safety Assurance - Security Assessment.

Total (L= 45, T = 0) = 45 Periods**Text Books:**

- 1 Lan Sommerville, Software Engineering, Pearson Education, India , Tenth Edition, 2017.
- 2 Roger Pressman, Software Engineering: A Practitioner's Approach, McGraw Publications , India , Seventh Edition ,2017

Reference Books :

- 1 Jalote P,An Integrated Approach to Software Engineering,Narosa Publishers,New Delhi, Third Edition, 2015.
- 2 Mark Richards and Neal Ford, Fundamentals of Software Architecture: An Engineering Approach, O'Reilly, First Edition, 2020.
- 3 Rajib Mall, Fundamentals of Software Engineering, PHI Learning,India ,Fifth Edition,2018.
- 4 <https://nptel.ac.in/courses/106105087>

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation: R 2020

Course Code: 20IT910

Course Name: PRINCIPLES OF SOFTWARE
ENGINEERING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	<i>Explain the software engineering process and its various models</i>	3	2	3	-		-	-	-		-	-	3	-	-
CO2:	<i>Summarize how requirements may be organized in software requirements document</i>	3	2	3	-		-	-	-		-	-	3	-	-
CO3:	<i>Illustrate the architectural design decisions and apply real time systems.</i>	3	2	3	-		-	-	-		-	-	3	-	-
CO4:	<i>Outline the methods rely on documented specifications and Design.</i>	3	2	3	-		-	-	-		-	-	3	-	-
CO5:	<i>Discuss the process involved in verification and validation.</i>	3	2	3	-		-	-	-		-	-	3	-	-
Average		3	2	3	-		-	-	-		-	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20ME901	BASIC MECHANICAL ENGINEERING	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite:**Course Outcomes : On successful completion of the course, the student will be able to**

CO1: Explore the fundamental knowledge on basics of mechanical engineering

CO2: Demonstrate the concepts of manufacturing technology.

CO3: Describe the knowledge of power plants and pumps.

CO4: Interpret the basic concepts of IC Engines.

CO5: Analyze the Refrigeration and air conditioning systems

Cognitive Level

Understand

Understand

Understand

Understand

Analyze

UNIT - I FUNDAMENTALS [09]

Introduction to mechanical engineering, concepts of thermal engineering, mechanical machine design, industrial engineering, and manufacturing technology.

UNIT - II MANUFACTURING TECHNOLOGY [09]

Manufacturing, classification, lathe, drilling machines, milling machines, metal joining, metal forming, casting, forging, and introduction to powder metallurgy.

UNIT - III POWER PLANT ENGINEERING [09]

Introduction, Classification of Power Plants - Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants - Merits and Demerits - Pumps and turbines - working principle of Reciprocating pumps (single acting and double acting) - Centrifugal Pump.

UNIT - IV I C ENGINES [09]

Internal combustion engines as automobile power plant - Working principle of Petrol and Diesel Engines - Four stroke and two stroke cycles - Comparison of four stroke and two stroke engines.

UNIT - V REFRIGERATION AND AIR CONDITIONING SYSTEM [09]

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system-Layout of typical domestic refrigerator-Window and Split type room Air condition.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Shantha Kumar S R J., Basic Mechanical Engineering, Hi-tech Publications, Mayiladuthurai, Second Edition, 2000.
- 2 Venugopal K and Prahuraja V, Basic Mechanical Engineering, Anuradha Publishers, Kumbakonam, Fourth Edition 2000.

Reference Books :

- 1 Lecture notes prepared by Department of Mechanical Engineering, NITT, 2020.
- 2 R. K. Rajput, Manufacturing Processes, University Science Press, New Delhi, Fourth Edition, 2020.
- 3 Hajra Choudry, S. K., Elements of Work Shop Technology - Vol. I, Media Promoters, New Delhi, Fourth Edition, 2010.
- 4 Ramesh Babu, Basic civil and Mechanical Engineering, VRB Publishers, Chennai, Fourth Edition, 2017.

K.S.R COLLEGE OF ENGINEERING, TIRUCHENGODE-637215

DEPARTMENT OF MECHANICAL ENGINEERING

CO PO MAPPING

Regulation : R2020

Course Code: 20ME901

Course Name : BASIC MECHANICAL ENGINEERING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Explore the fundamental knowledge on basics of mechanical engineering	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO2:	Demonstrate the concepts of manufacturing technology	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO3:	Describe the knowledge of power plants and pumps.	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO4:	Interpret the basic concepts of IC Engines.	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO5:	Analyze the Refrigeration and air conditioning systems	3	3	3	-	-	2	-	-	-	-	-	-	-	-
Average		3	3	3	-	-	2	-							

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20ME902

SOLAR ENERGY UTILIZATION

(Open Elective)

L	T	P	C
3	0	0	3

Prerequisite:**Course Outcomes : On successful completion of the course, the student will be able to****Cognitive Level**

- CO1: Explore the measurement of solar radiation and their application to various systems.
- CO2: Illustrate the principles of non-concentrating collectors and apply the principles in various real time applications.
- CO3: Describe the concept of concentrating collectors and their application to a wide range of systems.
- CO4: Analyze the various material characteristics of solar cell and determine maximum efficiency of solar cells.
- CO5: Demonstrate the solar storage equipment and evaluate the economic analysis of various solar equipment.

Understand

Apply

Apply

Analyze

Understand

UNIT - I INTRODUCTION TO SOLAR ENERGY**[09]**

Introduction - Sun-Earth relationships- solar constant- solar radiation at the earth surface- depletion of solar radiation- measurement of solar radiation- solar radiation data- solar time- solar radiation geometry- solar radiation on tilted surfaces-Sun as the source of energy sun angles - overview of applications.

UNIT - II NON CONCENTRATING COLLECTORS**[09]**

Types and classification of solar collectors - terminology related to flat plate collectors - evacuated collectors-Heat transfer processes and efficiency of a solar collector -solar drying- solar desalination- solar mechanical cooling- solar desiccant cooling- detailed study on heat pump - it needed.

UNIT - III CONCENTRATING COLLECTORS**[09]**

Tracking systems - compound parabolic concentrators - parabolic trough concentrators - concentrators with point focus - Heliostats- comparison of various designs - central receiver systems - parabolic trough systems - solar performance analysis - solar power plant - solar furnace.

UNIT - IV SOLAR PHOTOVOLTAIC**[09]**

Fundamentals of solar cells- types of solar cell- P-N junction photodiode- description and principle of working of a solar cell- cell structure- solar module and panel- I-V characteristics of a PV module- maximum power point- cell efficiency- fill factor- Manufacturing of solar cell.

UNIT - V SOLAR ENERGY STORAGE AND ECONOMIC ANALYSIS**[09]**

Storage of solar energy - thermal storage-sensible and latent heat storage-Economic Analysis: Initial and annual costs-definition of economic terms for a solar system- present worth calculation-repayment of loan in equal annual installments- annual savings- cumulative savings and life cycle savings- payback period- clean development mechanism -solar vehicle -BIPV(Building Integrated photo voltaic) - house hold appliances.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Garg H P and Prakash J, Solar Energy: Fundamentals & Applications, McGraw Hill, New Delhi, First Revised Edition 2014 .
- 2 Duffie.J.A and Beckman W.A, Solar Engineering of Thermal processes, John Wiley And Sons, New York, Fourth Edition,2013 .

Reference Books :

- 1 Sukhatme. K and Sukhatme S.P., Solar Energy principles of thermal collection and storage, Tata McGraw Hill education, New Delhi, Third Edition,2008.
- 2 Rai G.D., Solar energy Utilization, Khanna Publishers, New Delhi, Fifth Edition, 2020.
- 3 Bhattachariya.T , Terrestrial Solar Photovoltaic, Narosa Publishers, New Delhi, Fourth Edition,2008.
- 4 Sukhatme S.P., Solar Energy, Tata McGraw Hills P Co., Third Edition, 2008.

K.S.R COLLEGE OF ENGINEERING, TIRUCHENGODE-637215

DEPARTMENT OF MECHANICAL ENGINEERING

CO PO MAPPING

Regulation : R2020

Course Code : 20ME902

Course Name : SOLAR ENERGY UTILIZATION

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Evaluate the measurement of solar radiation and their application to various systems.	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO2:	Illustrate the principles of non-concentrating collectors and apply the principles in various real time applications.	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO3:	Describe the concept of concentrating collectors and their application to a wide range of systems.	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO4:	Analyze the various material characteristics of solar cell and determine maximum efficiency of solar cells.	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO5:	Demonstrate the solar storage equipment and evaluate the economic analysis of various solar equipment.	3	3	3	-	-	2	-	-	-	-	-	-	-	-
Average		3	3	3	-	-	2	-							

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R COLLEGE OF ENGINEERING, TIRUCHENGODE-637215

DEPARTMENT OF MECHANICAL ENGINEERING

CO PO MAPPING

Regulation : R2020

Course Code : 20ME903

Course Name : PRODUCTION TECHNOLOGY OF AGRICULTURAL
MACHINERY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Acquire various engineering materials, classifications, compositions and properties	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO2:	Explore the concept and basic mechanics of metal cutting, working of standard machine tools and allied machines.	3	3	3	-	-	2	-	-	-	-	-	-	-	
CO3:	Apply the manufacturing process in welding for component production.	3	3	3	-	-	2	-	-	-	-	-	-	-	
CO4:	Demonstrate various advanced manufacturing process in engineering field.	3	3	3	-	-	2	-	-	-	-	-	-	-	
CO5:	Describe the basic concepts of Computer Numerical Control (CNC) machine tool and CNC programming.	3	3	3	-	-	2	-	-	-	-	-	-	-	
Average		3	3	3	-	-	2	-							

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	L	T	P	C
20ME904	3	0	0	3

SELECTION OF MATERIALS

(Open Elective)

Prerequisite:**Course Outcomes :** On successful completion of the course, the student will be able to

- CO1: Explore the classification and properties of engineering materials
 CO2: Acquire the knowledge on mechanical properties of various metal alloys.
 CO3: Identify different types of availability materials.
 CO4: Examine required materials for engineering applications.
 CO5: Select suitable material for various applications

Cognitive Level

- Understand
 Understand
 Analyze
 Analyze
 Evaluate

UNIT - I ENGINEERING MATERIALS [09]

Introduction - classification of engineering materials - selection of materials for engineering purposes -selection of materials and shape -classification metal and alloys, polymers, ceramics and glasses, composites, natural materials,- nonmetallic materials- smart materials - physical, metrical properties of metals.

UNIT - II MATERIAL PROPERTIES [09]

Mechanical properties - fatigue strength - fracture Toughness - Thermal Properties - Magnetic Properties - Fabrication Properties -electrical , optical properties - Environmental Properties , Corrosion properties -shape and size - Material Cost and Availability- failure analysis.

UNIT - III MANUFACTURING PROCESSING AND ECONOMIC ANALYSIS [09]

Interaction of Materials Selection, Design, and Manufacturing Processes - Production Processes and Equipment for Metals - Metal Forming, Shaping, and Casting - Plastic Parts Processing - Composites Fabrication Processes - Advanced Ceramics Processing - surface treatment - Resource -The Price and Availability of Materials.

UNIT - IV MATERIALS SELECTION CHARTS AND TESTING [09]

Ashby material selection charts-Testing of Metallic Materials - Plastics Testing - Characterization and Identification of Plastics - Professional and Testing Organizations - Ceramics Testing - Nondestructive Inspection.

UNIT - V APPLICATIONS AND USES [09]

Selection of Materials for Biomedical Applications - Medical Products - Materials in Electronic Packaging - Advanced Materials in Sports Equipment - Materials Selection for Wear Resistance - Advanced Materials in Telecommunications - Using Composites - Manufacture and Assembly with Plastics, fiber and Diamond Films.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- 1 Ashby, M. F. , Materials selection in mechanical design, Elsevier,New Delhi, Third Edition, 2005.
- 2 Ashby, M. F. and Johnson, K. Materials and design - the art and science of material selection in product design. Elsevier, New Delhi, First Edition, 2002.

Reference Books :

- 1 Charles, J. A., Crane, F. A. A. and Furness, J. A. G. ,Selection and use of engineering materials, Butterworth-Heinemann, New Delhi, Third Edition, 1997.
- 2 Handbook of Materials Selection. Edited by Myer Kutz John Wiley & Sons, Inc., New York, Second Edition, 2002.
- 3 Fisher P.E., Selection of Engineering Materials and Adhesives ,CRC Press, US, First Edition,2020
- 4 Joseph Datsko ,Materials Selection for Design and Manufacturing theory and practice, CRC Press, US, First edition,2020.

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Explore the classification and properties of engineering materials	3	3	3	-	-	1	-	-	-	-	-	-	-	-
CO2:	Acquire knowledge on mechanical properties of various metal alloys.	3	3	3	-	-	1	-	-	-	-	-	-	-	-
CO3:	Identify different types of availability materials.	3	3	3	-	-	1	-	-	-	-	-	-	-	-
CO4:	Examine required materials for engineering applications.	3	3	3	-	-	1	-	-	-	-	-	-	-	-
CO5:	Select suitable material for various applications	3	3	3	-	-	1	-	-	-	-	-	-	-	-
Average		3	3	3	-	-	1	-							

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

	L	T	P	C
20ME905	3	0	0	3

MARINE VEHICLES

(Open Elective)

Prerequisite:**Course Outcomes :** On successful completion of the course, the student will be able to

- CO1: Explore the various types of marine vehicles and its applications
 CO2: Acquire marine vehicle Safety, Operations and controls of bunkering.
 CO3: Demonstrate remotely operable vehicle design, construction and its components.
 CO4: Analyze submersible and autonomous under water vehicles.
 CO5: Design and operational consideration of manned and un manned submersible.

Cognitive Level

- Understand
 Understand
 Apply
 Analyze
 Create

UNIT - I MARINE VEHICLES [09]

Types - general - by function - commercial marine vehicles- passenger ship, cargo ships, oil and chemical tankers , cattle carriers, harbor crafts, off shore platform, container ships.

UNIT - II REEFERS AND GAS CARRIERS [09]

.Introduction - Types , design considerations, safety - operation and controls, precaution during bunkering.

UNIT - III REMOTELY OPERABLE VEHICLE (ROV), UMS SHIPS [09]

Remotely Operable Vehicles (ROV) - The ROV business - Design theory and standards - control and simulation - design and stability - components of ROV - applications, UMS operation, and controls.

UNIT - IV SUBMERSIBLES AND AUTONOMOUS UNDERWATER VEHICLE (AUV) [09]

submersibles types - applications, AUV - Design and construction considerations - components - sensors - Navigation -control strategies - applications.

UNIT - V MANNED AND UN MANNED SUBMERSIBLE [09]

Introduction - Design and operational consideration - pressure hull exo-structure - ballasting and trim - maneuvering and control - Life support and habitability - emergency devices and equipment's - certification and classification, towed vehicles - gliders - crawler - Design and construction.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- Jonathan M. Ross, human factors for naval marine vehicle design and operation, CRC Press, US, Second Edition, 2001.
- Sabiha A. Wadoo, Pushkin Kachroo, Autonomous underwater vehicles, modeling, control design and Simulation, CRC press,US,Second Edition, 2011.

Reference Books :

- Ferial L hawry, The ocean engineering handbook, CRC press, US,First Edition, 2000.
- Richard A Geyer, Submersibles and their use in oceanography and ocean engineering, Elsevier, New Delhi, First Edition, 1997.
- Robert D. Christ,Robert L. Wernli, Sr., The ROV Manual A User Guide for Remotely Operated Vehicles, Elsevier, New Delhi, second edition, 2014.
- Frank Busby. R, Manned Submersibles, Office of the oceanographer of the Navy, United states, First Edition, 1976.

K.S.R COLLEGE OF ENGINEERING, TIRUCHENGODE-637215

DEPARTMENT OF MECHANICAL ENGINEERING

CO PO MAPPING

Regulation : R2020

Course Code : 20ME905

Course Name : MARINE VEHICLES

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Explore the various types of marine vehicles and its applications	3	3	3	-	-	2	-	-	1	-	-	-	-	-
CO2:	Acquire Safety, Operations and controls of bunkering.	3	3	3	-	-	2	-	-	1	-	-	-	-	-
CO3:	Demonstrate remotely operable vehicle design, construction and its components.	3	3	3	-	-	2	-	-	1	-	-	-	-	-
CO4:	Analyze submersible and autonomous under water vehicles.	3	3	3	-	-	2	-	-	1	-	-	-	-	-
CO5:	Design and operational consideration of manned and un manned submersible.	3	3	3	-	-	2	-	-	1	-	-	-	-	-
Average		3	3	3	-	-	2	-	-	1	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20ME906	SENSORS AND TRANSDUCER (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite:

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

CO1: Explore the basic concepts of various sensors and transducers.	Understand
CO2: Develop knowledge in mechanical and electromechanical sensor.	Apply
CO3: Differentiate the types of thermal sensor which are used in various applications.	Apply
CO4: Identify various types of magnetic sensors and working principles	Analyze
CO5: Acquire suitable sensors and its applications.	Understand

UNIT - I INTRODUCTION [09]

Definition, classification, static and dynamic parameters, Characterization - Electrical, mechanical, thermal and chemical. Classification of errors - Error analysis, Static and dynamic characteristics of transducers.

UNIT - II MECHANICAL AND ELECTROMECHANICAL SENSORS [09]

Resistive Potentiometer - strain gauge - Inductive sensors and transducer - capacitive sensors - ultrasonic sensors.

UNIT - III THERMAL SENSOR [09]

Gas thermometric sensors - acoustic temperature sensors - magnetic thermometer, resistance change -type thermometric sensors.

UNIT - IV MAGNETIC SENSOR [09]

Force and displacement measurement - Magneto resistive sensors - Hall Effect sensor, Inductance and eddy current sensors - Angular/rotary movement transducer - Electromagnetic flow meter, squid sensor.

UNIT - V SENSORS AND THEIR APPLICATIONS [09]

Automobile sensor - Home appliance sensor - Aerospace sensors - sensors for manufacturing medical diagnostic sensors - environmental monitoring.

Total (L= 45, T = 0) = 45 Periods

Text Books :

- 1 Ernest O Doebelin, Measurement Systems - Applications and Design, Tata McGraw-Hill, New Delhi, Fourth edition, 2016.
- 2 Sawney A K and Puneet Sawney, A Course in Mechanical Measurements and Instrumentation and Control, Dhanpat Rai and Co, New Delhi, Fourteenth edition, 2016.

Reference Books :

- 1 Patranabis D, Sensors and Transducers, PHI, New Delhi, Sixth Edition, 2015.
- 2 Richard Zurawski, Industrial Communication Technology Handbook, CRC Press, US, Second edition, 2015.

E-Resources :

- 1 <https://nptel.ac.in/courses/108/108/108108147/>
- 2 <https://www.youtube.com/watch?v=1uPTYjxZzyo>

Regulation : R2020

Course Code : 20ME906

Course Name : SENSORS AND TRANSDUCER

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Explore the basic concepts of various sensors and transducers.	3	3	3	-	-	1	-	-	-	-	-	-	-	-
CO2:	Develop knowledge in mechanical and electromechanical sensor.	3	3	3	-	-	1	-	-	-	-	-	-	-	-
CO3:	Differentiate the types of thermal sensor which are used in various applications.	3	3	3	-	-	1	-	-	-	-	-	-	-	-
CO4:	Identify various types of magnetic sensors and working principles	3	3	3	-	-	1	-	-	-	-	-	-	-	-
CO5:	Acquire suitable sensors and its applications.	3	3	3	-	-	1	-	-	-	-	-	-	-	-
Average		3	3	3	-	-	1	-	-	-	-	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

	L	T	P	C
20ME907				
ENERGY AUDITING (Open Elective)	3	0	0	3

Prerequisite:

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

CO1: Describe the energy crisis & environmental concerns associated with the energy management and the importance of energy auditing.	Understand
CO2: Identify the tools, techniques, management practices for the audit and management of electrical energy.	Understand
CO3: Recognize the techniques of energy analysis and the associated energy efficient technologies for the routinely used thermal energy systems.	Apply
CO4: State about the typical electrical energy powered utilities, services of industrial facilities & organizations and be able to identify the opportunities and options for the conservation & management of electrical energy.	Understand
CO5: Interpret the basic economic concepts of underlay energy production and end use.	Evaluate

UNIT - I INTRODUCTION [09]

Energy - Power - Past & Present scenario of world; National energy consumption data - Environmental aspects associated with energy utilization - Energy Auditing: Need, Types, Methodology and Barriers. Role of energy managers. Instruments for energy auditing.

UNIT - II ELECTRICAL SYSTEMS [09]

Components of EB billing - HT and LT supply, Transformers, Cable sizing, Concept of capacitors, Power factor improvement, Harmonics, Electric motors - Motors efficiency computation, Energy efficient motors, Illumination - Lux, Lumens, Types of lighting, Efficacy, LED lighting and scope of economics in illumination - Auditing in electrical systems.

UNIT - III THERMAL SYSTEMS [09]

Stoichiometry, Boilers, Furnaces and Thermal fluid heaters - Efficiency computation and economic measures. Steam: Distribution & usage, Steam traps, Condensate recovery, Flash steam utilization, Insulators & Refractories - Auditing in thermal systems.

UNIT - IV ENERGY CONSERVATION IN MAJOR UTILITIES [09]

Pumps, Fans, Blowers, Compressed air systems, Refrigeration and Air Conditioning systems - Cooling towers - D.G. sets - Auditing and energy conservation.

UNIT - V ECONOMICS [09]

Energy economics - Discount rate, Payback period, Internal rate of return, Net present value, Life cycle costing - ESCO concept - Auditing and Economics.

Total (L= 45, T = 0) = 45 Periods**Text Books :**

- Energy manager training manual (4 Volumes) available at www.energymanagertraining.com, a website administered by Bureau of energy efficiency (BEE), a statutory body under ministry of power, Government of India, 2004.
- Abbi, Y.B, Energy Audit, Open University, The Energy and Resources Institute, Government Of India, 2012 .

Reference Books :

- Witte. L.C., P. S. Schmidt, D.R. Brown, Industrial Energy Management and Utilization, Hemisphere Pub, Washington, First Edition, 1988 .
- Sonal Desai, Handbook of Energy Audit, Tata McGraw Hill, New Delhi, Second Edition, 2015.
- Dryden. I.G.C., The Efficient Use Of Energy, Butterworth's, London, Fourth Edition, 2013.
- Turner W.C., Energy Management Handbook, Wiley, New York, Eighth Edition, 2014.

Regulation : R2020

Course Code : 20ME907

Course Name : ENERGY AUDITING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Describe the energy crisis & environmental concerns associated with the energy management and the importance of energy auditing.	3	3	3	-	2	2	-	-	1	-	-	-	-	-
CO2:	Identify the tools and techniques, and the management practices for the audit and management of electrical energy.	3	3	3	-	2	2	-	-	1	-	-	-	-	-
CO3:	Recognize the techniques of energy analysis and the associated energy efficient technologies for the routinely used thermal energy systems.	3	3	3	-	2	2	-	-	1	-	-	-	-	-
CO4:	State about the typical electrical energy powered utilities, services of industrial facilities & organizations and be able to identify the opportunities and options for the conservation & management of electrical energy.	3	3	3	-	2	2	-	-	1	-	-	-	-	-
CO5:	Interpret the basic economic concepts of underlay energy production and end use.	3	3	3	-	2	2	-	-	1	-	-	-	-	-
Average		3	3	3	-	2	2	-	-	1	-	-	-	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020
20ME908	FIBRE REINFORCED PLASTICS (Open Elective)	L T P C 3 0 0 3

Prerequisite:

Course Outcomes : On successful completion of the course, the student will be able to

CO1: Select various materials for designing composite structures.	Cognitive Level Understand
CO2: Apply knowledge of fracture mechanics of composites during designing of composite structures.	Apply
CO3: Analyze critically damping capacity of composite materials.	Analyze
CO4: Correlate various manufacturing/fabricating techniques for composite structures based on design.	Analyze
CO5: Explore various composite applications.	Understand

UNIT - I INTRODUCTION [09]

Definition, Reason for composites, Classifications of composites, Thermosets - Epoxy; Unsaturated polyester resin; vinyl ester, polyimides etc.,-preparation, properties, and uses.

UNIT - II REINFORCEMENTS [09]

Types, Properties, chemistry and applications of fillers such as silica, titanium oxide, talc, mica etc., Manufacturing process, Properties, structure and uses of Glass fiber -.Carbon, Aramid, Boron, jute, sisal, cotton.

UNIT - III FABRICATIONS OF THERMOSET COMPOSITES [09]

Hand layup method, compression and transfer moulding, pressure and vacuum bag process, filament winding, protrusion, reinforced RIM, Injection moulding, of thermosets, SMC and DMC, Advantages and disadvantages of each method.

UNIT - IV TESTING OF COMPOSITES [09]

Destructive and non-destructive tests; Destructive-tensile, compression, flexural, impact strength, Hardness-Fatigue-toughness HDT ,basic concepts of fracture mechanisms.

UNIT - V APPLICATIONS OF COMPOSITES [09]

Aerospace, land transport, marine, structural, chemical plants and corrosion resistant products and energy applications sports, electrical, electronic and communication applications.

Total (L= 45, T = 0) = 45 Periods

Text Books :

- 1 Chawla, K.K, Composite Material s, Springer Science in progress, USA, Sixth Edition, 2019.
- 2 Balasubramaniam, Composite Materials, John Wiley & Sons, Indian Ed., New York, Fourth Edition, 2016.

Reference Books :

- 1 Sharma S.C., Composite materials, Narosa Publications, NewDelhi, Third Edition, 2015.
- 2 Isaac M. Daniel and Ori Ishai, Engineering Mechanics of Composite Materials, Oxford University Press, UK, Second Edition, 2017.

E-RESOURCES

- 1 <https://nptel.ac.in/courses/112/105/112105232/>
- 2 <https://nptel.ac.in/courses/112/107/112107142/>

Regulation : R2020

Course Code : 20ME908

Course Name : FIBRE REINFORCED PLASTICS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Select various materials for designing composite structures.	3	3	3	-	-	1	-	-	-	-	-	-	-	-
CO2:	Apply knowledge of fracture mechanics of composites during designing of composite structures.	3	3	3	-	-	1	-	-	-	-	-	-	-	
CO3:	Analyze critically damping capacity of composite materials.	3	3	3	-	-	1	-	-	-	-	-	-	-	
CO4:	Correlate various manufacturing / fabricating techniques for composite structures based on design.	3	3	3	-	-	1	-	-	-	-	-	-	-	
CO5:	Explore various composite applications.	3	3	3	-	-	1	-	-	-	-	-	-	-	
Average		3	3	3	-	-	1	-							

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20ME909	LEAN MANUFACTURING (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite:

Course Outcomes : On successful completion of the course, the student will be able to

- C01: Demonstrate the lean manufacturing principles to find and eliminate wastes.
 C02: Identify the lean manufacturing tools and their potential applications.
 C03: Summarize the usage of visual management, TPM and lean practices.
 C04: Acquire the technology drivers of lean manufacturing.
 C05: Describe technology drivers of lean manufacturing.

Cognitive Level

- Understand
 Understand
 Apply
 Understand
 Analyze

UNIT - I LEAN MANUFACTURING PRINCIPLES [09]

Lean manufacturing paradigms - lean manufacturing - origin - Toyota Production System - types of wastes -tools and techniques to eliminate wastes - value stream mapping (VSM) - primary icons - secondary icons - developing the VSM.

UNIT - II LEAN MANUFACTURING TOOLS [09]

5S concepts - stages of 5S and waste elimination - Kaizen - steps of Kaizen - lean manufacturing through Kaizen - Single Minute Exchange of Die - theory of SMED - design for SMED - strategic SMED and waste elimination - pull production through Kanban - one piece flow production.

UNIT - III VISUAL MANAGEMENT, TPM AND LEAN IMPLEMENTATION [09]

Visual management - tools for eliminating wastes - overproduction, inventory, delay, transportation, processing, unnecessary motion, defective parts, underutilization of people - implementation - total productive maintenance - implementation of lean practices.

UNIT - IV MANAGEMENT AND TECHNOLOGY DRIVERS OF LEAN MANUFACTURING [09]

Lean manufacturing - twenty criteria model - management driver - organizational structure - devolution of authority - employee status and involvement - nature of management - business and technical processes - time management - agility through technology driver.

UNIT - V MANUFACTURING STRATEGY AND COMPETITIVE DRIVERS OF LEAN MANUFACTURING [09]

Quick manufacturing setups - quick response - product life cycle management - product service elimination - automation - competitive driver - status of quality and productivity - compatible cost accounting system.

Total (L= 45, T = 0) = 45 Periods

Text Books :

- 1 Devadasan.S.R, Mohan Sivakumar.V, Muruges.R and Shalij.P.R, Lean Manufacturing: Theoretical, Practical and Research Futures, PHI Learning Private Limited, New Delhi, Second Edition, 2012.
- 2 Pascal Dennis, Lean Production Simplified, Productivity Press, New York, Third Edition, 2007.

Reference Books :

- 1 Bill Carreira, Lean Manufacturing That Works, PHI Learning Private Limited, New Delhi, Third Edition, 2016.
- 2 Dennis P. Hobbs, LEAN Manufacturing Implementation, Cengage Learning, New Delhi, Fifth Edition, 2015.

E-RESOURCES

- 1 <https://nptel.ac.in/courses/112/104/112104188/> - (Lean Manufacturing System Technology)
- 2 <https://freevidelectures.com/course/4162/nptel> - (Toyota Production system)

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Demonstrate the lean manufacturing principles to find and eliminate wastes .	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO2:	Identify the lean manufacturing tools and their potential applications.	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO3:	Summarize the usage of visual management, TPM and lean practices.	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO4:	Acquire the technology drivers of lean manufacturing.	3	3	3	-	-	2	-	-	-	-	-	-	-	-
CO5:	Describe technology drivers of lean manufacturing.	3	3	3	-	-	2	-	-	-	-	-	-	-	-
Average		3	3	3	-	-	2	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20ME910	SURFACE ENGINEERING	L	T	P	C
	(Open Elective)	3	0	0	3

Prerequisite:

Course Outcomes : On successful completion of the course, the student will be able to

CO1: Demonstrate the various factors influencing wear in materials	Cognitive Level
CO2: Identify wear resistance techniques in engineering materials	Understand
CO3: Acquire various surface treatment methods for alloy metals	Apply
CO4: Describe various surface treatment techniques and its applications	Understand
CO5: Explore the corrosion behaviour of engineering materials	Analyze
	Understand

UNIT - I WEAR [09]

Introduction tribology, surface degradation, wear and corrosion, types of wear, roles of friction and lubrication- overview of different forms of corrosion, introduction to surface engineering, importance of substrate

UNIT - II COATING [09]

Chemical and electrochemical polishing, significance, specific examples, chemical conversion coatings, phosphating, chromating, chemical colouring, anodizing of aluminium alloys, thermochemical processes -industrial practices

UNIT - III SURFACE TREATMENT [09]

Surface pre-treatment, deposition of copper, zinc, nickel and chromium - principles and practices, alloy plating, electrocomposite plating, electroless plating of copper, nickel-phosphorous, nickel-boron; electroless composite plating; application areas, properties, test standards (ASTM) for assessment of quality deposits

UNIT - IV SURFACE TREATMENT TECHNIQUES [09]

Definitions and concepts, physical vapour deposition (PVD), evaporation, sputtering, ion plating, plasma nitriding, process capabilities, chemical vapour deposition (CVD), metal organic CVD, plasma assisted CVD, specific industrial applications

UNIT - V SPRAYING [09]

Thermal spraying, techniques, advanced spraying techniques - plasma surfacing, D-Gun and high velocity oxy-fuel processes, laser surface alloying and cladding, specific industrial applications, tests for assessment of wear and corrosion behaviour

Total (L= 45, T = 0) = 45 Periods

Text Books :

- 1 Stachowiak, G.W & Batchelor A.W, Engineering Tribology, Butterworth-Heinemann, UK, First Edition, 2005.
- 2 Rabinowicz.E, Friction and Wear of materials, John Willey & Sona ,New York, Second Edition,1995.

Reference Books :

- 1 Sudarshan T S, Surface modification technologies - An Engineer's guide, Marcel Dekker, New york, First Edition,1989.
- 2 Varghese C.D, Electroplating and Other Surface Treatments - A Practical Guide, TMH, New Delhi, First Edition,1993.
- 3 Williama. J.A, Engineering Tribology, Oxboarduniv. Press, UK, Second Edition,1994.
- 4 Basu S.K.,Sengupta S.N &Ahuja B.P, Fundamentals of Tribology, Prentice-Hall of India Pvt. Ltd, New Delhi, Second Edition,2005.

K.S.R COLLEGE OF ENGINEERING, TIRUCHENGODE-637215

DEPARTMENT OF MECHANICAL ENGINEERING

CO PO MAPPING

Regulation : R2020

Course Code : 20ME910

Course Name : SURFACE ENGINEERING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1:	Demonstrate the lean manufacturing principles to find and eliminate wastes.	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO2:	Identify the lean manufacturing tools and their potential applications.	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO3:	Acquire various surface treatment methods for alloy metals	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO4:	Describe various surface treatment techniques and its applications	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO5:	Explore the corrosion behaviour of engineering materials	3	3	3	-	-	-	-	-	-	-	-	-	-	-
Average		3	3	3	3	-	-	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20SF901	OCCUPATIONAL HEALTH AND HYGIENE (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes: On successful completion of the course, the student will be able to

Cognitive Level

CO1	Compare the concept and spectrum of health functional units and activities of occupational health service.	Understand
CO2	Identify physical chemical and biological hazards in the work environment and its control measures.	Apply
CO3	Explain the principles of ventilation and its requirements.	Understand
CO4	Demonstrate about the lighting and its requirements.	Understand
CO5	Reduce the gas poisoning and its effects.	Apply

UNIT - I OCCUPATIONAL HEALTH [09]

Concept and spectrum of health - functional units and activities of occupational health services - occupational and work-related disease - Levels of prevention of diseases - notifiable occupational diseases such as silicosis, asbestosis, pneumoconiosis, siderosis, anthracosis, aluminosis and anthrax.

UNIT - II VIBRATION [09]

Recognition, evaluation and control of physical hazards. Vibration - Description and measurement of vibration. Vibration control methods. Effects of whole-body vibration on human body and control measures - Noise - noise measurement, evaluation, noise control methods - hearing loss - causes - Biological effects of noise exposure.

UNIT - III VENTILATION [09]

Ventilation systems - Purpose of ventilation - General principles ventilation requirements. Physiological and comfort level. Natural ventilation - Dilution ventilation - Mechanical ventilation - Local exhaust ventilation - Ventilation measuring instruments. Fundamentals of hood and duct designs. Standards on ventilation.

UNIT - IV LIGHTING [09]

Purpose of lighting - Advantages of good illumination - Lighting and the work - Sources and kinds of artificial lighting principles of good illumination. Design of Lighting installation - Maintenance - Lighting and Color Standards on lighting and illuminations.

UNIT - V GAS POISONING [09]

Lead - Nickel, Chromium and Manganese toxicity - Gas poisoning (such as CO, ammonia, coal and dust) their effects and prevention - Local and systemic and chronic effects - Carcinogens, Mutagens, Teratogens. Personal monitoring devices - Medical support.

Total = 45 Periods

Text Books:

1. Jeanne Mager Stellman(ed)Encyclopedia of Occupational Health and Safety, International Labour Office, Geneva, Fourth Edition, 1998.
2. The Industrial Environment -Its Evaluation and Control, DHHS (NIOSH),1973.

Reference Books:

1. Barbara Cohrssen, Patty's Industrial Hygiene and Toxicology, Wiley, Interscience, NewYork. Seventh Edition, 2021.
2. Yudenich, V.V., Accident First Aid, Mir Publishers, Moscow, 1986.
3. Cantlie, James., First aid to the injured. St John Ambulance Association, 1932.
4. S.K. Halder, Industrial and Occupational Health, Kindle Edition, 2017.

DEPARTMENT OF SAFETY AND FIRE ENGINEERING
CO PO MAPPING

Regulation: R2020

Course Code: 20SF901

Course Name: Occupational Health and Hygiene

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Compare the concept and spectrum of health functional units and activities of occupational health service.	3	2	2	-	-	3	2	2	-	-	-	2	-	-
CO2	Identify physical chemical and biological hazards in the work environment and its control measures.	3	2	2	-	-	3	2	2	-	-	-	2	-	-
CO3	Explain the principles of ventilation and its requirements.	3	2	2	-	-	3	2	2	-	-	-	2	-	-
CO4	Demonstrate about the lighting and its requirements.	3	2	2	-	-	3	2	2	-	-	-	2	-	-
CO5	Reduce the gas poisoning and its effects.	3	2	2	-	-	3	2	2	-	-	-	2	-	-
Average		3	2	2	-	-	3	2	2	-	-	-	2	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20SF902	CONSTRUCTION SAFETY (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes: On successful completion of the course, the student will be able to

Cognitive Level

CO1	List out Hazards from various Construction equipment and activities.	Remember
CO2	Mention various Control measures adopted in each Construction activity to avoid Incidents.	Apply
CO3	Demonstrate the safe use of various types of ladders, Hand held power tools, Hydraulic tools used in Construction industry.	Understand
CO4	Compare various components of cranes, safety features and its function.	Understand
CO5	Choose the minimum requirements of BOCW act to the Construction site when they work.	Apply

UNIT - I INTRODUCTION [09]

Safety aspects of construction planning- Human factors in construction safety management. Roles of various groups in ensuring safety in construction industry.

UNIT - II SAFETY IN VARIOUS CONSTRUCTION OPERATIONS [09]

Excavation- underwater works- Ladders & Scaffolds - Tunneling- Blasting- Demolition- Pneumatic caissons- Confined Space- Temporary Structures. Indian Standards on construction safety- National Building Code Provisions on construction safety.

UNIT - III SAFETY IN MATERIAL HANDLING EQUIPMENTS [09]

Storage & stacking of construction materials, Safety in the use of construction equipment's - Vehicles, Cranes, Tower Cranes, Lifting gears, Hoists & Lifts, Wire Ropes, Pulley blocks, Temporary power supply, Mixers, Conveyors, Pneumatic and hydraulic tools in construction.

UNIT - IV CONTRACT CONDITIONS ON SAFETY [09]

Health, Welfare, Social Security and Insurance. Application of ergonomics for construction safety.

UNIT - V CONTRACT LABOUR ACT AND CENTRAL RULES [09]

Buildings and other Construction Workers (RE & CS) Act and Central Rules. Provisions regarding Licensing, safety, health, welfare and social security aspects only.

Total = 45 Periods

Text Books:

1. National Building Code of India, Bureau of Indian Standards, New Delhi, 2005.
2. Building & Other Construction Workers (RE & CS) Act and Central Rules, 1966.

Reference Books:

1. V.J. Davies & K. Tomasin, Construction Safety Handbook, Thomas Telford Publishing, London. 1990.
2. K.N. Vaid (Ed.), Construction Safety Management, National Institute of Construction Management and Research, Bombay, 1988.
3. James B. Full man, Construction Safety, Security & Loss Prevention, John Wiley & Sons. 1984.
4. R.T. Ratay, Handbook of Temporary Structures in Construction, Mc Graw-Hill, 1984.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF SAFETY AND FIRE ENGINEERING
CO PO MAPPING

Regulation: R2020

Course Code: 20SF902

Course Name: Construction Safety

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	List out Hazards from various Construction equipment and activities.	3	2	3	-	2	-	3	-	1	-	-	2	-	-
CO2	Mention various Control measures adopted in each Construction activity to avoid Incidents.	3	2	3	-	2	-	3	-	1	-	-	2	-	-
CO3	Demonstrate the safe use of various types of ladders, Hand held power tools, Hydraulic tools used in Construction industry.	3	2	3	-	2	-	3	-	1	-	-	2	-	-
CO4	Compare various components of cranes, safety features and its function.	3	2	3	-	2	-	3	-	1	-	-	2	-	-
CO5	Choose the minimum requirements of BOCW act to the Construction site when they work.	3	2	3	-	2	-	3	-	1	-	-	2	-	-
Average		3	2	3	-	2	-	3	-	1	-	-	2	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20SF903	BUILDING FIRE SAFETY (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes: On successful completion of the course, the student will be able to	Cognitive Level
C01 Explain the human behaviour under emergency movement and the concept of planning and design of seating arrangements in assembly buildings, evacuation routes and exits.	Understand
C02 Outline the general life safety requirements applicable to all buildings and to plan, design and locate exits in buildings.	Understand
C03 Illustrate the fire and life safety requirements for buildings of specific occupancy.	Understand
C04 Choose and distribute portable and fixed firefighting systems in buildings of different occupancies as per BIS.	Apply
C05 Develop the method of carrying out fire investigation, arson identification, fire training, fire safety audit and fire risk assessment.	Apply

UNIT - I BASIC BUILDING PLANNING AND DESIGN [09]

Process of emergency evacuation - special features of personnel movement. Parameter characteristics of the movement of people; Stages of evacuation; Planning and design of evacuation routes and exits; planning of seating arrangements in large assembly buildings.

UNIT - II NBC CODES FOR BUILDINGS [09]

Classification of buildings based on occupancy and type of construction according to fire resistance as per NBC; Fire zone; General fire safety requirements applicable to all individual occupancies. General exit requirements as per NBC; Internal staircases; horizontal exits; fire tower; ramps; fire lifts; external fire escape ladders; Planning of location and calculation of capacity, number and width of exit as per NBC for different occupancy classification.

UNIT - III FIRE PREVENTION AND BIS STANDARD [09]

Fire and life safety requirements in different groups of buildings-Hotel, Schools & Colleges, Hospitals, Theatres, shopping malls, etc., Fire protection and prevention in high rise buildings - Fire protection in underground structures and in buildings under construction. Sitting of detectors as per relevant Indian standard specifications; Selection and planning of alarm system as per relevant standards (BIS).

UNIT - IV FIRE PREVENTION AND BIS STANDARD [09]

Selection and distribution of portable extinguishers (for class A and B fires) and other fire protection equipment and systems for different occupancy classification as per NBC; Planning of fixed fire fighting installation for different occupancy classification-sprinkler system; total flooding system; CO2 system; foam system; Fire Investigation; Detection of arson; Fire training and education - fire drill, fire order; Fire safety audits; Fire risk assessment.

UNIT - V FIRE SAFETY AND CODES [09]

Causes of fire in buildings. Stages of fire and how it spreads. Fire drill. Heat / fire / smoke detection. Alarm and extinguisher systems. Fire safety standards. General guidelines for egress design for multi-storey buildings. Understanding all the above through product literature/ field visits. Exercise on design of fire safety systems for different building types through choice, calculations, layout and drawings.

Total = 45 Periods

Text Books:

1. Butcher, E.G. And Parnell, A.C., Designing of fire safety. John Wiley and Sons Ltd., New York, U.S.A, 1983.
2. Roytman, M. Ya., Principles of Fire Safety Standards for Building Construction, Amerind Publishing Co. Pvt. Ltd., New Delhi, 1975.

Reference Books:

1. Barendra Mohan Sen, Fire Protection and Prevention the Essential Handbook, UBSPublishers and Dist., New Delhi, 2013.
2. Jain, V.K., Fire Safety in Buildings, New Age International (P) Ltd., New Delhi, Second Edition, 2010.
3. Huang, Kai, Population and Building Factors That Impact Residential Fire Rates in Large U.S. Cities, Applied Research Project, Texas State University.
4. Life Safety Code Handbook, National Fire Protection Association, Lathrop, James K.Ed. NFPA, 1991.

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DEPARTMENT OF SAFETY AND FIRE ENGINEERING

CO PO MAPPING

Regulation: R2020

Course Code: 20SF903

Course Name: Building Fire Safety

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Explain the human behaviour under emergency movement and the concept of planning and design of seating arrangements in assembly buildings, evacuation routes and exits.</i>	3	3	3	-	-	-	2	-	-	1	-	2	-	-
CO2	<i>Outline the general life safety requirements applicable to all buildings and to plan, design and locate exits in buildings.</i>	3	3	3	-	-	-	2	-	-	1	-	2	-	-
CO3	<i>Illustrate the fire and life safety requirements for buildings of specific occupancy.</i>	3	3	3	-	-	-	2	-	-	1	-	2	-	-
CO4	<i>Choose and distribute portable and fixed firefighting systems in buildings of different occupancies as per BIS.</i>	3	3	3	-	-	-	2	-	-	1	-	2	-	-
CO5	<i>Develop the method of carrying out fire investigation, arson identification, fire training, fire safety audit and fire risk assessment.</i>	3	3	3	-	-	-	2	-	-	1	-	2	-	-
Average		3	3	3	-	-	-	2	-	-	1	-	2	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20SF904	SAFETY IN ELECTRICAL ENGINEERING (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes: On successful completion of the course, the student will be able to

Cognitive Level

CO1	Explain the working principles and applications of various kinds of Electrical Machines and/or systems.	Understand
CO2	Choose & brief the hazards associated with electricity at work place.	Apply
CO3	Recall human safety aspects over electric and magnetic fields.	Remember
CO4	Compare various protective equipment and enumerate their working and application.	Understand
CO5	Identify hazardous areas/locations in a given industrial site for selection, installation, operation and maintenance of electrical equipment.	Apply

UNIT - I INTRODUCTION TO ELECTRICAL EQUIPMENTS [09]

Transformers, DC Machines, Alternators, Induction Machines- Characteristics, application Protection Relays: Requirements of relay- types of protection, Classification: Distance Relay, Differential Relay, Static Relay- Definitions and types.

UNIT - II CIRCUIT BREAKERS [09]

Function switch gear, Arc Phenomenon- Initialization of an Arc, Arc interruption, Recovery voltage, and Restriking voltage classification and working, Working of MCB and ELCB. Faults in Power System: Causes and types, Fuses: Definition, types of fuses, selection of fuses, advantages and disadvantages.

UNIT - III EFFECT OF ELECTRIC FIELD AND MAGNETIC FIELD [09]

Human Safety Aspects, Effect of Current and Voltage on Human being- distance from the source, Typical V-I characteristics of skin - Nervous System, Electrical Shocks and their prevention, Insulation: Classes of Insulation, FRLS insulation, Continuity test.

UNIT - IV SAFETY DURING INSTALLATION OF PLANT AND EQUIPMENT [09]

Safe sequences in installation -Risk during installation, Safety during testing and commissioning- steps, Test on relays- Protection and interlock system on safety.

UNIT - V HAZARDOUS ZONES [09]

Classification of hazardous zones. Intrinsically safe and explosion proof electrical apparatus, Selection of equipment in hazardous area. Electrical Fires: Hazards of static electricity, Safety procedures in electrical maintenance, Statutory requirements from Electrical Inspectorate. Introduction to Indian Electricity Act and Rules.

Total = 45 Periods

Text Books:

1. S. Rao, Electrical Safety, Fire Safety Engineering and Safety Management, Khanna Publishers, New Delhi, Third Edition, 2019.
2. John Cadick, Electrical Safety Hand book, John Cadick, TMH Publishers, Sixth Edition, 2019.

Reference Books:

1. Charles A Gross, Fundamentals of Electrical Engineering, Taylor and Francis Group, 2012.
2. H. Wayne Beaty, Handbook for Electrical Engineers, Mc GrawHill, Fifteenth Edition, 2007.
3. Donald G Fink, Standard Handbook for Electrical Engineers, Mc GrawHill, Twelfth Edition, 1987.
4. Donald G Fink, Electrical Engineering, Mc Graw Hill, Fifteenth Edition, 1907.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF SAFETY AND FIRE ENGINEERING
CO PO MAPPING

Regulation: R2020

Course Code: 20SF904

Course Name: Safety in Electrical Engineering

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Explain the working principles and applications of various kinds of Electrical Machines and/or systems.</i>	3	1	2	-	-	2	1	-	-	-	-	-	-	-
CO2	<i>Choose & brief the hazards associated with electricity at work place.</i>	3	1	2	-	-	2	1	-	-	-	-	-	-	-
CO3	<i>Recall human safety aspects over electric and magnetic fields.</i>	3	1	2	-	-	2	1	-	-	-	-	-	-	-
CO4	<i>Compare various protective equipment and enumerate their working and application.</i>	3	1	2	-	-	2	1	-	-	-	-	-	-	-
CO5	<i>Identify hazardous areas/locations in a given industrial site for selection, installation, operation and maintenance of electrical equipment.</i>	3	1	2	-	-	2	1	-	-	-	-	-	-	-
Average		3	1	2	-	-	2	1	-						

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20SF905	LEGAL ASPECTS OF SAFETY (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes: On successful completion of the course, the student will be able to

Cognitive Level

CO1	Describe about the factories act and rules.	Understand
CO2	Illustrate the legal obligations regarding any injury by gaining knowledge of Workmen's Compensation Act. ESI Act & Rules.	Understand
CO3	Outline about the legal aspects granting of license for storage, transportation and usage of explosive substance as applicable as per Petroleum Act and Explosive Act.	Understand
CO4	Explain the Environment (Protection) act and Rules.	Understand
CO5	Choose the concept, powers and functions of Central, State and Joint Boards, provisions regarding prevention and control of Water & Air pollution, Penalties, Central & State Laboratories.	Apply

UNIT - I FACTORIES ACT [09]

Factories Act- Definitions, Preliminary, inspecting staff, Health, Safety, Provisions relating to hazardous processes, Welfare, Working hours of adults, Employment of young persons, Special provisions - Definitions, Powers of inspectors, Power of Govt. to direct inquiry. Duties of Safety Officers, Reporting of accidents, Emergency Action Plan, Safety Committee.

UNIT - II WORKMEN'S COMPENSATION ACT [09]

Workmen's Compensation Act: Definitions, Employer's liability for compensation, Calculation of amount of compensation. ESI Act and Rules: Applicability, Definitions and Benefits. Public Liability Insurance Act and Rules- Definitions, Calculation of amount of relief, Environmental Relief Fund, Advisory Committee, Powers of District Collector, Extent of Liability, Contribution to Relief Fund.

UNIT - III EXPLOSIVES ACT [09]

Explosives Act: Definitions, Categories of Explosives, General Safety Provisions, and Use of Explosives, Grant of license, Notice of Accidents, Inquiry into ordinary and more serious accidents. Extension of definition to other explosive substances. Explosives Rules, SMPV Rules and Gas Cylinder Rules (in brief). Petroleum Act with important rules - definitions, safety in the import, transport, storage, license, exemption, notice of accidents.

UNIT - IV ENVIRONMENT (PROTECTION) ACT [09]

Water Act and Air Act: Definitions, powers and functions of Boards, prevention and control of pollution, consent administration. Environment (Protection) Act and Rules-Definitions, powers of central government, power of giving directions, authorities. MSIHC Rules- Definitions, Duties of Authorities, Notification of major accidents, Safety Reports, Safety Audit, On-site & Off-site emergency plans.

UNIT - V POWER TO MAKE RULES [09]

Powers and Functions of Central, State and Joint Boards, Provisions regarding prevention and control of water pollution, Penalties, Central & State Water Laboratories, Power to make rules, Power of supersession and overriding effect. Rules on Consent for Establishment.

Total = 45 Periods

Text Books:

1. S.K.T. Narayanan, Safety, Health and Environment Handbook Hardcover, McGraw Hill Education (India) Private limited, First Edition, 2017.
2. Gayle Wood Side and Dianna Koeurek, Environmental Safety and Health Engineering, John Wiley & Sons, 1997.

Reference Books:

1. Ganguly & Changeriya, Health Safety and Environment, 2016.
2. Explosives Act and Related Rules & The Gas Cylinder Rules, Professional Book Publishers, 2004.
3. James B. Well, Environmental Management Handbook for Hydrocarbon Processing Industries, Factories Act, 1948.
4. Petroleum Act and Rules & The Petroleum Act, Universal Law Publishing, 1934.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF SAFETY AND FIRE ENGINEERING
CO PO MAPPING

Regulation: R2020

Course Code: 20SF905

Course Name: Legal Aspects of Safety

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Describe about the factories act and rules.</i>	3	-	3	-	-	3	3	2	-	-	-	2	-	-
CO2	<i>Illustrate the legal obligations regarding any injury by gaining knowledge of Workmen's Compensation Act. ESI Act & Rules.</i>	3	-	3	-	-	3	3	2	-	-	-	2	-	-
CO3	<i>Outline about the legal aspects granting of license for storage, transportation and usage of explosive substance as applicable as per Petroleum Act and Explosive Act.</i>	3	-	3	-	-	3	3	2	-	-	-	2	-	-
CO4	<i>Explain the Environment (Protection) act and Rules.</i>	3	-	3	-	-	3	3	2	-	-	-	2	-	-
CO5	<i>Choose the concept, powers and functions of Central, State and Joint Boards, provisions regarding prevention and control of Water & Air pollution, Penalties, Central & State Laboratories.</i>	3	-	3	-	-	3	3	2	-	-	-	2	-	-
Average		3	-	3	-	-	3	3	2	-	-	-	2	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20SF906	SAFETY IN INDUSTRIES (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes: On Completion of this course, the student will be able to

Cognitive Level

CO1	Explain the General safety rules, principles, maintenance, Inspections in Foundry Operations.	Understand
CO2	Apply the concepts of safety in design of building fire safety.	Apply
CO3	Develop the safety in industrial operations.	Apply
CO4	Recall about welding, common hazards in welding, personal protective equipment and safety precautions in welding.	Remember
CO5	Illustrate on safety in finishing, inspection and testing of machines.	Understand

UNIT - I FOUNDRY OPERATIONS SAFETY [09]

Foundry Operations - Furnace - health hazard - safe methods of operation. Forging operations heat radiation - maintenance of machines - final checking of tools, guards, lubrication, shop equipment and hand tools - safe work practice. Operations in hot and cold rolling mills. Shearing - bending - rolling - drawing - turning - boring - milling - planning - grinding. Selection and care of tools - health hazards and prevention.

UNIT - II BUILDING FIRE SAFETY [09]

Building Fire Safety Objectives of fire safe building design, Fire load, fire resistant material and fire testing - structural fire protection - structural integrity - concept of exit design - fire calculations - fire certificates - fire safety requirements for high rise buildings - snookers.

UNIT - III PERSONNEL RISK IN INDUSTRIAL OPERATIONS [09]

Storage and Transportation General consideration, petroleum product storage, storage tanks and vessel storage layout segregation, separating distance, secondary containment - venting and relief, atmospheric vent, pressure, vacuum valves, flame arrestors, fire relief - fire prevention and protection - LPG storage - underground storage - loading and unloading facilities - drum and cylinder storage warehouse, storage hazard assessment of LPG and LNG Hazards during transportation - pipeline transport.

UNIT - IV WORKSHOP PROCESS SAFETY [09]

Workshop Safety Hand tools and Power tools - Safety while using Grinding stone - Welding and gas cutting safety - Identification of Dangerous points - Lubrication Safety - Safety in Cold Forming and Hot Working of Metals.

UNIT - V SAFETY INSPECTION AND AUDIT [09]

Safety Inspections Safety Audit - Safety Survey - Plant safety inspection - Safety tour - Safety sampling - What is safety budget - Direct cost - indirect cost - Safety Equipment's & their budget preparation.

Total = 45 Periods

Text Books:

1. Elahi Naseer, Industrial Safety Management, Kalpaz Publication, 2006.
2. Dr. Shaileshkrumar U Kale, Dr. Umesh Gramopadhye, Industrial Safety Management.

Reference Books:

1. Guidelines for Hazard Evaluation Procedures, Centre for Chemical Process Safety, Third Edition, AIChE 2008.
2. Guidelines for Chemical Process Quantitative Risk Analysis, Centre for Chemical Process Safety, Second Edition, AIChE, 2000.
3. Methodologies for Risk and Safety Assessment in Chemical Process Industries, Common Wealth Science Council, UK.
4. Trevor A Klett, Hazop and Hazon, Institute of Chemical Engineering.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF SAFETY AND FIRE ENGINEERING
CO PO MAPPING

Regulation: R2020

Course Code: 20SF906

Course Name: Safety in Industries

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Explain the General safety rules, principles, maintenance, Inspections in Foundry Operations.</i>	2	3	-	-	-	3	3	2	-	-	-	2	-	-
CO2	<i>Apply the concepts of safety in design of building fire safety.</i>	2	3	-	-	-	3	3	2	-	-	-	2	-	-
CO3	<i>Develop the safety in industrial operations.</i>	2	3	-	-	-	3	3	2	-	-	-	2	-	-
CO4	<i>Recall about welding, common hazards in welding, personal protective equipment and safety precautions in welding.</i>	2	3	-	-	-	3	3	2	-	-	-	2	-	-
CO5	<i>Illustrate on safety in finishing, inspection and testing of machines.</i>	2	3	-	-	-	3	3	2	-	-	-	2	-	-
Average		2	3	-	-	-	3	3	2	-	-	-	2	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20SF907	FOOD SAFETY (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes: On Completion of this course, the student will be able to

Course Outcome	Description	Cognitive Level
CO1	Apply the knowledge on food quality in food industry.	Apply
CO2	Identify the food additives and food contaminants and their chemical and toxicological properties.	Apply
CO3	Summarize the effects of pests on food and the various methods for controlling them.	Understand
CO4	Explain about the national and international regulations for biosafety.	Understand
CO5	Demonstrate an ability to recognize the environmental, social and ethical implications of biotech applications.	Understand

UNIT - I FOOD QUALITY [09]

Objective and importance of quality control, classification of quality attributes and its role in food quality, quality assessment of food materials (fruits, cereals, milk and meat), types of quality characteristics of food, methods used for determination of the quality in food industry, factors influencing the quality of food, sample and sampling methods of quality evaluation.

UNIT - II FOOD SANITATION [09]

Factors contributing to physical, chemical and biological contamination in food chain, prevention and control of food borne hazards, definition and regulation of food sanitation, sources of contamination, personal hygiene-food handlers, cleaning compounds, sanitation methods and pest control, sanitation and safety in food services.

UNIT - III FOOD SAFETY [09]

Principles of food safety and quality, quality assurance, Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP), Good Hygienic Practices (GHP), Good Veterinary Practice (GVP), Applications of HACCP in food safety, Current challenges to food safety.

UNIT - IV FOOD LAWS AND REGULATIONS [09]

Basic concepts of food standards, Role of national regulatory agencies: Food safety and Standards Act: salient provision and prospects, FSSAI, PFA, certification- AGMARK, ISI (BIS). Role of international regulatory agencies: USDA, FDA, BRC, WHO, FAO, Codex Alimentarius commission, WTO agreements: SPS and TBT agreements, ISO and its standards for food quality and safety.

UNIT - V FOOD SAFETY AUDITING [09]

Food surveillance: International and national practices, procedure and protocols, food alerts, traceability and food product recall. Export and import of food in India: introduction, import and export policies, FDA import policy, export-import policy, export control systems. Import intelligence and alert systems, packaging and labelling, specifications and certifications.

Total = 45 Periods

Text Books:

1. Fleming & Hunt, Biological Safety, Principles and Practices, ASM Press, Fourth Edition, 2006.
2. Fawatt, H.H. and Wood, W.S., Safety and Accident Prevention in Chemical Operation, Wiley Interscience, 1965.

Reference Books:

1. N.G. Marriott, G.W. Schilling and B. Robert, Principles of Food Sanitation, Springer, Fifth Edition 2018.
2. I. Alli, Food Quality Assurance - Principles & Practices, CRC Press, India, 2018.
3. Cynthia A. Robert, The Food Safety Information Hand Book, 2009.
4. Early, Guide to Quality Management Systems for the Food Industry, Springer, First Edition, 2005.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF SAFETY AND FIRE ENGINEERING
CO PO MAPPING

Regulation: R2020

Course Code: 20SF907

Course Name: Food Safety

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Apply the knowledge on food quality in food industry.</i>	3	3	3	-	-	3	3	3	-	-	-	3	-	-
CO2	<i>Identify the food additives and food contaminants and their chemical and toxicological properties.</i>	3	3	3	-	-	3	3	3	-	-	-	3	-	-
CO3	<i>Summarize the effects of pests on food and the various methods for controlling them.</i>	3	3	3	-	-	3	3	3	-	-	-	3	-	-
CO4	<i>Explain about the national and international regulations for biosafety.</i>	3	3	3	-	-	3	3	3	-	-	-	3	-	-
CO5	<i>Demonstrate an ability to recognize the environmental, social and ethical implications of biotech applications.</i>	3	3	3	-	-	3	3	3	-	-	-	3	-	-
Average		3	3	3	-	-	3	3	3	-	-	-	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20SF908

SAFETY MANAGEMENT AND ITS PRINCIPLE
(Open Elective)

L	T	P	C
3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes: On Completion of this course, the student will be able to

Cognitive Level

CO1	Demonstrate the knowledge and understanding of basic terms in safety management.	Understand
CO2	Compare safety organizational requirements for effective safety management.	Understand
CO3	Solve the workplace hazards and apply controls measures using hierarchy of control.	Apply
CO4	Develop the safety performance of an organization.	Apply
CO5	Explain accident investigation methodologies and apply systematic procedure to identify and unearth the root cause of the incident and accident.	Understand

UNIT - I INTRODUCTION OF SAFETY [09]

Safety - Goals of safety engineering - Need for safety, Safety and productivity. Definitions: Accident, Injury, Unsafe act, Unsafe Condition, Dangerous Occurrence, Reportable accidents, History of safety movement - Theories of accident causation.

UNIT - II SAFETY ORGANIZATION [09]

Objectives, Types, Functions, Role of management, Supervisors, Workmen, Unions, Government and voluntary agencies in safety - Safety policy - Safety Officer - Responsibilities - Safety committee - Need, Types, Advantages.

UNIT - III ACCIDENT PREVENTION AND TRAINING [09]

Accident Prevention Methods - Engineering, Education and Enforcement, Safety Education & Training - Importance, Various training methods, Effectiveness of training, Behavior Oriented Training - Communication - Purpose, Barrier to communication. Housekeeping: Responsibility of management and employees - Advantages of good housekeeping - 5 's of housekeeping - Work permit system - objectives, hot work and cold work permits. Typical industrial models and methodology - Entry into confined spaces.

UNIT - IV MONITORING SAFETY PERFORMANCE [09]

Frequency rate, Severity rate, Incidence rate, Activity rate - Cost of accidents - Computation of Costs - Utility of Cost data - Plant safety inspection types, Inspection procedure - Safety sampling techniques - Job safety Analysis (JSA), Safety surveys, Safety audits - Safety Inventory Technique.

UNIT - V INVESTIGATION ON ACCIDENTS [09]

Why? When? Where? Who? & How? Basics - Man - Environment & Systems. Process of Investigation - Tools - Data Collection - Handling witnesses - Case study. Accident analysis - Analytical Techniques - System Safety - Change Analysis.

Total = 45 Periods

Text Books:

1. N.V. Krishnan, Safety Management in Industry, Jaico Publishing House, 1997.
2. Ronald P. Blake, Industrial Safety, Prentice Hall, New Delhi, 1973.

Reference Books:

1. Willie Hammer, Occupational Safety Management and Engineering, Prentice Hall, Fifth Edition, 2007.
2. Ted S. Ferry, Modern Accident Investigation and Analysis, John Wiley & Sons, Second Edition, 2007.
3. John V. Grimaldi and Rollin H. Simonds, Safety Management, American Society of Safety Engineers, Fifth Edition, 1993.
4. Accident Prevention Manual for Industrial Operations, National Safety Council, Chicago, 1982.

CO PO MAPPING

Regulation: R2020

Course Code: 20SF908

Course Name: Safety Management and its Principles

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Demonstrate the knowledge and understanding of basic terms in safety management.</i>	3	2	2	-	-	3	3	2	2	-	-	1	-	-
CO2	<i>Compare safety organizational requirements for effective safety management.</i>	3	2	2	-	-	3	3	2	2	-	-	1	-	-
CO3	<i>Solve the workplace hazards and apply controls measures using hierarchy of control.</i>	3	2	2	-	-	3	3	2	2	-	-	1	-	-
CO4	<i>Develop the safety performance of an organization.</i>	3	3	2	-	-	3	3	2	2	-	-	1	-	-
CO5	<i>Explain accident investigation methodologies and apply systematic procedure to identify and unearth the root cause of the incident and accident.</i>	3	3	2	-	-	3	3	2	2	-	-	1	-	-
Average		3	2	2	-	-	3	3	2	2	-	-	1	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20SF909

SAFETY IN AUTOMOBILE ENGINEERING
(Open Elective)

L	T	P	C
3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes: On Completion of this course, the student will be able to

Cognitive Level

CO1	Explain about automobile engines, fuel systems and CMV rules for proto type testing and emission standards.	Understand
CO2	Demonstrate the electrical systems-ignition, lighting, horn, wipers, HVAC and concerned CMV rules	Understand
CO3	Classify the transmission systems - clutch, gearbox, steering, and differential. Chassis - springs, axles and brakes and corresponding CMV rules.	Understand
CO4	Outline the lubricating systems, cooling systems and miscellaneous systems. CMV rules for safety devices.	Understand
CO5	Choose passive and active safety.	Apply

UNIT - I INTRODUCTION AND EMISSION [09]

Types of automobiles. Limiting Dimensions as per Central Motor Vehicles Rules. Engines - Classification, Construction, Materials of engine components. Prototype Testing as per Central Motor Vehicles Rules. Fuel System - Fuel tank, Fuel filter, Types of Fuel system. Carburettor - Simple and Modern, Fuel injection System. Emission Standards as per CMV Rules.

UNIT - II ELECTRICITY STORAGE AND ITS UTILIZATION [09]

Electrical System - Storage Battery Operations and Maintenance. Ignition System - Coil and Magneto Ignition System. Starting System, Lighting System, Horn System-Wind Shield Wiper Motors, Fans, Heaters, Trafficators. Automobile air conditioning. Central Motor Vehicles Rules regarding Lighting, Windshields, Wipers.

UNIT - III TRANSMISSION SYSTEM AND BRAKING SYSTEM [09]

Transmission System - Clutches - operation and fault finding of clutches, Fluid Flywheel, Gear Box types, Steering Systems, Chassis Springs, and Suspension. Differential, Dead and Live axles, Rims, Tyre etc. Brakes - Types, construction and fault finding. CMV Rules-Brakes, Steering & Tyre.

UNIT - IV LUBRICATION AND COOLING SYSTEM [09]

Lubrication Systems-Types, Components, lubricating oil, Cooling system- Details of components, Study of Systems, Types. Miscellaneous - Special gadgets and accessories for fire fighting vehicles. Automobile accidents. CMV Rules regarding Safety devices for drivers, passengers.

UNIT - V PASSIVE AND ACTIVE SAFETY [09]

Design of body for safety, deceleration of vehicle, passenger. Concept of crumple zone, SafetyCage. Optimum crash pulse. Barrier test - Crash tests - Antilock braking system, Stability Control. Adaptive cruise control, Lane Keep Assist System, Collision warning, avoidance system, Blind Spot Detection system, Driver alertness detection System. ADAS, DAT.

Total = 45 Periods

Text Books:

1. Robert Bosch GmbH, Safety, Comfort and Convenience Systems, Wiley, Third Edition, 2007.
2. Ljubo Vlacic, Michel Parent, Fumio Harashima, Intelligent Vehicle Technologies Theory and Applications, ButterworthHeinemann, 2001.

Reference Books:

1. GBS Narang, Automobile Engineering, Khanna Publishers, Delhi, 2014.
2. Kirpal Singh, Automobile Engineering, Vol.I & II. Standard publishes, Delhi, Thirteenth Edition, 2012.
3. Joseph Heitner, AutomotiveMechanics-Principles & Practices, CBS Publisher-Delhi, Second Edition, 2006.
4. P. L. Kohli, Automotive Electrical Equipment's, McGraw Hill, New Delhi, 1993.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF SAFETY AND FIRE ENGINEERING
CO PO MAPPING

Regulation: R2020

Course Code: 20SF909

Course Name: Safety in Automobile Engineering

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Explain about automobile engines, fuel systems and CMV rules for proto type testing and emission standards.</i>	3	3	2	-	-	3	3	3	-	-	-	2	-	-
CO2	<i>Demonstrate the electrical systems - ignition, lighting, horn, wipers, HVAC and concerned CMV rules.</i>	3	3	2	-	-	3	3	3	-	-	-	2	-	-
CO3	<i>Classify the transmission systems - clutch, gearbox, steering, and differential. Chassis - springs, axles and brakes and corresponding CMV rules.</i>	3	3	2	-	-	3	3	3	-	-	-	2	-	-
CO4	<i>Outline the lubricating systems, cooling systems and miscellaneous systems. CMV rules for safety devices.</i>	3	3	2	-	-	3	3	3	-	-	-	2	-	-
CO5	<i>Choose passive and active safety.</i>	3	3	2	-	-	3	3	3	-	-	-	2	-	-
		3	3	2	-	-	3	3	3	-	-	-	2	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020			
20SF910	SAFETY IN TRANSPORTATION (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course

Course Outcomes: On Completion of this course, the student will be able to

Cognitive Level

CO1	Explain the Working of railways and safety aspects in railway operation	Understand
CO2	Apply the Basic geometric design features of roads	Apply
CO3	Summarize about traffic studies and traffic safety	Understand
CO4	Outline the basic layout and facilities of docks and harbour	Understand
CO5	Choose the Working of airways and safety aspects in airway operation	Remember

UNIT - I RAILWAY ENGINEERING [09]

Introduction of Railway Engineering: Permanent way. Curves, super-elevation, negative super elevation, transition curve, grade compensation on curves. Railway operation and control - points and crossings turn-out. Signalling and interlocking. Centralized traffic control. Railway accidents & safety. Rapid transit railways - types, merits & demerits.

UNIT - II HIGHWAY ENGINEERING [09]

Introduction of Highway Engineering: Classification of highways and urban road patterns. Typical cross section of roads. Factors controlling the alignment of roads. Basic geometric design - stopping and overtaking sight distances.

UNIT - III TRAFFIC ENGINEERING [09]

Introduction of Traffic Engineering: Traffic characteristics. Various traffic studies and their applications. Traffic signals. Carriage-way markings. Traffic islands. Highway intersections. Principles of highway lighting. Road Accidents prevention, investigation and reduction.

UNIT - IV HARBOUR AND DOCK ENGINEERING [09]

Introduction of Harbour & Dock Engineering: Water transportation, classification of harbours, accessibility and size, ports, Indian ports. Layout of ports, breakwater, facilities (in brief) for docking, repair, approach, loading and unloading, storing and guiding.

UNIT - V AIR TRANSPORTATION ENGINEERING [09]

Classification of air transportation, Types of air craft engines - Propellants-feeding systems - Ignition and combustion - Theory of rocket propulsion - Performance study - Staging - Terminal and characteristic velocity-Applications - spaceflights. Air way accidents & safety.

Text Books:

1. B.S. Dhillon, Transportation Systems, Reliability and Safety, CRC Press, 2011.
2. John Khisty C, Kent Lall B, Transportation Engineering - An Introduction, Prentice Hall of India, New Delhi, Third Edition 2002.

Reference Books:

1. Srinivasan, R., Harbour, Dock and Tunnel Engineering, Charotar Publishing House Pvt. Ltd, Anand, 2013.
2. Chandra, S. & Agarwal, M. M. Railway Engineering, Oxford University Press, New Delhi, 2007.
3. Kadiyali, L. R., Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi, 2004.
4. Khanna, S. K. and Justo, C.E.G., Highway Engineering, Nem Chand & Brothers, New Delhi, Ninth Edition, 2001.

CO PO MAPPING

Regulation: R2020

Course Code: 20SF910

Course Name: Safety in Transportation

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Explain the Working of railways and safety aspects in railway operation</i>	3	3	3	-	-	2	-	2	-	-	-	3	-	-
CO2	<i>Apply the Basic geometric design features of roads</i>	3	3	3	-	-	2	-	2	-	-	-	3	-	-
CO3	<i>Summarize about traffic studies and traffic safety</i>	3	3	3	-	-	2	-	2	-	-	-	3	-	-
CO4	<i>Outline the basic layout and facilities of docks and harbour</i>	3	3	3	-	-	2	-	2	-	-	-	3	-	-
CO5	<i>Choose the Working of airways and safety aspects in airway operation</i>	3	3	3	-	-	2	-	2	-	-	-	3	-	-
Average		3	3	3	-	-	2	-	2	-	-	-	3	-	-

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

20SH901

APPLI CATIONS OF STATISTICS

(Open Elective)

L	T	P	C
3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course**Course Outcomes :** On Completion of this course, the student will be able to**Cognitive Level**

CO1 Analyze the measures of central tendency and dispersion.

Analyze

CO2 Applying the concepts of Correlation and Regression analysis

Apply

CO3 Testing the samples using method of hypothesis to obtain inferences.

Remember

CO4 Develop their skills in Design of Experiments.

Remember

CO5 Solving Non Parametric data to obtain inferences.

Understand

UNIT - I DESCRIPTIVE STATISTICS**[09]**

Introduction to Statistics, Measures of Central Tendency - Mean, Median, Mode, Weighted

Mean, Geometric Mean, Harmonic Mean, Measures of Variability- Range, Inter-Quartile Range, Variance, Standard Deviation, Coefficient of Variation.

UNIT - II CORRELATION AND REGRESSION ANALYSIS**[09]**

Types of Correlation-Karl Pearson's Coefficient of Correlation- Spearman's Rank Correlation-Regression Analysis-Uses-Regression equations-X on Y and Y on X Estimation.

UNIT - III TESTING OF HYPOTHESIS**[09]**

Large sample test based on Normal distribution for single mean and difference of means - Tests based on t - F distributions for testing means and variances-Chi-Square Test.

UNIT - IV DESIGN OF EXPERIMENTS**[09]**

Analysis of variance - One-way and two-way classifications - Completely randomized design - Randomized block design - Latin square design.

UNIT - V NON PARAMETRIC TESTS**[09]**

The Sign Test- Rank Sum Test- Mann-Whitney U Test, One Sample run Test-Spearman's Rank Correlation and Kruskal-Wallis Test (H-test).

Total (L: 45 T:0) = 45 Periods**Text Books :**

- 1 Gupta.S.P., Statistical Methods, Sultan Chand & Sons Educational Publishers,New Delhi, Thirty first Edition,2002.
- 2 Ross, S.M., Introduction to Probability and Statistics for Engineers and Scientists, Elsevier, Third Edition,2004.

Reference Books :

- 1 Srivatsava TN and Shailaja Rego, Statistics for Management, Tata McGraw Hill,Fifth Edition, 2008.
- 2 Walpole. R.E., Myers. R.H., and Ye. K., Probability and Statistics for Engineers and Scientists, Pearson Education, Asia , Eighth Edition, 2007.
- 3 Richard I. Levin, David S. Rubin, Statistics for Management, Pearson Education, Seventh Edition, 2011.
- 4 Pillai R.S.N and Bagavathi.V ,Statistics ,S.Chand Publishers ,New Delhi, Seventeenth Reprint Edition 2008.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF SCIENCE AND HUMANITIES
CO-PO MAPPING

Regulation : R 2020

Course Code: 20SH901

Course Name : APPLI CATIONS OF STATISTICS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	Analyze the measures of central tendency and dispersion.	3	3	3	3										
CO2	Applying the concepts of Correlation and Regression analysis	3	3	3	3										
CO3	Testing the samples using method of hypothesis to obtain inferences.	3	3	3	3										
CO4	Develop their skills in Design of Experiments	3	3	3	3										
CO5	Solving Non Parametric data to obtain inferences.	3	3	3	3										
Average		3	3	3	3										

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)		R 2020			
20SH902	COMBINATORICS AND GRAPH THEORY (Open Elective)	L	T	P	C
		3	0	0	3
Prerequisite: No prerequisites are needed for enrolling into the course					
Course Outcomes : On Completion of this course, the student will be able to					Cognitive Level
CO1	Interpret the concept of combinatorics Principles in Computer applications.	Understand			
CO2	Acquire knowledge in Recurrences and Generating Functions.	Evaluate			
CO3	Applying the concepts of graph theory	Apply			
CO4	Constructing algorithm using Trees..	Remember			
CO5	Developing Skills in Colouring and Directed Graphs.	Analyze			
UNIT- I	COMBINATORICS	[09]			
The pigeon-hole principle - Basic counting problems- The binomial coefficients (the binomial theorem, algebraic vs. combinatorial proof, Pascal's identity, Pascal's triangle, Catalan numbers) - the principle of inclusion and exclusion.					
UNIT - II	RECURRENCES	[09]			
Fibonacci numbers - The substitution method- Linear recurrences (mostly homogenous recurrences, the characteristic polyn Generating functions.					
UNIT - III	INTRODUCTION TO GRAPH THEORY	[09]			
. Definition - examples - subgraphs - complements and graph isomorphism - Euler trail and circuits - planar graphs - Hamilton paths and cycles.					
UNIT - IV	TREES	[09]			
Definition - rooted trees - trees and sorting - weighted trees and prefix codes - bi connected components and Articulation points.					
UNIT - V	MATRICES, COLOURING AND DIRECTED GRAPH	[09]			
Chromatic number - Chromatic partitioning - Chromatic polynomial - Matching - Covering - Fourcolor problem - Directed graphs - Types of directed graphs - Digraphs and binary relations -Directed paths and connectedness - Euler graphs.					
Total (L: 45 T:0) = 45 Periods					

Text Books :

- 1 Grimaldi, R.P. Discrete and Combinatorial Mathematics: An Applied Introduction, Fourth Edition, Pearson Education Asia, Delhi, 2007.
- 2 Narsingh Deo, Graph Theory With Application to Engineering and Computer Science, Prentice Hall of India, Second Edition, 2003.

Reference Books :

- 1 Douglas B. West, Introduction to Graph Theory, Prentice-Hall of India, Second Edition, 2012.
- 2 John Clark, Derek Allan Holton, A first look at Graph Theory, World Scientific Publishing Company Illustrated edition, Reprint, 1991
- 3 Rosen, K.H., Discrete Mathematics and its Applications, Seventh Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
- 4 Diestel, R, Graph Theory, Springer, Third Edition, 2006

CO-PO MAPPING

Regulation : R 2020

Course Code: 20SH902

Course Name: COMBINATORICS AND GRAPH THEORY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	<i>Interpret the concept of combinatorics Principles in Computer applications.</i>	3	3	3	3										
CO2	<i>Acquire knowledge in Recurrences and Generating Functions.</i>	3	3	3	3										
CO3	<i>Applying the concepts of graph theory</i>	3	3	3	3										
CO4	<i>Constructing algorithm using Trees..</i>	3	3	3	3										
CO5	<i>Developing Skills in Colouring and Directed Graphs.</i>	3	3	3	3										
Average		3	3	3	3										

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

20SH903	OPTIMIZATION TECHNIQUES (Open Elective)	L	T	P	C
		3	0	0	3

Prerequisite: No prerequisites are needed for enrolling into the course.

Course Outcomes : On successful completion of the course , the student will be able to

Cognitive Level

CO1	Enable to develop the decision making during the uncertain situations by linear programming approach.	Apply
CO2	Identify to minimize the Transportation and Assignment cost and maximize the profit in Industries.	Analyze
CO3	Developing the network techniques in project scheduling.	Apply
CO4	Study the importance of stock controlling to maximize the profit.	Remember
CO5	Understand and apply the Replacement and sequencing methods in manufacturing engineering.	Understand

UNIT - I LINEAR PROGRAMMING PROBLEM [09]

Introduction - scope and role of OR - phases of OR - limitations of OR - linear programming problem - formulation of linear programming problem - optimum solution by graphical method - simplex method (using slack variables only).

UNIT - II TRANSPORTATION AND ASSIGNMENT PROBLEM [09]

Transportation Models (Minimizing and Maximizing Cases) - Balanced and unbalanced cases - Initial Basic feasible solution by North West Corner Rule, Least cost and Vogel's approximation methods. Check for optimality by Modified method.

Assignment Models (Minimizing and Maximizing Cases) - Balanced and Unbalanced Cases - Solution by Hungarian method.

UNIT - III NETWORK MODELS [09]

Network - Fulkerson's rule - construction of a network - critical path method (CPM) - optimistic, pessimistic and most likely time estimates - project scheduling by PERT analysis.

UNIT - IV INVENTORY MODEL [09]

Types of Inventory - Deterministic inventory models - EOQ and EBQ models with and without shortages - Quantity discount model - Price breaks - probabilistic inventory model.

UNIT - V REPLACEMENT MODELS AND SEQUENCING [09]

Replacement of items that deteriorate with time - value of money changing with time - not changing with time - optimum replacement policy - individual and group replacement. Sequencing problem - assumptions - processing of 'n' jobs in 2 machines, 'n' jobs with 'm' machines.

Total (L: 45 T: 0) = 45 Periods

Text Books :

- 1 P.K. Gupta and Man Mohan, Problems in Operations Research, S. Chand and Co, New Delhi, Fourteenth Edition, 2016.
- 2 Wayne. L. Winston, Operations Research applications and algorithms, Thomson learning, New Delhi, Tenth Edition 2016.

Reference Books :

- 1 Hira and Gupta, Problems in Operations Research, S. Chand and Co, New Delhi, Eighth Edition, 2015.
- 2 Taha H.A, Operation Research, Pearson Education, New Delhi, Sixth Edition, 2016.
- 3 J k Sharma , Operation Research, Macmillan India Pvt. Ltd., New Delhi, Seventh Edition, 2007
- 4 R.Panneerselvam Operations Research, PHI Learning, Second Edition, 2011.

CO-PO MAPPING

Regulation : R 2020

Course Code:20SH903

Course Name : OPTIMIZATION TECHNIQUES

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Enable to develop the decision making during the uncertain situations by linear programming approach.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO2	<i>Identify to minimize the Transportation and Assignment cost and maximize the profit in industries</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO3	<i>Developing the network techniques in project scheduling.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	<i>Study the importance of stock controlling to maximize the profit.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
CO5	<i>Understand and apply the Replacement and sequencing methods in manufacturing engineering.</i>	3	3	3	3	-	-	-	-	-	-	-	-	-	-
Average		3	3	3	3	-									

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020			
	BASIC MILITARY EDUCATION AND TRAINING	L	T	P	C
20SH904	(Open Elective)	3	0	0	3

Prerequisite: Only NCC Cadets are eligible for opting into the course.

Course Outcomes: On Completion of this course , the student will be able to **Cognitive level**

CO1	Develop the character, camaraderie of NCC cadets	Apply
CO2	Inculcate the discipline and secular outlook.	Apply
CO3	Educate weapon handling and training.	Understand
CO4	Learn the quality of selfless service among the cadets by working as a team.	Remember
CO5	Learn the basis of military management.	Understand

UNIT – I NCC ORGANIZATION & NATIONAL INTEGRATION [09]

NCC Organization - History of NCC- NCC Organization- NCC Training- NCC Uniform - Promotion of NCC cadets - Aim and advantages of NCC Training- NCC badges of Rank- Honours and Awards - Incentives for NCC cadets by central and state govt. National Integration- Unity in diversity- contribution of youth in nation building- national integration council- Images and Slogans on National Integration.

UNIT – II BASIC PHYSICAL TRAINING & DRILL [09]

Basic physical Training - various exercises for fitness (with Demonstration). Food - Hygiene and Cleanliness. Drill- Words of commands- position and commands- sizing and forming- saluting- marching- turning on the march and wheeling- saluting on the march- side pace, pace forward and to the rear- marking time- Drill with arms- ceremonial drill-guard mounting.(WITH DEMONSTRATION)

UNIT – III WEAPON TRAINING [09]

Main Parts of a Rifle- Characteristics of 5.56mm INSAS rifle- Characteristics of .22 rifle- loading and unloading - position and holding- safety precautions - range procedure- MPI and Elevation- Group and Snap shooting- Long/Short range firing(WITH PRACTICE SESSION) - Characteristics of 7.62mm SLR- LMG- carbine machine gun.

UNIT – IV SOCIAL AWARENESS AND COMMUNITY DEVELOPMENT [09]

Aims of Social service-Variou Means and ways of social services- family planning - HIV and AIDS- Cancer its causes and preventive measures- NGO and their activities- Drug trafficking- Rural development programmes - MGNREGA- SGSY-JGSY-NSAP-PMGSY-Terrorism and counter terrorism- Corruption - female feticide -dowry -child abuse-RTI Act- RTE Act- Protection of children from sexual offences act- civic sense and responsibility

UNIT – V SPECIALIZED SUBJECT (ARMY) [09]

Basic structure of Armed Forces- Military History - War heroes- battles of Indo-Pak war- Param Vir Chakra- Career in the Defense forces- Service tests and interviews-Field craft and Battle craft-Basics of Map reading including practical.

Total = 45 Periods

Text Books :

- 1 National Cadet Corps- A Concise handbook of NCC Cadets by Ramesh Publishing House, New Delhi, 2014.

Reference Books :

- 1 *Cadets Handbook – Common Subjects SD/SW published by DG NCC, New Delhi.*
- 2 *Cadets Handbook- Specialized Subjects SD/SW published by DG NCC, New Delhi*
- 3 *NCC OTA Precise published by DG NCC, New Delhi.*

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF SCIENCE AND HUMANITIES
CO-PO MAPPING

Regulation : R 2020

Course Code: 20SH904

Course Name: BASIC MILITARY EDUCATION AND TRAINING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Display sense of patriotism, secular values and shall be transformed into motivated youth who will contribute towards nation building through national unity and social cohesion.	3	1	1	1	3	3	3	3	3	3	-	-	-	-
CO2	Demonstrate Health Exercises, the sense of discipline, improve bearing, smartness, turnout, develop the quality of immediate and implicit obedience of orders	3	1	1	1	3	3	3	3	3	3	-	-	-	-
CO3	Basic knowledge of weapons and their use and handling.	3	2	1	1	3	3	3	3	3	3	-	-	-	-
CO4	Understanding about social evils and shall inculcate sense of whistle blowing against such evils and ways to eradicate such evils	3	2	1	1	3	3	3	3	3	3	-	-	-	-
CO5	Acquaint, expose & provide knowledge about Army/Navy/ Air force and to acquire information about expansion of Armed Forces, service subjects and important battles.	3	2	1	1	3	3	3	3	3	3	-	-	-	-
Average		3	2	1	1	3	3	3	3	3	3	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R2020

20SH905	PROFESSIONAL COMMUNICATION		L	T	P	C
	(Open Elective)		1	0	2	3

Prerequisite:**Course Outcomes : On Successful Completion of the Course, the student will be able to****Cognitive Level**

CO1	Organize and compose resume' and SWOT analysis.	Understand
CO2	Prioritize the skills for interviews and job hunt.	Understand
CO3	Interpret by Listening and reading a text and comprehend it.	Understand
CO4	Identify the purpose of writing short messages and presentation.	Understand
CO5	Optimize the speaking skills to do well in Group Discussion.	Understand

UNIT – I SWOT Analysis and Resume' Writing [09]

SWOT Analysis - Key SWOT Questions- Assessment of strength and weakness - Mind map and Activity - Job Application and Resume' - Types of Resume' - Common mistakes in Resume' writing - Cover Letter (Email).

UNIT – II Interview Skills [09]

Types of Interviews - Telephone Interview (HR and Technical) - Dos and Don'ts in telephone Interview - Video Interviews - Practice for successful interviews - Video Samples.

UNIT - III Listening and Reading [09]**Listening** - Listening and typing - Listening and sequencing of sentences - Filling in the blanks - Listening and answering questions.**Reading** - Filling in the blanks - Cloze exercise - Vocabulary building - Reading and answering questions.**UNIT - IV Writing Short Messages and Presentation Skills [09]**

Writing Memos - Email writing - Business Email - Elements of effective presentation - Structure of presentation - Audience analysis - Body Language.

UNIT - V Group Discussion and Essay Writing [09]

Introduction to Group Discussion - Structure of GD - Brainstorming the topic - Body Language - Mock GD - Five steps to writing an essay - writing short essays.

Total = 45 Periods**Text Books :**

- 1 Ravindran, Padma, English for Work, Ebek Language Laboratories Private Limited, Trichy, First Edition, 2011
- 2 Kalpana V, Communication Skills Laboratory Manual, Vijay Nicole Imprints Private Limited, Chennai, First Edition, 2013

Reference Books :

- 1 Norman Whitby, Business Benchmark: Pre-Intermediate to Intermediate -BEC Preliminary, Cambridge University Press, New Delhi, First Edition, 2008.
- 2 Meenakshi Raman and Sangeeta Sharma, Technical Communication English for Engineers, Oxford University Press, New Delhi, 2008.
- 3 Rizvi Ashraf M, Effective Technical Communication, Mc GrawHill, New Delhi, 28th Reprint, 2015.
- 4 Department of English, English for Technologies and Engineers, Orient Black Swan, Hyderabad, First Edition, 2016.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF SCIENCE AND HUMANITIES
CO-PO MAPPING

Course Code: 20SH905

Regulation : R 2020
 Course Name : PROFESSIONAL COMMUNICATION

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	Organize and compose resume' and SWOT analysis.										3	3		2	
CO2	Prioritize the skills for interviews and job hunt.										3	3		2	
CO3	Interpret by Listening and reading a text and comprehend it.										3	3		2	
CO4	Identify the purpose of writing short messages and presentation.										3	3		2	
CO5	Optimize the speaking skills to do well in Group Discussion.										3	3		2	
Average											3	3		2	

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	K.S.R. COLLEGE OF ENGINEERING (Autonomous)	R 2020			
	FUNDAMENTALS OF NANOSCIENCE AND TECHNOLOGY	L	T	P	C
20SH906	(Open Elective)	3	0	0	3

Prerequisite: NIL

Course Outcomes: On Completion of this course , the student will be able to	Cognitive level
CO1 Learn the basics of nanotechnology in physics, chemistry and biology	Remember
CO2 Recognize the methods of preparation of nanomaterials	Analyze
CO3 Relate the characterization techniques for confirming nanomaterials	Apply
CO4 Categorize the nanomaterials and its preparation	Analyze
CO5 Identify the area of application and its field	Understand

UNIT – I INTRODUCTION [09]

Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thin films multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties.

UNIT – II GENERAL METHODS OF PREPARATION [09]

Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapor phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMB.

UNIT – III NANOMATERIALS [09]

Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis (arc-growth, laser ablation, CVD routes, Plasma CVD), structure-properties.Applications- Nanometal oxides-ZnO, TiO₂,MgO, ZrO₂, NiO, nano alumina, CaO, AgTiO₂, Ferrites, Nano clays- functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications.

UNIT – IV CHARACTERIZATION TECHNIQUES [09]

X-ray diffraction technique, Scanning Electron Microscopy - experimental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, STM, ESCA-Nanoindentation.

UNIT – V APPLICATIONS [09]

Nano InfoTech: Information storage- nano computer, molecular switch, super chip, nanocrystal, Nano biotechnology: nanoprobes in medical diagnostics and biotechnology, Nano medicines, Targeted drug delivery, Bioimaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nano sensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sun barrier products - In Photostat, printing, solar cell, battery.

Total = 45 Periods

Text Books :

- 1 John Dinardo. N, "Nanoscale characterization of surfaces & Interfaces", 2nd edition, Weinheim Cambridge, Wiley-VCH, 2000
- 2 Introduction to Nanoscience and Nanotechnology by Chattopadhyay K.K 1 January 2013

Reference Books :

- 1 Timp .G, "Nanotechnology", AIP press/Springer, 1999.
- 2 AkhleshLakhtakia (Editor), "The Hand Book of Nano Technology, Nanometer Structure, Theory, Modeling and Simulations". Prentice-Hall of India (P) Ltd, New Delhi, 2007.
- 3 NANO: The Essentials: Understanding Nanoscience and Nanotechnology by T. Pradeep
- 4 An Introduction To Nanomaterials And Nanoscience (Pb 2020) by DAS A

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF SCIENCE AND HUMANITIES
CO-PO MAPPING

Regulation : R 2020

Course Code:20SH906

**FUNDAMENTALS OF
 NANOSCIENCE AND
 TECHNOLOGY**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Learn the basics of nanotechnology in physics, chemistry and biology	3	3	-	-	2	-	-	1	-	2	-	2	-	-
CO2	Recognize the methods of preparation of nanomaterials	3	3	-	-	2	-	-	1	-	2	-	2	-	-
CO3	Relate the characterization techniques for confirming nanomaterials	3	3	-	-	2	-	-	1	-	2	-	2	-	-
CO4	Categorize the nanomaterials and its preparation	3	3	-	-	2	-	-	1	-	2	-	2	-	-
CO5	Identify the area of application and its field	3	3	-	-	2	-	-	1	-	2	-	2	-	-
Average		3	3	-	-	2	-	-	1	-	2	-	2	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

**K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – V**

R 2020

20IT567

TECHNOLOGIES ENABLING IoT

(Honors Courses)

L	T	P	C
3	0	0	3

Prerequisite: Fundamental knowledge about IoT devices

Course Outcomes: On Completion of this course , the student will be able to

Cognitive level

CO1	Understand the basic concept of Embedded systems.	Understand
CO2	Understand the architecture of lot and protocols used.	Understand
CO3	Identify the Cloud technologies and platforms availability	Apply
CO4	Analyze various technologies and data handling software in open source	Analyzing
CO5	Design an application for industrial IoT	Creating

UNIT – I Embedded Systems [09]

Introduction to IoT Boards, - IoT deployment for Raspberry Pi /Arduino/Equivalent platform - Interfacing of Sensors and actuators- Communication: Connecting microcontroller with mobile devices -communication through Bluetooth and wifi.

UNIT – II Wireless Sensor Network [09]

WSN node-Anatomy of the network node- Architecture of WSN-Types of WSN- WSN standards: IEEE 802.15.4-Low rate WPAN-Zigbee, Wireless HART-6LOWPAN, Zwave, BLE, LoRA.- Protocol stack of WSNs.

UNIT – III Cloud Computing [09]

Introduction to Cloud Computing(concept, architecture, working)- Introduction to Cloud service models-SaaS, PaaS, IaaS, NaaS, IDaaS, DBaaS- Cloud Platforms: Google App Engine, Amazon Web Services, Microsoft Azure-Cloud services, Windows Azure Platform Appliance- Distributed Computing: Need- Distributed computing vs. Cloud computing.

UNIT – IV Big Data [09]

Introduction to Big data, Types of data, Characteristics of Big data- Data handling technologies, Flow of data, Data acquisition, Data storage-Introduction to Hadoop- Introduction to Data Analytics, Types of data analytics-Local Analytics, Cloud analytics and applications..

UNIT – V Industrial IoT and Its Application [09]

Business Model and Reference Architecture: IIoT-Business Models-IIoTSensing,IIoT Communication ,IIoTSecurity and Fog Computing. Industrial IoTApplications- Home Automation, Industrial IoT, Logistics, Driver assistance, collision-impact, Inventory Management & Quality Control- Smart Cities, Environmental Protection, Lavatory maintenance, Water quality,Power Plants, Food, Warehouse, Retail, Energy management, Agriculture, Health and Lifestyle, Facility Management.

Total = 45 Periods

Text Books :

1. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press, 2017
2. Arduino for Dummies, John Nussey, 2nd Edition, ISBN: 978-1119489542, For Dummies Publishing, 2018
3. Olivier Hersent, David Boswarthick, and Omar Elloumi, "The Internet of Things: Key Applications And Protocols", Wiley Publications, 2012

Reference Books :

1. Hakima Chaouchi, "The Internet of Things Connecting Objects to the Web ISBN : 978-1- 84821140-7, Wiley Publications, 2013
2. Kazem Sohraby, Daniel Minoli and Taieb Znati, "Wireless Sensor Networks Technology, Protocols, and Applications", John Wiley & Sons, 2010.
Giacomo Veneri Antonio Capasso, "Hands-On Industrial Internet of Things", Packtr Publications, January 2018
3. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Wiley Publications, 2013.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation : R 2020

Course Code: 20IT567

Course Name : TECHNOLOGIES ENABLING IoT

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the basic concept of Embedded systems.	3	3	2	-	3	-	-	-	-	-	-	2	-	2
CO2	Understand the architecture of IoT and protocols used.	3	3	2	-	3	-	-	-	-	-	-	2	-	2
CO3	Identify the Cloud technologies and platforms availability	3	3	2	-	3	-	-	-	-	-	-	2	-	2
CO4	Analyze various technologies and data handling software in open source	3	3	2	-	3	-	-	-	-	-	-	2	-	2
CO5	Design an application for industrial IoT	3	3	2	-	3	-	-	-	-	-	-	2	-	2
Average		3	3	2	-	3	-	-	-	-	-	-	2	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – V

R 2020

	L	T	P	C
20IT568				
(Honors Courses)	3	0	0	3

Prerequisite: Fundamental knowledge about Programming and IoT platforms

Course Outcomes: On Completion of this course , the student will be able to	Cognitive level
CO1 Understand the basic architecture of IoT	Understand
CO2 Explain various IoT protocols required for implementing IoT applications	Understand
CO3 Identify the key requirements for implementing IoT with Arduino Uno	Apply
CO4 Analyze the different functionality of using Raspberry Pi boards	Analyze
CO5 Design the application in IoT using Python Programming Language	Creating

UNIT – I IoT-AN ARCHITECTURAL OVERVIEW [09]

IoT System Architecture and Design Principles-IoT Standards-Ubiquitous Computing and Internet of Things-IoT Communication requirements-IoT Network Design Fundamentals-Low power Design Consideration for IoT Sensors-Sensor Interfacing- Actuator Interfacing- wireless MCU/MPU Architecture

UNIT – II IoT PROTOCOLS [09]

Internet and Web layering, Introduction to wired and wireless communication technologies for IoT, Edge connectivity, IoT protocols - MQTT, MQTT-SN, Constrained Application Protocol (CoAP), STOMP, AMQP, Comparison of protocols, IPv4 and IPv6.

UNIT – III IMPLEMENTING IOT WITH ARDUINO [09]

Introduction to Arduino Platforms-Arduino Uno architecture- IDE setup-Importing Arduino boards in Arduino IDE tool- Installation of Arduino libraries-Basics of Embedded C Programming-Interfacing of Sensors and Actuators with Arduino Uno

UNIT – IV IMPLEMENTING IOT WITH RASPBERRY PI (RPI) [09]

Basic functionality of RPi board- setting up the board by installing OS-First boot and basic configuration of RPi-Basic Linux Commands-Accessing RPi remotely using networking tools-RPi GPIO pins.

UNIT – V PYTHON PROGRAMMING [09]

Installation of python- Numbers and Math in python- Variables and Inputs-Built -in modules - Functions-strings- python lists-Python slicing- Save and run python files.

Total = 45 Periods

Text Books :

- 1 Perry Lea, Internet of Things for Architects: Architecting IoT solutions by implementing sensors, communication infrastructure, edge computing, analytics, and security, Packt Publisher, 2018
- 2 Programming the Raspberry Pi: Getting Started with Python, Simon Monk, 2nd Edition, ISBN: 978-1259587405, Tata McGraw Hill Publication. 2012
3. Arduino for Dummies, John Nussey, 2nd Edition, ISBN: 978-1119489542, For Dummies Publishing, 2018

Reference Books :

- 1 Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press, 2017
- 2 Programming Arduino: Getting started with sketches, 2nd Edition, Simon Monk, ISBN: 978-1259641633, Tata McGraw Hill Publication.
- 3 Exploring Raspberry Pi: Interfacing to the real world with Embedded Linux, Derex Molly, 1st Edition, ISBN: 978-1119188681, Wiley Publication, 2016
- 4 Arduino Programming in 24 hours, Richard Blum, 1st Edition, ISBN: 978-0672337123, Sams Tech Yourself Publishing, 2014

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation : R 2020

Course Code:20IT568

Course Name : IOT SYSTEMS DESIGN

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Understand the basic architecture of IoT</i>	3	3	-	-	2	-	-	-	-	-	2	2	-	-
CO2	<i>Explain various IoT protocols required for implementing IoT applications</i>	3	3	-	-	2	-	-	-	-	-	2	2	-	-
CO3	<i>Identify the key requirements for implementing IoT with Arduino Uno</i>	3	3	-	-	2	-	-	-	-	-	2	2	-	-
CO4	<i>Analyze the different functionality of using Raspberry Pi boards</i>	3	3	-	-	2	-	-	-	-	-	2	2	-	-
CO5	<i>Design the application in IoT using Python Programming Language</i>	3	3	-	-	2	-	-	-	-	-	2	2	-	-
Average		3	3	-	-	2	-	-	-	-	-	2	2	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – VII

R 2020

20IT768	FOG COMPUTING & ENERGY MANAGEMENT IN IOT DEVICES (Honors Courses)	L	T	P	C
		3	0	0	3

Prerequisite: To know the fundamental knowledge of IoT device

Course Outcomes: On Completion of this course , the student will be able to **Cognitive level**

CO1	Understand the Fog Computing models and its Communications.	Understand
CO2	Discuss the architectural models and goal oriented approach.	Understand
CO3	Identify the security and privacy in Fog Computing Networks.	Applying
CO4	Test for various Energy harvesting methods in Fog Computing Environment.	Analyzing
CO5	Explain the use of Techniques and its application in Fog Computing.	Evaluating

UNIT – I INTRODUCTION TO FOG COMPUTING **[09]**

Fog Computing-Fog computing and related models-Needs of fog computing-Communication technologies-Edge and Fog Computing-Future challenges-Edge Computing: Challenges and opportunities-Caching and Fog computing-Mobility management in CCN-Security in Content Centric Networks.

UNIT – II ARCHITECTURE **[09]**

Fog Computing Architecture Model-Fog computing for IoT: A Taxonomy-Comparisons of surveyed solutions-Challenges-Harnessing the Computing continuum for programming our world: A Goal-oriented Approach- Goal-oriented Annotations for Intensional Specification - A Mapping and Run-time System for the Computing Continuum- Building Blocks and Enabling Technologies

UNIT – III SECURITY AND PRIVACY ISSUES **[09]**

Trust in IoT- Authentication- Authorization -Privacy: Requirements of Privacy in IoT- Web Semantics and Trust Management for Fog Computing- Trust Through Web Semantics- Fog Computing Requirements When Applied to Challenging IoTs Application Domains- IoT Case Studies

UNIT – IV ENERGY HARVESTING **[09]**

Run time Energy management in WSN-Collection of energy enabled Internet of Things-Optimal Data Placement in Fog Networks:Delay Minimization without Replication- Delay Minimization without Replication-Performance Evaluation- Modeling and simulation of Distributed Fog Environment using FogNetSim++

UNIT – V FOG COMPUTING TECHNIQUES AND APPLICATIONS **[09]**

5G Networks with Fog Computing-Reliable and Power efficient machine learning WSN-Distributed machine learning for IoT Applications in Fog-Communication system for Smart Grids-Task scheduling for Nodes.

Total = 45 Periods

Text Books :

- 1 Assad Abbas , Samee U. Khan, Albert Y. Zomaya ,Fog Computing: Theory and Practice,Wiley Publisher,2020
- 2 Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press,2017

Reference Books :

- 1 Fog Protocol and FogKit: A JSON-Based Protocol and Framework for Communication Between Bluetooth-Enabled Wearable Internet of Things Devices Spencer Lewson,by Spencer Lewson June 2015
- 2 Fog Computing: Helping the Internet of Things Realize its Potential Amir VahidDastjerdi and RajkumarBuyya, University of Melbourne
3. Carlos Manuel Ferreira Carvalho, Nuno Filipe Silva VerissimoPaulino, "CMOS Indoor Light Energy Harvesting System for Wireless Sensing Applications", springer
- 4 Danick Briand, Eric Yeatman, Shad Roundy , "Micro Energy Harvesting

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation :R 2020

Course Name :FOG COMPUTING & ENERGY MANAGEMENT IN IOT
DEVICES

Course Code: 20IT768

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Understand the Fog Computing models and its Communications.</i>	3	3	2	-	3	-	-	-	-	-	-	2	-	2
CO2	<i>Discuss the architectural models and goal oriented approach.</i>	3	3	2	-	3	-	-	-	-	-	-	2	-	2
CO3	<i>Identify the security and privacy in Fog Computing Networks.</i>	3	3	2	-	3	-	-	-	-	-	-	2	-	2
CO4	<i>Test for various Energy harvesting methods in Fog Computing Environment.</i>	3	3	2	-	3	-	-	-	-	-	-	2	-	2
CO5	<i>Explain the use of Techniques and its application in Fog Computing.</i>	3	3	2	-	3	-	-	-	-	-	-	2	-	2
Average		3	3	2	-	3	-	-	-	-	-	-	2	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – VII

R 2020

	L	T	P	C
20IT767 (Honors Courses)	3	0	0	3

Prerequisite: Fundamental knowledge about various programming language such as C, Python, Java

Course Outcomes: On Completion of this course , the student will be able to **Cognitive level**

CO1	Discuss the IoT security issues and concerns	Understand
CO2	Identify the main threats and attacks in IoT Environment	Applying
CO3	Examine the user based authentication in IoT	Analyze
CO4	Explain the Security Requirements in IoT Architecture	Evaluating
CO5	Create awareness of IoT security	Creating

UNIT – I SECURING THE IoT & SECURITY ARCHITECTURE [09]

Introduction, Security Requirements in IoT Architecture, Security in Enabling Technologies, Security Concerns in IoT Applications, Security Requirements in IoT, Insufficient Authentication/Authorization, Insecure Access Control, Threats to Access Control, Privacy, and Availability , Attacks Specific to IoT.

UNIT – II SECURITY AND VULNERABILITY IN THE IoT [09]

Fundamentals of cryptography, Secrecy and Secret-Key Capacity, Authentication/Authorization for Smart Devices, Transport Encryption, Secure Cloud/Web Interface, Secure Software/Firmware, Physical Layer Security

UNIT – III IoT NODE AUTHENTICATION [09]

Security Goals in IoT, Public-Key-Based Authentication, Identify-Based Authentication, Trust models & privacy preservation, Encryption and Digital Signature, IP Connectivity, Lightweight Cryptography, Existing Security Schemes for IoT

UNIT – IV DATA PROTECTION & SECURITY REQUIREMENTS IN IoT ARCHITECTURE [09]

Data Protection in IoT: Data lifecycle in IoT, Protecting Data in IoT Security Requirements in IoT Architecture: Introduction, Network Layer, Service Layer, Application-Interface Layer, Cross-Layer Threats, Threats Caused in Maintenance of IoT, cloud security for IoT, IoT Security for machine learning applications

UNIT – V SECURITY IN ENABLING TECHNOLOGIES & EXISTING SECURITY SCHEME FOR IoT [09]

Security in Identification and Tracking Technologies, Security in Integration of Wireless Sensor Network and RFID, Security in Communications, Security Protocols and Privacy Issues into 6LoWPAN Stack, Security in Service Management-Security Concerns in Social IoT, Confidentiality and Security for IoT Based Healthcare.

Total = 45 Periods

Text Books :

- 1 Shancang Li Li Da Xu, Securing the Internet of Things, Syngress, January 2017.
- 2 Waleed Ejaz Alagan Anpalagan Internet of Things for Smart Cities Technologies, Big Data and Security,, Springer Cham, 2019.

Reference Books :

- 1 Anthony Sabella, Rik Irons Mclean, Marcelo Yannuzzi, Orchestrating and Automating Security for the Internet of Things: Delivering Advanced Security Capabilities from Edge to Cloud for IoT, Publisher: Cisco Press, June 2018.
- 2 Fei Hu, "Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations ", CRC Press, 2016.
3. Aditya Gupta, "The IoT Hacker's Handbook: A Practical Guide to Hacking the Internet of Things", Apress publisher, 2019.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation :R 2020

Course Code: 20IT767

Course Name :PRIVACY AND SECURITY IN IoT

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Discuss the IoT security issues and concerns</i>	3	3	-	-	3	-	-	1	1	-	-	-	-	2
CO2	<i>Identify the main threats and attacks in IoT Environment</i>	3	3	-	-	3	-	-	1	1	-	-	-	-	2
CO3	<i>Examine the user based authentication in IoT</i>	3	3	-	-	3	-	-	1	1	-	-	-	-	2
CO4	<i>Explain the Security Requirements in IoT Architecture</i>	3	3	-	-	3	-	-	1	1	-	-	-	-	2
CO5	<i>Create awareness of IoT security</i>	3	3	-	-	3	-	-	1	1	-	-	-	-	2
Average		3	3	-	-	3	-	-	1	1	-	-	-	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)		R 2020			
SEMESTER – VI					
INDUSTRIAL IoT		L	T	P	C
20IT673	(Honors Courses)	3	0	0	3
Prerequisite: Fundamental knowledge about IoT platforms					
Course Outcomes: On Completion of this course , the student will be able to		Cognitive level			
CO1	Understand the basic concepts of Industry 4.0 and the other related fields	Understand			
CO2	Understand cyber physical system and the emerging applications	Understand			
CO3	Analyze the different storage systems	Analyzing			
CO4	Inspect the different level of security and Risk in IIoT	Analyzing			
CO5	Utilize the technologies related In IIoT to develop the applications	Applying			
UNIT – I	INDUSTRY 4.0	[09]			
Introduction, Historical Context, General framework, Application areas, Dissemination of Industry 4.0 and the disciplines that contribute to its development, Artificial intelligence, The Internet of Things and Industrial Internet of Things, Additive manufacturing, Robotization and automation, Current situation of Industry 4.0. Introduction to Industry 4.0 to Industry 5.0 Advances					
UNIT – II	INDUSTRIAL IoT	[09]			
Introduction to Cyber Physical Systems (CPS), Architecture of CPS- Components, Data science and technology for CPS, Emerging applications in CPS in different fields. Case study: Application of CPS in health care domain.					
UNIT – III	IIoT DATA SOURCES, DATA CENTERS AND SERVICE PROVIDER	[09]			
IT vs OT- CMMS, ERP, MES, EMS, PLM and other actors- Cloud Computing Taxonomies- Cloud Services-Data Repositories and Data Centers Connection: Sensors and Networks- Context-Data Sharing and Collaboration- Big Data Analytics-Descriptive Analytics-Diagnostic Analytics-Prescriptive- Data Management with Hadoop.					
UNIT – IV	IoT SECURITY AND RISK	[09]			
Cybersecurity in OT level-Cybersecurity in IT level-IT-OT Cybersecurity Convergence-Risks and threats of sharing data-Blockchains in cybersecurity-					
UNIT – V	CASE STUDY	[09]			
Understanding Smart Appliances -Smart Operation-Smart Monitoring-Smart Energy Savings-Smart Maintenance, Case study-Smart Grid, Smart Cars, Self-Driving Cars, Introducing Google's Self-Driving Car, Intellectual Property Rights.					
Total = 45 Periods					

Text Books :

- 1 Jean-Claude André, Industry 4.0, Wiley- ISTE, July 2019
- 2 Diego Galar Pascual, Pasquale Daponte, Uday Kumar, Handbook of Industry 4.0 and SMART Systems, CRC Press, 2020

Reference Books :

- 1 Miller M, The internet of things: How smart TVs, smart cars, smart homes, and smart cities are changing the world, Pearson Education, 2015.
- 2 Pengwei Du and Ning Lu, Energy storage for smart grids: planning and operation for renewable and variable energy resources VEs, Academic Press, 2018.
- 3 Hossam A. Gabbar, Smart Energy Grid Engineering, Academic Press, 2017.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation :R 2020

Course Code: 20IT673

Course Name :INDUSTRIAL IoT

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Understand the basic concepts of Industry 4.0 and the other related fields</i>	3	3	-	-	3	-	-	1	-	-	1	2	2	-
CO2	<i>Understand cyber physical system and the emerging applications</i>	3	3	-	-	3	-	-	1	-	-	1	2	2	-
CO3	<i>Analyze the different storage systems</i>	3	3	-	-	3	-	-	1	-	-	1	2	2	-
CO4	<i>Inspect the different level of security and Risk in IIoT</i>	3	3	-	-	3	-	-	1	-	-	1	2	2	-
CO5	<i>Utilize the technologies related In IIoT to develop the applications</i>	3	3	-	-	3	-	-	1	-	-	1	2	2	-
Average		3	3	-	-	3	-	-	1	-	-	1	2	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – VIII

R 2020

20IT867	ROBOTIC PROCESS AUTOMATION (Honors Courses)	L	T	P	C
		3	0	0	3

Prerequisite: Nil

Course Outcomes: On Completion of this course , the student will be able to **Cognitive level**

CO1	Define the basic concepts of Robotic Process Automation	Remembering
CO2	Understand processes which can be automated, associated business documentation basics, RPA journey of an organization	Understanding
CO3	Develop familiarity and deep understanding of UiPath tools	Applying
CO4	Develop ability to independently design and create robots for business processes	Creating
CO5	Design basic and simple chat bots	Creating

UNIT – I RPA CONCEPTS **[09]**

RPA Basics-History of RPA-The Benefits of RPA-Downsides of RPA-RPA Compared to BPO,BPM,andBPA-Consumer Willingness for Automation-The Workforce of the Future-RPA Skills: On-Premis Vs. the Cloud-Web Technology- Programming Languages and Low Code- Programming Languages and Low Code)-Databases-APIs- Artificial Intelligence- Cognitive Automation-Agile, Scrum,Kanban,and Waterfall-DevOps-Flowcharts-Process Methodologies

UNIT – II RPA PLANNING AND VENDOR EVALUATION **[09]**

Planning: What to Automate-ROI for RPA-RPA Use Cases-The Plan-RPA Vendor Evaluation: Find the user- Finding- Ecosystem-Costs-Training and Education -Best-of-Breed vs. End-to-End-Thought Leadership and Vision - Security, Monitoring and Deployment-Type of RPA-Design-Next-Generation Technologies-Center of Excellence-Forming the Team-Business Analysts-Developer-RPA Solution Architect-RPA Supervisor-What Should a CoE Do- Communication-Change Management-CoE Case Study

UNIT – III BOT DEVELOPMENT **[09]**

Installation of UiPath-Flowcharts and Sequences-Log Message-Variables-Loops and Conditionals-Handling User Events and Assistant Bots-Common UiPath Functions-The UiPath Orchestrator

UNIT – IV ADVANCED AUTOMATION CONCEPTS AND TECHNIQUES **[09]**

Data Manipulation-Taking Control of controls-Application with Plugins and Extensions- Exception Handling, Debugging and Logging-Managing and maintaining code.

UNIT – V DEPLOYING AND MAINTAINING THE BOT **[09]**

Publishing using publish utility - Using Orchestration Server to control bots - Using Orchestration Server to deploy bots - License management - Publishing and managing Updates-RPA Vendors-Open Source RPA-Future of RPA

Total = 45 Periods

Text Books :

- 1 Tom Taulli, The Robotics process Automation handbook, Apress publisher, USA, 2020
- 2 Alok Mani Tripathi - Learning Robotic Process Automation - Packt Publishing Ltd. - 2018

Reference Books :

- 1 Javed, Robotic Process Automation Using UiPath StudioX, Springer India, 2022
- 2 Christian Langmann, Daniel Turi, Robotic Process Automation (RPA) - Digitization and Automation of Processes, Springer Gabler Wiesbaden, 2023

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation :R 2020

Course Code: 20IT867

Course Name :ROBOTIC PROCESS AUTOMATION

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Define the basic concepts of Robotic Process Automation</i>	3	3	-	2	2	-	-	1	-	2	-	2	-	2
CO2	<i>Understand processes which can be automated, associated business documentation basics, RPA journey of an organization Understanding</i>	3	3	-	2	2	-	-	1	-	2	-	2	-	2
CO3	<i>Develop familiarity and deep understanding of UiPath tools</i>	3	3	-	2	2	-	-	1	-	2	-	2	-	2
CO4	<i>Develop ability to independently design and create robots for business processes</i>	3	3	-	2	2	-	-	1	-	2	-	2	-	2
CO5	<i>Design basic and simple chat bots</i>	3	3	-	2	2	-	-	1	-	2	-	2	-	2
Average		3	3	-	2	2	-	-	1	-	2	-	2	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – V

R 2020

20IT569	LINKED OPEN DATA AND ITS APPLICATIONS	L	T	P	C
	(Honors Courses)	3	0	0	3

Prerequisite: Fundamental knowledge about databases

Course Outcomes: On Completion of this course , the student will be able to **Cognitive level**

CO1	Understand the computational aspects of creation, storage & retrieval of Linked OpenData(LOD).	Understand
CO2	Discuss the need of RDF & SPARQL in querying LOD.	Understand
CO3	Analyze the publishing & consumption of LOD in WWW.	Analyze
CO4	Recommend the various systems applicable to LOD.	Evaluating
CO5	Explain the large scale machine learning for LOD.	Evaluating

UNIT – I INTRODUCTION **[09]**

Introduction-Principles of Linked Data- URIs, RDF data model, RDF Serialisation, Relationship links, Identity links, Vocabulary Links-Linked Data Design Considerations-Web of Data-Bootstrapping-Topology

UNIT – II RDF & SPARQL **[09]**

RDF database systems-RDF and Semantic Web — Encoding, storage, indexing — Query processing-reasoning-SPARQL-Improving Linked Data quality

UNIT – III PUBLISHING & CONSUMING LINKED OPEN DATA **[09]**

Publishing Linked Data-Publishing patterns-Recipes for publishing-Consuming Linked-Data Querying Linked Data Architecture of Linked Data Applications - Advertising on the web: Issues in Online Advertising-Online Algorithms-The Matching Problem

UNIT – IV RECOMMENDATION SYSTEMS **[09]**

Recommendation systems: A Model for Recommendation Systems, Content-Based Recommendations, Collaborative Filtering, Dimensionality Reduction

UNIT – V LARGE SCALE MACHINE LEARNING **[09]**

Mining social network graphs - Social Networks as Graphs, Clustering of Social-Network Graphs, Discovery of Communities, Partitioning of Graphs, Overlapping Communities, Simrank, Counting Triangles, Large scale machine learning- Machine-Learning Model, Perceptrons, SVM, Learning from Nearest Neighbours

Total = 45 Periods

Text Books :

- 1 Tom Heath, Christian Bizer, "Linked Data: Evolving the Web into a Global Data Space", Morgan & Claypool Publishers, 2011.
- 2 Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2014.
3. Bob DuCharme, "Learning SPARQL", "O'Reilly Media, Inc.", 2011.

Reference Books :

- 1 Sören Auer, Volha Bryl, Sebastian Tramp, Linked Open Data -- Creating Knowledge Out of Interlinked Data, Springer Cham, 2014.
- 2 David Wood, "Linking Government Data", Springer Science & Business Media, 2011.
- 3 Olivier Curé, Guillaume Blin, "RDF Database Systems: Triples Storage and SPARQL Query Processing", Morgan Kaufmann, 2014.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation :R 2020

Course Code:20IT569

Course Name :LINKED OPEN DATA AND ITS APPLICATIONS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Understand the computational aspects of creation, storage & retrieval of Linked OpenData(LOD).</i>	3	3	-	-	2	-	-	-	-	-	-	2	2	-
CO2	<i>Discuss the need of RDF&SPARQL in querying LOD.</i>	3	3	-	-	2	-	-	-	-	-	-	2	2	-
CO3	<i>Analyze the publishing & consumption of LOD in WWW.</i>	3	3	-	-	2	-	-	-	-	-	-	2	2	-
CO4	<i>Recommend the various systems applicable to LOD.</i>	3	3	-	-	2	-	-	-	-	-	-	2	2	-
CO5	<i>Explain the large scale machine learning for LOD.</i>	3	3	-	-	2	-	-	-	-	-	-	2	2	-
Average		3	3	-	-	2	-	-	-	-	-	-	2	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – VIII

R 2020

20IT868	COGNITIVE SCIENCE	L	T	P	C
	(Honors Courses)	3	0	0	3

Prerequisite: Fundamental knowledge about mathematics

Course Outcomes: On Completion of this course , the student will be able to **Cognitive level**

CO1	Understand the basics of Cognitive Science with focus on acquisition, representation and use of knowledge by individual minds, brains, and machines	<i>Understand</i>
CO2	understand the mind and intelligence, embracing psychology, artificial intelligence, neuroscience and linguistics.	<i>Understand</i>
CO3	Apply the role of neuro-science in the cognitive field.	<i>Applying</i>
CO4	Compare the computational models for semantic processing.	<i>Analyzing</i>
CO5	Discuss the role of reasoning in cognitive processing.	<i>Creating</i>

UNIT – I INTRODUCTION TO COGNITIVE SCIENCE **[09]**

The Cognitive view -Some Fundamental Concepts - Computers in Cognitive Science - Applied Cognitive Science - The Interdisciplinary Nature of Cognitive Science - Artificial Intelligence: Knowledge representation -The Nature of Artificial Intelligence - Knowledge Representation -Artificial Intelligence: Search, Control, and Learning.

UNIT – II COGNITIVE PSYCHOLOGY **[09]**

Cognitive Psychology – The Architecture of the Mind - The Nature of Cognitive Psychology- A Global View of The Cognitive Architecture- Propositional Representation- Schematic Representation- Cognitive Processes, Working Memory, and Attention- The Acquisition of Skill- The Connectionist Approach to Cognitive Architecture.

UNIT – III COGNITIVE NEUROSCIENCE **[09]**

Brain and Cognition Introduction to the Study of the Nervous System – Neural Representation – Neuropsychology- Computational Neuroscience - The Organization of the mind - Organization of Cognitive systems- Strategies for Brain mapping – A Case study: Exploring mind reading.

UNIT – IV LANGUAGE ACQUISITION, SEMANTICS AND PROCESSING MODELS **[09]**

Milestones in Acquisition - Theoretical Perspectives- Semantics and Cognitive Science - Meaning and Entailment - Reference - Sense - Cognitive and Computational Models of Semantic Processing- Information Processing Models of the Mind- Physical symbol systems and language of thought- Applying the Symbolic Paradigm- Neural networks and distributed information processing.

UNIT – V HIGHER-LEVEL COGNITION **[09]**

Reasoning- Decision Making- Computer Science and AI: Foundations & Robotics- New Horizons- Dynamical systems and situated cognition- Challenges- Emotions and Consciousness- .Physical and Social Environments- Applications.

Total = 45 Periods

Text Books :

- 1 Tom Heath, Christian Bizer, "Linked Data: Evolving the Web into a Global Data Space", Morgan & Claypool Publishers, 2011.
- 2 David Wood, "Linking Government Data", Springer Science & Business Media, 2011.
3. Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2014.

Reference Books :

- 1 . Olivier Curé, Guillaume Blin, "RDF Database Systems: Triples Storage and SPARQL Query Processing", Morgan Kaufmann, 2014.
- 2 . Bob DuCharme, "Learning SPARQL", "O'Reilly Media, Inc.", 2011.
- 3 José Luis Bermúdez An Introduction to the Science of the Mind , Cambridge University Press, 2010

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation :R 2020

Course Code:20IT868

Course Name :COGNITIVESCIENCE

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Understand the basics of Cognitive Science with focus on acquisition, representation and use of knowledge by individual minds, brains, and machines</i>	3	3	-	3	-	-	-	2	-	-	-	2	-	2
CO2	<i>understand the mind and intelligence, embracing psychology, artificial intelligence, neuroscience and linguistics.</i>	3	3	-	3	-	-	-	2	-	-	-	2	-	2
CO3	<i>Apply the role of neuro-science in the cognitive field.</i>	3	3	-	3	-	-	-	2	-	-	-	2	-	2
CO4	<i>Compare the computational models for semantic processing.</i>	3	3	-	3	-	-	-	2	-	-	-	2	-	2
CO5	<i>Discuss the role of reasoning in cognitive processing.</i>	3	3	-	3	-	-	-	2	-	-	-	2	-	2
Average		3	3	-	3	-	-	-	2	-	-	-	2	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – VI

R 2020

20IT675	REAL TIME DATA STREAMING	L	T	P	C
	(Honors Courses)	3	0	0	3

Prerequisite: Fundamental knowledge about data Science

Course Outcomes: On Completion of this course , the student will be able to	Cognitive level
CO1 Describe the basic data stream models and its applications	Understand
CO2 Understand the different machine learning algorithms.	Understand
CO3 Classify the suitable stream mining algorithms for data stream systems.	Analyze
CO4 Examine the data stream processing systems and services.	Analyze
CO5 Solve problems in real-world applications that process data streams.	Creating

UNIT – I INTRODUCTION TODATASTREAMS [09]

Data stream: Introduction-A Real world Movement-Difference between Data Mining and Data Stream-Data stream models - Basic streaming methods- Applications-Change detection - Maintaining histograms from data streams

UNIT – II STREAMMININGALGORITHMS [09]

Evaluating streaming algorithms-learning from data streams-evaluation issues – open issues. Clustering from data streams-clustering examples-clustering variables. Frequent pattern mining- frequent itemset mining - heavy hitters - mining frequent item set from data streams - sequence pattern mining.

UNIT – III CLASSIFICATION METHODS IN DATASTREAMS [09]

Decision trees from data streams - very fast decision tree algorithm (VFDT) - extensions - OLIN: info-fuzzy algorithms. Novelty detection in data streams-learning and novelty-novelty detection as a one-class classification problem-learning new concepts-the online novelty and drift detection algorithms

UNIT – IV ANALYSIS OF STREAM DATA [09]

Multi-dimensional analysis of data - architecture for on-line analysis of data streams - stream data cube computation. Load shedding in data stream systems-Load shedding for aggregation queries- Load shedding in aurora - load shedding for sliding window joins - load shedding for classification queries

UNIT – V ADVANCED CONCEPTS ON STREAM COMPUTING [09]

Synopsis construction in data streams - sampling methods - wavelets - sketches - histograms. Join processing in data streams - indexing and querying data streams - dimensionality reduction and forecasting on streams-distributed mining of data streams

Total = 45 Periods

Text Books :

- 1 Joao Gama, "Knowledge Discovery from Data Streams", CRC Press, 2010.
- 2 Charu C. Aggarwal, "Data Streams: Models and Algorithms", Kluwer Academic Publishers, Springer 2007 Edition.

Reference Books :

- 1 Byron Ellis, "Real Time Analytics: Techniques to Analyze and Visualize Streaming Data", John Wiley and Sons, 2014.
- 2 Shilpi Saxena, Saurabh Gupta, "Practical Real-time Data Processing and Analytics", Pack publishing, 2017.
- 3 Andrew Psaltis, Streaming Data, Manning publisher, First Edition, June 2017.

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation :R 2020

Course Code:20IT675

Course Name : REAL TIME DATA STREAMING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Describe the basic data stream models and its applications</i>	3	3	2	-	3	-	-	2	-	2	-	-	-	2
CO2	<i>Understand the different machine learning algorithms.</i>	3	3	2	-	3	-	-	2	-	2	-	-	-	2
CO3	<i>Classify the suitable stream mining algorithms for data stream systems.</i>	3	3	2	-	3	-	-	2	-	2	-	-	-	2
CO4	<i>Examine the data stream processing systems and services.</i>	3	3	2	-	3	-	-	2	-	2	-	-	-	2
CO5	<i>Solve problems in real-world applications that process data streams.</i>	3	3	2	-	3	-	-	2	-	2	-	-	-	2
Average		3	3	2	-	3	-	-	2	-	2	-	-	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – VIII

R 2020

20IT869	TEXTPROCESSING ANDMINING (Honors Courses)	L	T	P	C
		3	0	0	3

Prerequisite: To know basic understanding of mathematics, statistics and programming.

Course Outcomes: On Completion of this course , the student will be able to	Cognitive level
CO1 Discuss the basic concepts and types of text mining.	Understand
CO2 Classify the different aspects of text categorization and clustering.	Understand
CO3 Identify the role played by text mining in Information retrieval and extraction.	Applying
CO4 Categorize the use of probabilistic models for text mining.	Analyze
CO5 Determine the current trends in text mining.	Creating

UNIT – I INTRODUCTION [09]

Overview of text mining- General architecture - algorithms - core operations - Pre-processing - types of problems- basics of document classification - information retrieval- clustering and organizing documents -information extraction - prediction and evaluation-textual information on numerical vectors-collecting documents-document standardization—tokenization-lemmatization-vector generation for prediction-sentence boundary determination-evaluation performance.

UNIT – II TEXT CATEGORIZATION AND CLUSTERING [09]

Text Categorization -document representation - feature selection - decision tree classifiers - rule-based classifiers - probabilistic and naive bayes classifiers - linear classifiers-classification of linked and web data - meta-algorithms- clustering -vector space models - distance - based algorithms - word and phrase-based clustering - semi-supervised clustering.

UNIT – III TEXT MINING FOR INFORMATION RETRIEVAL AND INFORMATION EXTRACTION [09]

Information retrieval and text mining- keyword search- nearest-neighbor methods- similarity- web-based document search-matching-inverted lists-evaluation.information extraction-architecture-co-reference-named entity and relation extraction-template filling and database construction—applications.inductive-unsupervised algorithms for information extraction.

UNIT – IV PROBABILISTIC MODELS [09]

Probabilistic models for text mining-mixture models-stochastic processes in bayesian-nonparametric models - graphical models - relationship between clustering, dimension reduction and topic modeling-latent semantic indexing-probabilistic latent semantic indexing-latent dirichlet allocation-interpretation and evaluation-probabilistic document clustering and topic models-probabilistic models for information extraction-hidden markov models-stochastic context-free grammars - maximal entropy modeling - maximal entropy markov models -conditional random fields.

UNIT – V RECENT TRENDS [09]

Visualization approaches - architectural considerations - visualization techniques in link analysis -example- mining text streams - text mining in multimedia - text analytics in social media - opinion mining and sentiment analysis - document sentiment classification - opinion lexicon expansion -aspect-based sentiment analysis - opinion spam detection - text mining applications and case studies.

Total = 45 Periods

Text Books :

- 1 Sholom Weiss, Nitin Indurkha, Tong Zhang, Fred Damerau "The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data", Springer, paperback, 2010.
- 2 Ronen Feldman, James Sanger, "The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data", Cambridge University press, 2006.

Reference Books :

- 1 Charu C. Aggarwal, Cheng Xiang Zhai, "Mining Text Data", Springer, 2012.
- 2 Anne Kao, Steve R. Poteet, Natural Language Processing and Text Mining, Springer London Ltd, 2006.
- 3 Chris Biemann, Alexander Mehler Text Mining: From Ontology Learning to Automated Text Processing Applications, Springer Cham, 2014

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation :R 2020

Course Code:20IT869

Course Name :TEXTPROCESSING ANDMINING

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Discuss the basic concepts and types of text mining.</i>	3	3	-	-	2	-	-	-	-	2	-	2	2	-
CO2	<i>Classify the different aspects of text categorization and clustering.</i>	3	3	-	-	2	-	-	-	-	2	-	2	2	-
CO3	<i>Identify the role played by text mining in Information retrieval and extraction.</i>	3	3	-	-	2	-	-	-	-	2	-	2	2	-
CO4	<i>Categorize the use of probabilistic models for text mining.</i>	3	3	-	-	2	-	-	-	-	2	-	2	2	-
CO5	<i>Determine the current trends in text mining.</i>	3	3	-	-	2	-	-	-	-	2	-	2	2	-
Average		3	3	-	-	2	-	-	-	-	2	-	2	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – VI

R 2020

20IT674	BIGDATA SECURITY (Honors Courses)	L	T	P	C
		3	0	0	3

Prerequisite: Basic knowledge about SQL

Course Outcomes: On Completion of this course , the student will be able to **Cognitive level**

CO1	Understand the mathematical foundations of security principles.	Understand
CO2	Discuss the different aspects of encryption techniques.	Understand
CO3	Identify the role played by authentication in security.	Applying
CO4	Analyze the security concerns of big-data.	Analyzing
CO5	Examine the applications of security analytics	Analyzing

UNIT – I SYMMETRIC TECHNIQUES **[09]**

Mathematics of symmetric cryptography : Modular Arithmetic, Euclid theorem, congruence, algebraic structures – Foundations of Modern cryptography – Model of cryptosystems – Classical encryption techniques : Substitution techniques, Transposition techniques and steganography - cipher models: stream cipher and block cipher design principles - Block cipher modes of operation - DES - DDES and TDES - strength of DES - AES – strength of AES – RC4 – Symmetric key distribution.

UNIT – II ASYMMETRIC TECHNIQUES **[09]**

Mathematics of symmetric cryptography: Primes, Primality Testing, Factorization, Euler Totient Function, Fermat's and Euler's theorem, Discrete logarithm – Asymmetric key cipher : RSA cryptosystems & cryptanalysis – ElGamal cryptosystem – Elliptic curve arithmetic and cryptography – Asymmetric key distribution and management.

UNIT – III MESSAGE AUTHENTICATION **[09]**

Authentication requirements - Authentication functions - Message authentication codes (MAC) - Hash functions – Security of hash functions and MACS – MD5 Message Digest algorithm – Secure hash algorithm – Digital Signatures.

UNIT – IV INTRODUCTION TO SECURITY ANALYTICS **[09]**

Introduction to Security Analytics — Techniques in Analytics — Analysis in everyday life — Challenges in Intrusion and Incident Identification - Simulation and Security Process, Analytical Softwares and tools, Malware Analysis - static and dynamic analysis - Security Intelligence - Security Breaches.

UNIT – V APPLICATIONS OF SECURITY ANALYTICS **[09]**

Access Analytics – Analysis of Logfile - Security analysis with text mining – Machine Learning and data mining applications for security: Intrusion detection and network anomaly detection. Big data analytics for security: Analyzing DDOS - Distributed Denial of Service attack: counter based method, and access pattern based method - Machine learning for Ransom ware detection and prevention.

Total = 45 Periods

Text Books :

- 1 William Stallings, "Cryptography and Network Security: Principles and Practices", Pearson/PHI, 5th Edition, 2010.
- 2 Behrouz A. Forouzan, "Cryptography and Network Security", Tata McGraw Hill Education, 2nd Edition, 2010.

Reference Books :

- 1 Douglas R. Stinson, "Cryptography Theory and Practice", Chapman & Hall/CRC, 3rd Edition, 2006.
- 2 Mark Talabis, Robert McPherson, I Miyamoto and Jason Martin, "Information Security Analytics: Finding Security Insights, Patterns, and Anomalies in Big Data", Syngress Media, U.S., 2014.
- 3 Shibakali Gupta, Indradip Banerjee and Siddhartha Bhattacharyya, Big Data Security, De Gruyter, Kolkatta, India 2019
- 4 Richard Jiang, Ahmed Bouridane, Danny Crookes, Chang-Tsun Li, Said Boussakta, Feng Hao, Eran A., Edirisinghe, Big Data Privacy and Security in Smart Cities, Springer Nature Switzerland AG, 2022

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY
CO-PO MAPPING

Regulation :R 2020

Course Code:20IT674

Course Name :BIGDATASECURITY

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	<i>Understand the mathematical foundations of security principles.</i>	3	3	2	-	2	-	-	2	-	-	-	2	-	1
CO2	<i>Discuss the different aspects of encryption techniques.</i>	3	3	2	-	2	-	-	2	-	-	-	2	-	1
CO3	<i>Identify the role played by authentication in security.</i>	3	3	2	-	2	-	-	2	-	-	-	2	-	1
CO4	<i>Analyze the security concerns of big-data.</i>	3	3	2	-	2	-	-	2	-	-	-	2	-	1
CO5	<i>Examine the applications of security analytics</i>	3	3	2	-	2	-	-	2	-	-	-	2	-	1
Average		3	3	2	-	2	-	-	2	-	-	-	2	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)
SEMESTER – VII

R 2020

20IT769	SENTIMENT ANALYSIS	L	T	P	C
	(Honors Courses)	3	0	0	3

Prerequisite: To know Programming language Python or R

Course Outcomes: On Completion of this course , the student will be able to	Cognitive level
CO1 Understand the need for sentiment analysis.	Understand
CO2 Explore the various methodologies involved in text sentiment classification.	Understand
CO3 Compare the fusion of Natural Language processing with sentiment analysis.	Analyzing
CO4 Determine the available sentiment summarization methods.	Evaluating
CO5 Elaborate the various tools used for sentiment analysis.	Creating

UNIT – I INTRODUCTION [09]

Need for Sentiment Analysis - Problem of Sentiment Analysis - Subjectivity - Stance - Words to Discourse - Pragmatics - Natural Language Processing issues - Opinion Definition - Sentiment Analysis Tasks - Opinion Summarization - Types of opinion - Subjectivity and emotion - Author and Reader Standpoint.

UNIT – II DOCUMENT SENTIMENT CLASSIFICATION [09]

Sentiment Classification Using Supervised Learning - Unsupervised Learning - Rating Prediction - Cross-Domain Sentiment Classification - Cross-Language Sentiment Classification - Sentence Subjectivity and Classification - Subjectivity Classification - Sentence Sentiment Classification - Conditional Sentences - Sarcastic Sentences - Cross-Language Subjectivity and Sentiment Classification - Discourse Information for Sentiment Classification.

UNIT – III ASPECT BASED SENTIMENT ANALYSIS [09]

Aspect Sentiment Classification - Rules Of Opinions and Compositional Semantics - Aspect Extraction - Identifying Resource Usage Aspect - Simultaneous Opinion Lexicon Expansion and Aspect Extraction - Grouping Aspects Into Categories - Entity, Opinion Hold And Timing Extraction - Coreference Resolution and Word Sense Disambiguation - Aspect and Entity Extraction - Sentiment Lexicon Generation - Corpus Based Approach - Dictionary Based Approach - Desirable and Undesirable Fact S.

UNIT – IV OPINION SUMMARIZATION [09]

Aspect Based Opinion Summarization - Improvements to Aspect-Based Opinion Summarization - Contrastive View Summarization - Traditional Summarization - Analysis of Comparative Opinions - Identifying Comparative Sentences - Identifying Preferred Entities - Opinion Search and Retrieval - Opinion Spam Detection - Types of Spam Detection - Supervised and Un-Supervised Approach - Group Spam Detection.

UNIT – V TOOLS FOR SENTIMENT ANALYSIS [09]

Detecting Fake or Deceptive Opinions - Quality of Review - Quality as Regression Model - Other Methods - Case Study - Sentiment Analysis Applications - Tools for Sentiment Analysis - Semantria - Meltwater - Google Analytics - Facebook Insights - Tweetstats.

Total = 45 Periods

Text Books :

- 1 Bing Liu, "Sentiment Analysis and Opinion Mining", Morgan and Claypool publishers, 2012.
- 2 Bing Liu, "Sentiment Analysis—Mining opinion, Sentiments and Emotions", Cambridge University Press, 2015

Reference Books :

- 1 Bo Pang and Lillian Lee, "Opinion Mining and Sentiment Analysis", Now Publishers Inc, 2008.
- 2 Roy De Groot, "Data Mining for Tweet Sentiment Classification—Twitter Sentiment Analysis", LAP Lambert Academic Publishing, 2012.
- 3 Bing Liu (Author), Elisabetta Fersini (Author), Enza Messina (Author), Federico Pozzi (Author) Sentiment Analysis in Social Networks, Morgan Kaufmann Publishers In, 2016

K.S.R. COLLEGE OF ENGINEERING, TIRUCHENGODE – 637215
DEPARTMENT OF INFORMATION TECHNOLOGY

CO-PO MAPPING

Regulation :R 2020

Course Code:20IT769

Course Name :SENTIMENTANALYSIS

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the need for sentiment analysis.	3	3	2	-	3	-	-	-	-	2	-	2	1	-
CO2	Explore the various methodologies involved in text sentiment classification.	3	3	2	-	3	-	-	-	-	2	-	2	1	-
CO3	Compare the fusion of Natural Language processing with sentiment analysis.	3	3	2	-	3	-	-	-	-	2	-	2	1	-
CO4	Determine the available sentiment summarization methods.	3	3	2	-	3	-	-	-	-	2	-	2	1	-
CO5	Elaborate the various tools used for sentiment analysis.	3	3	2	-	3	-	-	-	-	2	-	2	1	-
Average		3	3	2	-	3	-	-	-	-	2	-	2	1	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

VALUE ADDED COURSE

20ITV01

PC hardware and Trouble Shooting

L	T	P	C
1	0	2	1

Course Outcomes : On successful completion of the course, the student will be able to

CO1: understand the fundamentals of Hardware.

CO2: understand the operations of basic trouble shooting in hardware

Cognitive Level

Understand

Understand

Module – I Hardware Basics**[7]**

Introduction to computer hardware, components of mother boards & its types-ports, slots, connectors, add on cards, power supply units, and cabinet types

Module – II Hardware Trouble Shooting**[8]**

Hardware Trouble Shooting: Scanner, Network, Hardware failure, Testing, CMOS, CDROM, Hard disk drive, Monitor, Mother Board, Sound Card, Video Card, Printers, floppy drive, Microphone.

Total = 15 Periods**Text Books :**

- 1 Mike Meyers, Introduction to PC Hardware and Troubleshooting, McGraw-Hill Education March 2003
- 2 B Govindarajalu, IBM PC and Clones - "Hardware, Troubleshooting and Maintenance", Tata McGraw - Hill ,Second Edition, 1991.

Reference Books :

- 1 Dan Gookin , "Troubleshooting & Maintaining Your PC All-In-One for Dummies",4th Edition, April 2021
- 2 Prof. S.P.S. Saini, "Troubleshooting and Maintenance of Computers", Vayu Education of India, 2009.

CO-PO MAPPING

Regulation: R 2020

Course Code: 20ITV01

Course Name: PC hardware and Trouble Shooting

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	understand the fundamentals of Hardware.	3	3	-	3	-	3	-	-	-	-	-	-	3	3
CO2	understand the operations of basic trouble shooting in hardware	3	3	-	3	-	3	-	-	-	-	-	-	3	3
Average		3	3	-	3	-	3	-	-	-	-	-	-	3	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

VALUE ADDED COURSE

20ITV02

DEVOPS Technologies

L	T	P	C
1	0	2	1

Course Outcomes : On successful completion of the course, the student will be able to

CO1: Understand the basic concept of DeveOps

CO2: To Utilize the technologies that adopt in various domains

Cognitive Level
 Understand
 Applying
Module - I Introduction to DEVOPS**[7]**

History of Devops - Devops Stakeholders - Devops Goals - Important terminology - Devops perspective - Devops and Agile - Devops Tools - Configuration management - Continuous Integration and Deploymen

Module - II Technologies related to DevOps**[8]**

Version Control with Git - Containerization using Docker - Orchestration using Kubernetes - DevOps on Cloud - AWS EC2 and IAM

Total = 15 Periods**Text Books :**

- Jennifer Davis and Katherine Daniels, "Effective DevOps", Shroff / O'Reilly Publications, 1st Edition 2021.

Reference Books :

- Gene Kim, Jez Humble, Patrick Debois, John Willis, Nicole Forsgren, "The Devops Handbook", It Revolution Press 2nd Edition,, 2021.

CO-PO MAPPING

Regulation: R 2020

Course Code: 20ITV02

Course Name: DEVOPS Technologies

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the basic concept of DeveOps	3	3	3	2	3	3	-	-	-	-	-	-	3	3
CO2	To Utilize the technologies that adopt in various domains	3	3	3	2	3	3	-	-	-	-	-	-	3	3
Average		3	3	3	2	3	3	-	-	-	-	-	-	3	3

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

VALUE ADDED COURSE

20ITV03

Cyber Security Analytics

L	T	P	C
1	0	2	1

Course Outcomes : On successful completion of the course, the student will be able to

CO1: Explain the basic concepts of Cyber security

CO2: Analyze the various security risk management in cyber security

Cognitive Level
 Understand
 Analyzing
Module – I Introduction to Cyber Security**[7]**

Evolution of Information Security, The Current Cyberspace Environment: Introduction to Cyber Risk, Developing Awareness of the Cyber Threat, How Digital transformation impacts cyber security, privacy and security, new cyber trends, Cyber Threat landscape

Module – II Analytics of Security risk Management**[8]**

Data Protection and Data Privacy, Breach Response & Recovery, Cyber Crisis Management, Business Continuity Planning, Identifying Business Continuity requirements, Business Impact analysis, Planning your Continuity, BCP Components, Cost-Benefit Analysis, Availability and Reliability, Risk Evaluation, Business Consequences, Management Consulting Techniques, Industry Case Studies

Total = 15 Periods**Text Books :**

- 1 A.Refsdal, B. Solhaug, K. Stolen, “ Cyber-Risk Management”, Springer, 2015/Latest Edition.
- 2 E. Wheeler, “Security Risk Management”, O’Reilly, 2011/Latest Edition.

Reference Books :

- 1 R. Bentham, “Cyber Risk Management: Practical Strategies to Protect your Organization from Cyber Threats”, Kogan Page, 2018/Latest Edition.
- 2 C.J. Hodson, “Cyber Risk Management: Prioritize Threats, Identify Vulnerabilities and Apply Controls”, Kogan Page, 2019/Latest Edition.

CO-PO MAPPING

Course Code: 20ITV03

Regulation: R 2020

Course Name: Cyber Security Analytics

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	Explain the basic concepts of Cyber security	3	3	-	3	3	-	-	-	2	-	-	-	3	3
CO2	Analyze the various security risk management in cyber security	3	3	-	3	3	-	-	-	2	-	-	-	3	3
Average		3	3	-	3	3	-	-	-	2	-	-	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

R 2020

VALUE ADDED COURSE

20ITV04

R Programming

L	T	P	C
1	0	2	1

Course Outcomes : On successful completion of the course, the student will be able to

CO1: Describe the fundamental concepts in R Programming

CO2: Understand the concept of various datatypes and it functions in R programming

Cognitive Level

Understand

Understand

Module – I Introduction to R**[7]**

What is R? - Why R? - Advantages of R over Other Programming Languages - R Studio: R command Prompt, R script file, comments - Handling Packages in R: Installing a R Package, Few commands to get started: installed.packages(), packageDescription(), help(), find.package(), library() - Input and Output - Entering Data from keyboard - Printing fewer digits or more digits - Special Values functions : NA, Inf and -inf.

Module – II Datatypes & Functions in R-Language**[8]**

R Data Types: Vectors, Lists, Matrices, Arrays, Factors, Data Frame - R - Variables - R Operators - R-Function - R Strings - R vectors - R Arrays - R Factors -creating factors, generating factor levels gl().

Total = 15 Periods**Text Books :**

- 1 Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (India), 2017.
- 2 Norman Matloff , The Art of R programming, No starch press(San Francisco),2011

Reference Books :

- 1 Hadley Wickham & Garrett Golemund, R for Data Science, O'rielly publications,February 2017.

CO-PO MAPPING

Regulation: R 2020

Course Code: 20ITV04

Course Name: R Programming

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Describe the fundamental concepts in R Programming	3	3	-	-	3	3	-	-	-	-	-	-	3	2
CO2	Understand the concept of various datatypes and it functions in R programming	3	3	-	-	3	3	-	-	-	-	-	-	3	2
Average		3	3	-	-	3	3	-	-	-	-	-	-	3	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

VALUE ADDED COURSE**20ITV05****Social Media Manager**

L	T	P	C
1	0	2	1

Course Outcomes : On successful completion of the course, the student will be able to

Cognitive Level

CO1: Understand the fundamental concepts of social media and its various channels in marketing

Understand

CO2: To analyze the social media data analysis

Analyze

Module – I Introduction to Social Media

[7]

What is Social Media? - How Social Media developed, Managing Information - Aggregators, Google Alerts, Blogs. Getting your company ready for Social Media Content Management - Touchpoint analysis, Scheduling, Creating content, Managing content programs, Planning Worksheets.

Module – II Social media analytics

[8]

Social media KPIs (reach and engagement) - Performing social media analytics (business goal, KPIs, data gathering, analysis, measure and feedback) - Pulse metrics - Heart metrics.

Total = 15 Periods**Text Books :**

- 1 Sameer Deshpande, Philip Kotler, Nancy R. Lee ,Social Marketing in India, 1st Edition , November 2013
- 2 Guy Kawasaki, Peg Fitzpatrick ,The Art of Social Media: Power Tips for Power Users , December 2014.

Reference Books :

- 1 Marcus Hart ,Social Media Management: A Complete Guide, Murphy & Moore Publishing September 2023
- 2 Jason McDonald ,Social Media Marketing Workbook,December , 2023

CO-PO MAPPING**Regulation: R 2020****Course Code: 20ITV05****Course Name: Social Media Manager**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the fundamental concepts of social media and its various channels in marketing	3	3	-	-	-	3	-	-	-	-	-	-	3	3
CO2	To analyze the social media data analysis	3	3	-	-	-	3	-	-	-	-	-	-	3	3
Average		3	3	-	-	-	3	-	-	-	-	-	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

VALUE ADDED COURSE**20ITV06****Augmented, virtual, and mixed reality**

L	T	P	C
1	0	2	1

Course Outcomes : On successful completion of the course, the student will be able to **Cognitive Level**
 CO1: Discuss the importance of Virtual reality **Understand**
 CO2: Describe the recent developments of Augmented reality and mixed reality **Understand**

Module - I Introduction of Virtual Reality [7]

Introduction of Virtual Reality: Introduction, Fundamental Concept and Components of Virtual Reality. Primary Features and Present Development on Virtual Reality. Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Virtuality and Immersion, Current trends and state of the art in immersive technologies, developing platforms and consumer devices

Module - II Augmented and Mixed Reality [8]

Augmented and Mixed Reality: Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

Total = 15 Periods**Text Books :**

- 1 Grigore C. Burdea, Philippe Coiffet, Virtual Reality Technology, Wiley, 2016.
- 2 Dieter Schmalstieg and Tobias Höllerer, Augmented Reality: Principles & Practice, Pearson Education India, 2016

Reference Books :

- 1 Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press, 2003/2006.
- 2 Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.

CO-PO MAPPING**Regulation: R 2020****Course Code: 20ITV06****Course Name: Augmented, virtual, and mixed reality**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Discuss the importance of Virtual reality	3	-	3	3	-	3	-	-	-	-	-	-	-	3
CO2	Describe the recent developments of Augmented reality and mixed reality	3	-	3	3	-	3	-	-	-	-	-	-	-	3
Average		3	-	3	3	-	3	-	3						

VALUE ADDED COURSE**20ITV07****Mojo Programming Language**

L	T	P	C
1	0	2	1

Course Outcomes : On successful completion of the course, the student will be able to

CO1: To Understand the basic concepts of Mojo.

CO2: Explain the concepts of object oriented programming in Mojo

Cognitive Level

Understand

Understand

Module – I BASIC FUNCTIONS OF MOJO**[7]**

Introduction to Mojo Programming-Setup and Installation-Functions and Data handling in Mojo-Method Constructors and method Overloading-Object oriented Programming in Mojo:Data types-Classes and Objects-Encapsulation-Inheritance-Polymorphism

Module – II OBJECT ORIENTED PROGRAMMING IN MOJO**[8]**

Manipulating Strings,Arrays,Dictionaries-File I/O operations-Exploring Database Connectivity and Data handling-Building Web Applications-Working with HTTP request and Responses-Integrating Databases and API in WebProjects

Total = 15 Periods**Text Books :**

- 1 Badal Tripathy,Mojo: Programming language for all of AI, Kindle Edition, 2023.

Reference Books :

- 1 Ava Johnson,MOJO : AI's new programming language : The future of AI programming, Kindle Edition, 2023.

CO-PO MAPPING**Regulation: R 2020****Course Code: 20ITV07****Course Name: Mojo Programming Language**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	To Understand the basic concepts of Mojo.	3	3	2	3	3	-	-	-	-	-	-	-	3	2
CO2	Explain the concepts of object oriented programming in Mojo	3	3	2	3	3	-	-	-	-	-	-	-	3	2
Average		3	3	2	3	3	-	3	2						

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

VALUE ADDED COURSE**20ITV08****LIFE SKILLS EDUCATION**

L	T	P	C
1	0	2	1

Course Outcomes : On successful completion of the course, the student will be able to

CO1: Understand the soft skills, hard skills and social emotional learning

CO2: Identify the use of different types of skills in real situations.

Cognitive Level
 Understand
 Applying
Module – I SOCIAL - EMOTIONAL LEARNING**[7]**

Skill Development: Hard skills and Soft skills, Social Emotional Learning (SEL) - Components of SEL - Benefits of Practicing Social Emotional Learning (SEL) - Ways to integrate Social Emotional Learning in the classroom - Emotional Skills: Coping with stress and dealing with emotions - Importance and Benefits of life skills - Humanistic curriculum design and Personal curriculum design

Module – II SOCIAL SKILLS**[8]**

Communication Skills - Interpersonal Skills - Empathy - Cognitive Skills - Presentation Skills - Career Skills-Leadership Skills and Managerial skills

Total = 15 Periods**Text Books :**

- 1 Bhagyashree A Dudhade, Life skills education. Neelkamal PublicationS,2016
- 2 Jain, Usha & Jain, Rajiv Kumar,Life skills - A guide to steer life, Vayo Education of India,2014.

Reference Books :

- 1 James, Larry, The first book lifeskills. Embassy Books,India, 2006.
- 2 Ravikanth Rao,K & Dinakar, P. , Life skills educations, Neelkamal Publications, New Delhi,2018.

CO-PO MAPPING**Regulation: R 2020****Course Code: 20ITV08****Course Name: LIFE SKILLS EDUCATION**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the soft skills, hard skills and social emotional learning	3	-	3	-	-	3	-	-	-	-	-	-	3	3
CO2	Identify the use of different types of skills in real situations.	3	-	3	-	-	3	-	-	-	-	-	-	3	3
Average		3	-	3	-	-	3	-	-	-	-	-	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

VALUE ADDED COURSE

20ITV09

HUMAN RIGHTS EDUCATION

L	T	P	C
1	0	2	1

Course Outcomes : On successful completion of the course, the student will be able to

CO1: Understand the human duties and responsibilities.

CO2: Determine the problems of enforcement of human rights in India.

Cognitive Level
 Understand
 Evaluate
Module – I HUMAN DUTIES AND RESPONSIBILITIES**[7]**

Concept of Humanism, Duties and Responsibilities - Identification of human duties and responsibilities: Towards Self, Family, Community, Society, Nation/State, Poor, Dalit, Down-trodden, Distress, Elders and others - Interrelationships of rights and duties: Harmony and Conflict.

Module – II PROBLEMS OF ENFORCEMENT OF HUMAN RIGHTS IN INDIA**[8]**

Illiteracy, lack of awareness - Abuse and misuse of power - Lack of accountability and transparency in government functioning: Right to Information - Lack of People's Participation in Governance - Social prejudices against caste, women, minorities, etc.- Inequitable access to natural and material resources.

Total = 15 Periods**Text Books :**

- 1 Jack Donnelly, Universal human rights in theory and practices, Manas Publication, New Delhi ,2005
- 2 Mohini Chatterjee, Feminism and women's human rights. Aaviskhkar Publishers and Distributors,2004.

Reference Books :

- 1 Abdulrahim, P. Vijapur, Kumar Suresh (Eds), Perspectives on human rights. New Delhi: Manas Publication, 1999.
- 2 Vijay Kumar, Human rights dimensions and Issues. Anmol Publications, New Delhi, 2003.

CO-PO MAPPING

Regulation: R 2020

Course Code: 20ITV09

Course Name: HUMAN RIGHTS EDUCATION

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Understand the human duties and responsibilities.	3	-	-	3	-	-	-	-	-	-	-	-	-	3
CO2	Evaluate the problems of enforcement of human rights in India.	3	-	-	3	-	-	-	-	-	-	-	-	-	3
Average		3	-	-	3	-	3								

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

VALUE ADDED COURSE

20ITV10	YOGA, HEALTH AND PHYSICAL EDUCATION	L	T	P	C
		1	0	2	1

Course Outcomes : On successful completion of the course, the student will be able to

CO1: Understand the concepts of Yoga and gain knowledge about health education

CO2: Understand about physical education, exercise and effect

Cognitive Level

Understand

Understand

Module - I YOGA AND HEALTH EDUCATION [7]

Meaning and concept of yoga - Aims and objectives - Eight limbs of yoga - Guidelines for practicing yoga - Benefits of yoga - Physiological, psychological, therapeutic and physical.

Health Education: Meaning - aims, objectives and scope - Methods of imparting health education in schools - health instruction, services.

Module - II PHYSICAL EDUCATION AND PHYSICAL EXERCISE [8]

Concept and meaning, definition - aims and objectives of physical education - Scope, Need and importance of physical education - physical fitness: meaning, definition, health related components of Physical fitness: Muscular strength, muscular Endurance, flexibility, cardio respiratory endurance and body composition, benefits of physical fitness. Need and Importance of Physical Aerobics and Anaerobic Exercise - Effects of exercise on the various systems - muscular, circulatory, digestive, nervous and respiratory systems.

Total = 15 Periods

Text Books :

- 1 Gupta D.K., Health education for children, KheelSahitya Kendra, New Delhi , 2005.
- 2 Jothi. K, Nutrition and weight management. International Sushisen publication, Trichy, 2021.
- 3 Nagendra H.R. and Nagaratna R. ,Yoga Prctices. Bangalore: Swami Vivekananda Yoga Prakashana,2008

Reference Books :

- 1 Gore,M.M., Anatomy and Physiology of Yogic Practicies. Motlal Banaras Dass, New Delhi ,2007.
- 2 Pandit Lakshmi Doss,Yogasana for everybody, Balaji Publications Chennai,2002.

CO-PO MAPPING

Regulation: R 2020

Course Code: 20ITV10

Course Name: YOGA, HEALTH AND PHYSICAL EDUCATION

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	Understand the concepts of Yoga and gain knowledge about health education	3	-	3	3	-	-	-	-	-	-	-	-	3	3
CO2	Understand about physical education, exercise and effect	3	-	3	3	-	-	-	-	-	-	-	-	3	3
Average		3	-	3	3		-	3	3						

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

VALUE ADDED COURSE

20ITV11

EDUCATIONAL PSYCHOLOGY

L	T	P	C
1	0	2	1

Course Outcomes : On successful completion of the course, the student will be able to

CO1: Understand the knowledge about various methods of psychology

CO2: Explain the concepts and theories of personality

Cognitive Level

Understand

Understand

Module – I EDUCATIONAL PSYCHOLOGY AND HUMAN GROWTH AND DEVELOPMENT [7]

Psychology: Meaning and definitions-Educational psychology: Meaning, scope and significance - Dimensions of human growth and development: Physical, cognitive, emotional, social, moral and language - Phases of developmental and development tasks - Infancy, childhood and adolescence.

Module – II PERSONALITY [8]

Personality: Meaning, definitions, and determinants of personality - Theories of Personality: Type, trait, and psychoanalytic - Assessment of personality: Projective and non-projective Techniques

Total = 15 Periods**Text Books :**

- 1 Bert Laura, E., Child development. PHI Learning, New Delhi, 2014
- 2 Matthews. G., Deary, L. J., & Whiteman, M.C., Personality: Theory and research. Guilford Publications, 2nd Edition, New York, 2009.

Reference Books :

- 1 Anitha Woolfolk, Educational psychology, Pearson Education, Singapore, 2004
- 2 Sprint Hall Norman, A, & Sprint Hall, Richard, C., Educational psychology: A developmental approaches. New Delhi: 5th Edition, McGraw Hill, 1990

CO-PO MAPPING**Regulation: R 2020****Course Code: 20ITV11****Course Name: EDUCATIONAL PSYCHOLOGY**

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Enable students to acquire knowledge about various methods of psychology	3	3	-	3	-	-	-	-	-	-	-	-	-	3
CO2	Explain the concepts and theories of personality	3	3	-	3	-	-	-	-	-	-	-	-	-	3
Average		3	3	-	3	-	3								

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

VALUE ADDED COURSE

20ITV12	ENVIRONMENTAL EDUCATION	L	T	P	C
		1	0	2	1

Course Outcomes : On successful completion of the course, the student will be able to

CO1: Discuss the need for environmental education

CO2: Analyze the environmental education curriculum

Cognitive Level

Understand

Analyze

Module - I ENVIRONMENTAL EDUCATION [7]

Concept and Meaning of Environment - Components of Environment - Types of Environment - Environmental Awareness - Environmental Attitude - Ecological Intelligence - Ecological Sensitivity - Environmental Education: Focal Aspects of Environmental Education - Goals of Environmental Education - Objectives of Environmental Education - Need and Importance- Scope of Environmental Education.

Module - II ENVIRONMENTAL EDUCATION IN SCHOOL CURRICULUM [8]

Status of Environmental Education in School Curriculum - Environmental Education at different levels of School Education - Innovative Methods of Teaching Environmental Education - Problems faced in Teaching Environmental Education - Role of UNEP, CEE and NCERT in promoting Environmental Education

Total = 15 Periods

Text Books :

- 1 Archana, T., Environmental education. Kalpaz Publications, 2011.
- 2 Palmer, J.A., Environmental education in the 21st Century: Theory, practice, progress, and promise. Routledge, 1998.

Reference Books :

- 1 Maria, C. M, Effect of ecological intelligence on developing ecological sensitivity among prospective teachers. Shashwat Publication, 2020.

CO-PO MAPPING

Regulation: R 2020

Course Code: 20ITV12

Course Name: ENVIRONMENTAL EDUCATION

CO	Course Outcomes	Programme Outcomes													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	Realise the need for environmental education	3	3	-	3	-	-	-	-	-	-	-	-	-	3
CO2	Analyse the environmental education curriculum	3	3	-	3	-	-	-	-	-	-	-	-	-	3
Average		3	3		3	-	3								

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)