



**KSR** College of  
Engineering

AN AUTONOMOUS INSTITUTION

NAAC  
ACCREDITED **A++**

NBA  
ACCREDITED  
PROGRAMMES



**25**  
Years  
KSRCE  
2001 - 2026  
Celebrating  
Academic Excellence

## B.E. - ELECTRICAL AND ELECTRONICS ENGINEERING

# REGULATIONS 2024

(Academic Year 2024-25 Onwards)

## Curriculum & Syllabus Semester I to IV







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

(Autonomous)

### DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

#### B.E. - Electrical and Electronics Engineering

(REGULATIONS 2024)

#### **Vision of the Institution**

**IV** To become a globally renowned institution in Engineering and Management, committed to providing holistic education that fosters research, innovation and sustainable development.

#### **Mission of the Institution**

**IM 1** Deliver value-based quality education through modern pedagogy and experiential learning.

**IM 2** Enrich Engineering and Managerial Skills through cutting-edge laboratories to meet evolving global demands.

**IM 3** Empower research and innovation by integrating collaboration, social responsibility, and commitment to sustainable development.

#### **Vision of the Department**

**DV** To produce competent Electrical and Electronics Engineers driving sustainable solutions through quality education and research.

#### **Mission of the Department**

**DM 1** Provide transformative education in Electrical and Electronics Engineering by integrating modern pedagogy and technology-enhanced learning.

**DM 2** Deliver holistic, value-driven education through cutting-edge laboratory facilities that meet the evolving needs of global industries.

**DM 3** Promote collaborative and interdisciplinary research to develop sustainable solutions.

#### **Programme Educational Objectives (PEOs): B.E. - Electrical and Electronics Engineering**

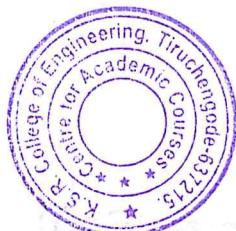
##### **The graduates of the programme will be able to**

**PEO 1** **Core Competency:** Graduates will exhibit strong technical knowledge in Electrical and Electronics Engineering to analyze, design and develop sustainable engineering solutions.

**PEO 2** **Professionalism:** Graduates will integrate interdisciplinary knowledge and ethical responsibility to develop innovative solutions addressing societal challenges.

**PEO 3** **Career Development:** Graduates will engage in lifelong learning and research for sustainable development to meet the evolving needs of the industry.

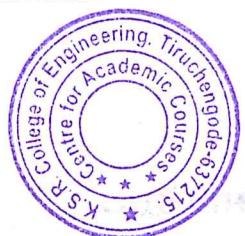
  
Chairman (BOG)



## Programme Outcomes (POs) of B.E. - Electrical and Electronics Engineering

Program Outcomes (POs)	
<b>PO1</b>	<b>Engineering Knowledge:</b> Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
<b>PO2</b>	<b>Problem Analysis:</b> Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
<b>PO3</b>	<b>Design/Development of Solutions:</b> Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
<b>PO4</b>	<b>Conduct Investigations of Complex Problems:</b> Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
<b>PO5</b>	<b>Engineering Tool Usage:</b> Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
<b>PO6</b>	<b>The Engineer and The World:</b> Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
<b>PO7</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
<b>PO8</b>	<b>Individual and Collaborative Team work:</b> Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
<b>PO9</b>	<b>Communication:</b> Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
<b>PO10</b>	<b>Project Management and Finance:</b> Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
<b>PO11</b>	<b>Life-Long Learning:</b> Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)
Program Specific Outcomes (PSOs)	
<b>PSO1</b>	<b>Power and Energy Systems:</b> Design, operate, maintain efficient and sustainable electrical power systems with renewable energy integration.
<b>PSO2</b>	<b>Embedded System and Automation:</b> Develop embedded, real-time control systems, and power electronic solutions for industrial process automation.

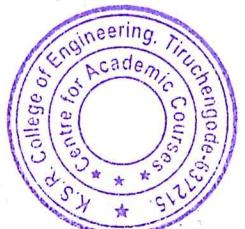
  
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	<b>K.S.R. COLLEGE OF ENGINEERING</b> Autonomous Institution Approved by AICTE and Affiliated to Anna University, Chennai Accredited by NAAC ('A++' Grade)										Curriculum UG R - 2024			
	Department	Department of Electrical and Electronics Engineering												
Programme	B.E - Electrical and Electronics Engineering													
<b>SEMESTER - I</b>														
S. No.	Course Code	Course Title	Categ ory	Periods per semester					Credit	Max. Marks				
				L	T	P	SL	Tot.	C= T/30	CA	ES	Total		
Induction Programme			MC	-	-	-	-	-	-	-	-	-		
<b>THEORY COURSES</b>														
1.	24ENT19	Professional Communication	HSMC	45	0	0	45	90	3	40	60	100		
2.	24ITT16	Programming for Problem Solving	ESC	45	0	0	45	90	3	40	60	100		
3.	24GET19	தமிழ் மரபு / Heritage of Tamils	HSMC	15	0	0	15	30	1	40	60	100		
<b>THEORY COURSES WITH LABORATORY COMPONENT</b>														
4.	24MAI19	Matrices and Calculus	BSC	30	15	30	45	120	4	50	50	100		
5.	24PHI07	Engineering Physics	BSC	45	0	30	45	120	4	50	50	100		
6.	24CHI06	Chemistry for Engineers	BSC	45	0	30	45	120	4	50	50	100		
<b>LABORATORY COURSES</b>														
7.	24ITP16	Programming for Problem Solving Laboratory	ESC	0	0	30	0	30	1	60	40	100		
8.	24MEP16	Engineering Graphics Laboratory	ESC	15	0	30	15	60	2	60	40	100		
9.	24GEP16	Engineering Experience Laboratory	ESC	0	0	30	0	30	1	60	40	100		
<b>EMPLOYABILITY ENHANCEMENT COURSES</b>														
10.	24SSP19	Aptitude and Coding Skills – I	EEC	0	0	30	0	30	1	60	40	100		
<b>MANDATORY COURSES</b>														
11.	-	Mandatory Course – I	MC	0	0	30	0	30	-	-	-	-		
Total				240	15	240	255	750	24	1000				



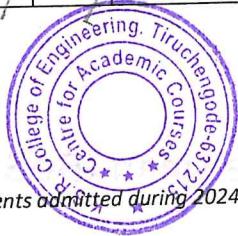
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SEMESTER - II												
S. No.	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot.		C= T/30	CA	ES
<b>THEORY COURSES</b>												
1.	24CST29	Python Programming	ESC	45	0	0	45	90	3	40	60	100
2.	24ECT21	Design Thinking	PCC	30	0	0	30	60	2	40	60	100
3.	24GET29	தமிழரும் தொழில்நுட்பமும் / Tamil and Technology	HSMC	15	0	0	15	30	1	40	60	100
<b>THEORY COURSES WITH LABORATORY COMPONENT</b>												
4.	24MAI29	Probability and Statistics	BSC	30	15	30	45	120	4	50	50	100
5.	24EEI21	Electric Circuit Analysis	PCC	45	0	30	45	120	4	50	50	100
6.	24EEI22	Analog Electronics	PCC	45	0	30	45	120	4	50	50	100
<b>LABORATORY COURSES</b>												
7.	24ENP29	Professional Communication Laboratory	HSMC	0	0	30	0	30	1	60	40	100
8.	24CSP29	Python Programming Laboratory	ESC	0	0	30	0	30	1	60	40	100
<b>EMPLOYABILITY ENHANCEMENT COURSES</b>												
9.	24SSP29	Aptitude and Coding Skills - II	EEC	0	0	30	0	30	1	60	40	100
				Total	210	15	180	225	630	21	900 ✓	

SEMESTER - III												
S. No.	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot.		C= T/30	CA	ES
<b>THEORY COURSES</b>												
1.	24MAT38	Transforms and Partial Differential Equations	BSC	45	15	0	60	120	4	40	60	100
2.	24EET31	Electromagnetic Field Theory	PCC	45	15	0	60	120	4	40	60	100
3.	24EET32	Electrical Machines - I	PCC	45	15	0	60	120	4	40	60	100
4.	24EET33	Linear Integrated Circuits	PCC	45	0	0	45	90	3	40	60	100
5.	24EET34	Digital Logic Circuits	PCC	45	15	0	60	120	4	40	60	100
<b>LABORATORY COURSES</b>												
6.	24EEP31	Electrical Machines - I Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
7.	24EEP32	Linear and Digital Circuits Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
8.	24ECP36	Design Studio - I	ESC	0	0	30	0	30	1	60	40	100
<b>EMPLOYABILITY ENHANCEMENT COURSES</b>												
9.	24SDP39	Soft Skills Development - III	EEC	0	0	30	0	30	1	60	40	100
				Total	225	60	150	285	720	24	900 ✓	

  
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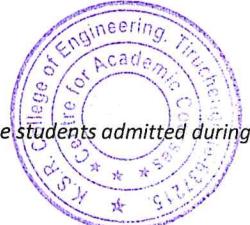


SEMESTER - IV												
S. No.	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot.		C= T/30	CA	ES
<b>THEORY COURSES</b>												
1.	24MAT46	Linear Algebra and Numerical Methods	BSC	45	15	0	60	120	4	40	60	100
2.	24EET41	Electrical Machines - II	PCC	45	15	0	60	120	4	40	60	100
3.	24EET42	Generation, Transmission and Distribution	PCC	45	15	0	60	120	4	40	60	100
4.	24EET43	Measurements and Instrumentation	PCC	45	0	0	45	90	3	40	60	100
5.	24GET49	Universal Human Values	HSMC	45	0	0	45	90	3	40	60	100
6.	-	Open Elective - I	OEC	45	0	0	45	90	3	40	60	100
<b>LABORATORY COURSES</b>												
7.	24EEP41	Electrical Machines - II Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
8.	24EEP42	Design Studio - II	PCC	0	0	30	0	30	1	60	40	100
<b>EMPLOYABILITY ENHANCEMENT COURSES</b>												
9.	24SDP49	Soft Skills Development - IV	EEC	0	0	30	0	30	1	60	40	100
				Total	270	45	105	315	735	24.5	900	

SEMESTER - V												
S. No.	Course Code	Course Title	Category	Periods per semester					Credit	Max. Marks		
				L	T	P	SL	Tot.		C= T/30	CA	ES
<b>THEORY COURSES</b>												
1.	24EET51	Power System Analysis	PCC	45	15	0	60	120	4	40	60	100
2.	24EET52	Control Systems	PCC	45	15	0	60	120	4	40	60	100
3.	24EET53	Power Electronics	PCC	45	0	0	45	90	3	40	60	100
4.	-	Professional Elective - I	PEC	45	0	0	45	90	3	40	60	100
5.	-	Open Elective - II	OEC	45	0	0	45	90	3	40	60	100
<b>THEORY COURSES WITH LABORATORY COMPONENT</b>												
6.	24EEI51	Microprocessors and Microcontrollers	PCC	45	0	30	45	120	4	50	50	100
<b>LABORATORY COURSES</b>												
7.	24EEP51	Power System Simulation Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
8.	24EEP52	Control and Instrumentation Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
9.	24EEP53	Power Electronics Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
<b>MANDATORY COURSE</b>												
10.	-	Mandatory Course - II	MC	30	0	0	0	30	0	100	-	100
<b>EMPLOYABILITY ENHANCEMENT COURSES</b>												
11.	24EEP54	Internship - I*	EEC	0	0	0	30	0	1	100	-	100
				Total	300	30	165	330	795	26.5	1100	

\*The students should undergo internship during the IV semester summer vacation.

  
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24ENT19	PROFESSIONAL COMMUNICATION	Category	L	T	P	SL	C						
		HSMC	45	0	0	45	3						
<b>(Common to All Branches)</b>													
<b>PRE-REQUISITE:</b>													
A comprehensive understanding of basic English grammar, vocabulary, and sentence structure with familiarity in Communication and Technical Writing are considered as pre-requisite for the course.													
<b>OBJECTIVE:</b>													
To equip learners with essential verbal and written communication skills, including technical writing, necessary for academic, professional, and workplace success.													
<b>UNIT - I</b>	<b>UNDERSTANDING COMPARISONS AND CONTRASTS</b>						<b>(9)</b>						
<b>Reading:</b> Technical brochures, telephone messages, social media messages.													
<b>Writing:</b> Emails/letters introducing oneself, Compare and Contrast Essay.													
<b>Grammar:</b> Present Tenses, Framing WH and Yes-No questions.													
<b>Vocabulary:</b> Portmanteau words, One-word substitutions.													
<b>UNIT - II</b>	<b>WRITING REPORTS AND PARAGRAPHS</b>						<b>(9)</b>						
<b>Reading:</b> Technical texts, biographies, travelogues, travel & technical blogs.													
<b>Writing:</b> Paragraph writing, Short Report on an event/industrial visit.													
<b>Grammar:</b> Past Tenses, Active & Passive Voice transformations, Prepositions.													
<b>Vocabulary:</b> Word formations using Prefixes & Suffixes.													
<b>UNIT - III</b>	<b>DESCRIBING THE PROCESS/PRODUCT</b>						<b>(9)</b>						
<b>Reading:</b> Advertisements, gadget reviews, user manuals, news reports.													
<b>Writing:</b> Definitions, Instructions, Product/Process description, Checklists.													
<b>Grammar:</b> Future Tenses, If clauses, Concord.													
<b>Vocabulary:</b> Nominal Compounds, Discourse Markers (connectives & sequence words).													
<b>UNIT - IV</b>	<b>TRANSCODING AND RECOMMENDATIONS</b>						<b>(9)</b>						
<b>Reading:</b> Newspaper articles, Journal reports.													
<b>Writing:</b> Recommendations, Transcoding.(Conversion of non-verbal to verbal information)													
<b>Grammar:</b> Articles, Relative pronouns, Modals.													
<b>Vocabulary:</b> Collocations, Homonyms.													
<b>UNIT - V</b>	<b>SUMMATION AND DESCRIPTION</b>						<b>(9)</b>						
<b>Reading:</b> Editorials and Opinion blogs, Company profiles.													
<b>Writing:</b> Descriptive/Narrative Essays, Job/Internship Application with Resume.													
<b>Grammar:</b> Numerical adjectives, Relative Clauses.													
<b>Vocabulary:</b> Cause & Effect Expressions, Homophones.													
<b>TOTAL (T:45 , SL:45) = 90 PERIODS</b>													

*Chairman (BOS)*



**COURSE OUTCOMES:****At the end of the course, the learners will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Recognize the structure of comparison texts using correct tenses and appropriate vocabulary.	Understand
CO2	Construct short paragraphs and reports using past tense and clear expressions.	Understand
CO3	Comprehend processes and products using future forms and appropriate vocabulary.	Understand
CO4	Interpret visuals like charts or graphs to produce well-structured written content.	Understand
CO5	Draft essays and job applications clearly, using proper grammar and structure.	Understand

**TEXT BOOKS:**

1. English for Engineers & Technologists, Orient Blackswan Private Ltd. Department of English, Anna University, 2023.
2. Nitin Bhatnagar, Communicative English for Engineers and Professionals, Pearson, 2024.

**REFERENCES:**

1. Dr. K.N. Shoba, and Dr. Lourdes Joevani, English for Science & Technology-II Cambridge University Press. Francis, Department of English, Anna University, 2023.
2. Lakshminarayanan, A Course Book on Technical English, Scitech Publications (India) Pvt. Ltd.2022.
3. Kulbhushan Kumar, RS Salaria, Effective Communication Skill, Khanna Publishing House, 2023.

**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	2	3	-	3	-	-
CO2	-	-	-	-	-	-	-	2	3	-	3	-	-
CO3	-	-	-	-	-	-	-	2	3	-	3	-	-
CO4	-	-	-	-	-	-	-	2	3	-	3	-	-
CO5	-	-	-	-	-	-	-	2	3	-	3	-	-

1-Low, 2-Medium, 3-High



**Chairman (BoS)**



24ITT16	PROGRAMMING FOR PROBLEM SOLVING	Category	L	T	P	SL	C						
		ESC	45	0	0	45	3						
(Common to AUTO, BME, CSE, CSE(CS), CSD, CSE (IoT), IT, ECE, EEE, MECH & SFE)													
<b>PREREQUISITE:</b>													
<p>Students must have basic computer literacy, including familiarity with operating systems, file management, and software usage. A Basic understanding of algorithms and flowcharts are required to design and visualize problem solving strategies. Students must have basic knowledge on programming principles, such as variables, simple data types, control structures, problem solving and logical thinking skills.</p>													
<b>OBJECTIVE:</b>													
<p>The course introduces fundamental programming concepts using the C language, covering computer organization, algorithm representation, and basic syntax. Students will learn control structures, functions, arrays, pointers, and string handling. The course also covers complex data types like structures and unions, storage classes, and file operations. By the end, students will be able to analyze problems, design algorithms, and implement solutions using C programming.</p>													
<b>UNIT - I</b>	<b>INTRODUCTION TO COMPUTING AND C</b>	<b>(9)</b>											
<p>Introduction to Computing: Organization of computer – Hardware and Software – Number system and Conversions – Representation of an algorithm: pseudo code, flowchart with examples. Introduction to C –features of C – Structure of C program – Character set – C tokens – Keywords – Identifiers – Constants – Variables – Data types – Operators – Precedence and Associativity.</p>													
<b>UNIT - II</b>	<b>CONTROL STRUCTURES</b>	<b>(9)</b>											
<p>Decision Making and Branching: Introduction – decision making with if statement – simple if statement – if-else statement – nested if-else statements – if-else-if ladder statement – switch statement – goto statement – conditional operator – Decision making and looping: Introduction – while statement – do-while statement – for statement.</p>													
<b>UNIT - III</b>	<b>FUNCTIONS AND ARRAY</b>	<b>(9)</b>											
<p>Functions: Declaration and definition – Function prototype – parameter and arguments – Return type – passing argument by value and by reference – Function scope and lifetime – Function pointer – Arrays: array declaration and initialization – One dimensional array and Two dimensional array with example.</p>													
<b>UNIT - IV</b>	<b>POINTERS AND STRINGS</b>	<b>(9)</b>											
<p>Pointers: Definition – Initialization – Pointer's arithmetic – Pointers to pointers – Pointers and arrays. String: Declaring and initializing string variables – String handling functions and operations.</p>													
<b>UNIT - V</b>	<b>STRUCTURE, UNION AND FILE</b>	<b>(9)</b>											
<p>Structures: Declaration – Definition – Structure within a structure – Union – Storage classes – Preprocessor directives – Files: Defining and opening a file – Closing a file – input/output operations on files – Command line arguments.</p>													
<b>L= 45, T=0, P=0, SL=45, TOTAL: 90 PERIODS</b>													

  
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**COURSE OUTCOMES:****At the end of the course, the learners will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Discuss about number systems and perform conversions between different number systems and depict about basic structure of C program.	Understand
CO2	Apply the concept of Looping and conditional statements to solve real-world programming problems efficiently..	Apply
CO3	Develop modular programs using functions and implement single and two-dimensional arrays for efficient data storage and manipulation.	Apply
CO4	Apply pointer concepts with arrays and functions, and develop efficient C programs using string operations for effective memory management and text processing.	Apply
CO5	Implement user-defined data types using structures and unions, manage memory with storage classes and perform file operations and command-line processing in C programs.	Apply

**TEXT BOOKS:**

1. Herbert Schildt, C - The Complete Reference, Tata McGraw-Hill, New Delhi, Fourth Edition, 2017.
2. Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, Third Edition, 2011.

**REFERENCES:**

1. Yashavant Kanetkar, "Let Us C: Authentic guide to C programming language", BPB Publication, Nineteenth Edition, 2022.
2. Robert C. Seacord, "Effective C", No Starch Press, 2020.
3. E Balagurusamy, "Programming In Ansi C", McGraw Hill Education, Eighth Edition, 2019.
4. Ashok N. Kamathane, 'Computer Programming, Pearson Education, India, Third Edition, 2015.
5. <https://archive.nptel.ac.in/courses/106/105/106105171/>

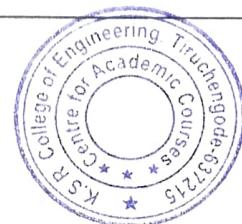
**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	1	1	-	-	-	2
CO2	3	3	3	-	-	-	-	1	1	-	-	-	2
CO3	3	3	3	-	-	-	-	1	1	-	-	-	2
CO4	3	3	3	-	-	-	-	1	1	-	-	-	2
CO5	3	3	3	-	-	-	-	1	1	-	-	-	2

1 - Low, 2 - Medium, 3 - High

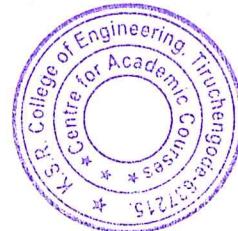


**Chairman (BoS)**



24GET19	தமிழ்மரபு	CATEGORY	L	T	P	SL	C						
		HSMC	15	0	0	15	1						
(அனைத்து துறைகளுக்கும் பொதுவானது)													
முன்கூட்டிய துறைசார் அறிவு : தேவை இல்லை													
அலகு - I	மொழி மற்றும் இலக்கியம்						[03]						
<p>இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்வியலயக்கியங்கள் - சங்க இலக்கியத்தின் சமயச்சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ் காப்பியங்கள், தமிழகத்தில் சமணபொத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கியவளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.</p>													
அலகு - II	மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை						[03]						
<p>நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஜம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத்தெய்வங்கள் - குமரியுனியில் திருவள்ளுவர் சிலை - இசை கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூகபொருளாதார வாழ்வில் கோவில்களின் பங்கு.</p>													
அலகு - III	நாட்டுப் புறக் கலைகள் மற்றும் வீர வினையாட்டுக்கள்						[03]						
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் வினையாட்டுகள்.													
அலகு - IV	தமிழர்களின் தினைக் கோட்பாடுகள்						[03]						
<p>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.</p>													
அலகு - V	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு						[03]						
<p>இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறபகுதிகளில் தமிழ் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்தமருத்துவத்தின் பங்கு கல்வெட்டுகள் கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.</p>													
Total (L= 15, SL=15) =30 Periods													

  
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பாடம் கற்றத்தின் விளைவுகள்: பாடத்தை வெற்றிகரகமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்		அறிவாற்றல் நிலை
CO1:	தமிழ்மொழியின் செந்ததன்மை மற்றும் இலக்கியம் குறித்த தெரிதல்	புரிதல்
CO2:	தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக் கருவிகள் குறித்த தெளிவு	புரிதல்
CO3:	தமிழர்களின் நாட்டுப் புரைக் கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்த தெளிவு	புரிதல்
CO4:	தமிழர்களின் தினைக் கோட்பாடுகள், சங்ககாலவணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள்.	புரிதல்
CO5:	இந்திய தேசிய இயக்கம், சுயமரியாதை இயக்கம் மற்றும் சித்த மருத்தவம் பற்றிய புரிதல்.	புரிதல்

## Text Books:

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

## Reference Books :

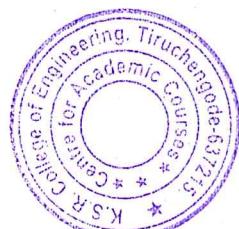
1	கீழடி-வைகை நடுக்கரையில் சங்ககால நகரநாகரிகம் (தொல்லியல்துறைவெளியீடு)
2	பொருநை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
3	Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL - (in print)
4	Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published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

## Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	3	3	-	2	-	3	-	-
Avg.	-	-	-	-	-	3	3	-	2	-	3	-	-

- சிறிது (குறைந்த)
- மிதமான (நடுத்தர)
- கணிசமான (உயர்)

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24GET19	HERITAGE OF TAMILS	CATEGORY	L	T	P	SL	C						
		HSMC	15	0	0	15	1						
(Common to all branches)													
<b>Prerequisite(s):</b> No prerequisites are needed for enrolling into the course													
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, Oyillattam, 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, SL=15) =30 Periods													
<b>Course Outcomes:</b>													
At the end 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							

  
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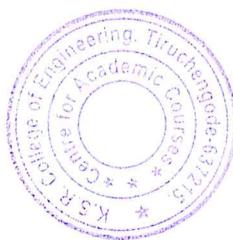


Text Books:	
1	Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
2	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies)
Reference Books:	
1	Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).
2	The Contribution of the Tamil to Indian Culture (Dr.M.Valarmathi) (Published 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)

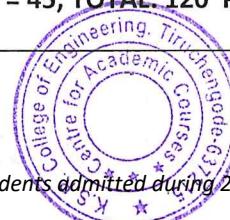
Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	3	3	-	2	-	3	-	-
Avg.	-	-	-	-	-	3	3	-	2	-	3	-	-

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

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24MAI19	MATRICES AND CALCULUS	Category	L	T	P	SL	C						
		BSC	30	15	30	45	4						
<b>SEMESTER I - B.E / B.TECH ( Common to All Branches )</b>													
<b>PREREQUISITE</b>													
The Students should have a basic understanding of calculus, matrices, and differential equations to effectively follow the concepts in this course.													
<b>OBJECTIVES:</b>													
Build a strong foundation in eigen values, eigen vectors, quadratic forms, and higher-order linear differential equations. Develop skills in differential and vector calculus to analyze curves, optimize multivariable functions, and interpret vector fields.													
<b>UNIT - I</b>	<b>LINEAR ALGEBRA</b>	<b>(9)</b>											
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.													
<b>UNIT - II</b>	<b>ORDINARY DIFFERENTIAL EQUATIONS</b>	<b>(9)</b>											
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.													
<b>UNIT - III</b>	<b>DIFFERENTIAL CALCULUS</b>	<b>(9)</b>											
Curvature - Radius of curvature (Cartesian co-ordinates only) – Centre of curvature and Circle of curvature – Involutes and Evolutes (Parabola, Ellipse, Hyperbola and Rectangular hyperbola ).													
<b>UNIT - IV</b>	<b>FUNCTIONS OF SEVERAL VARIABLES</b>	<b>(9)</b>											
Partial derivatives – Euler's theorem for homogenous functions – Taylor's series expansion - Maxima and Minima for functions of two variables – Method of Lagrangian multipliers.													
<b>UNIT - V</b>	<b>VECTOR CALCULUS</b>	<b>(9)</b>											
Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Green's theorem in plane, Gauss divergence theorem and Stoke's theorem (Cube, Cuboid and Rectangular Parallelopiped only).													
<b>List of Exercise/Experiments(MAT LAB):</b>													
<ol style="list-style-type: none"> <li>1. Calculate the characteristic equation and eigenvalues</li> <li>2. Find the eigenvector and diagonalization of a given matrix.</li> <li>3. SolvingODE with constant coefficients</li> <li>4. Detect the solution of ODE with variable coefficients</li> <li>5. Identifythe radius of curvature</li> <li>6. Establish theEvolute of curve.</li> <li>7. Reckon the Taylor's series for functions of two variables.</li> <li>8. Computethe maxima and minima.</li> <li>9. Estimate the directionalderivative, divergence and curl.</li> <li>10. Determine line integral, surface integral and volume integral.</li> </ol>													
<b>L = 30 , T = 15 &amp; P = 30 &amp; SL = 45, TOTAL: 120 PERIODS</b>													



**COURSE OUTCOMES:****At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Apply eigen values, eigen vectors, and the Cayley-Hamilton theorem to solve matrix problems and diagonalize quadratic forms into canonical form.	Apply
CO2	Apply methods to solve second and higher-order linear differential equations with constant and variable coefficients.	Apply
CO3	Apply concepts of differential calculus to find curvature, center of curvature, and evolutes of standard Cartesian conic sections.	Apply
CO4	Apply partial derivatives, Jacobians, and lagrangian multipliers to determine local extremum of multivariable functions.	Apply
CO5	Apply vector differential operators to the vector fields and verify Green's, Gauss divergence, and Stokes' theorems for geometries.	Apply

**TEXT BOOKS:**

1. Ravish R Singh and Mukul Bhatt, "Engineering Mathematics – I", Mc-Graw Hill Publications, New Delhi, 2<sup>nd</sup> Edition, 2020.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40<sup>th</sup> Edition, 2020.

**REFERENCES:**

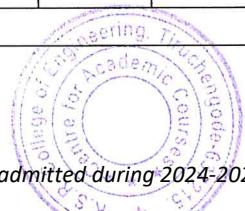
1. Bali N. P and Manish Goyal, "Engineering Mathematics", Laxmi Publications Pvt Ltd., 7<sup>th</sup> Edition, 2020.
2. Dass H.K, "Advance Engineering Mathematics", S. Chand and company, 11<sup>th</sup> Edition, 2014.
3. Jain R.K. and Iyengar S.R.K, " Advanced Engineering Mathematics", Narosa Publications, 8<sup>th</sup> Edition, 2012.
4. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, New Delhi, 10<sup>th</sup> Edition 2016.
5. <https://archive.nptel.ac.in/courses/111/108/111108157/>
6. <https://archive.nptel.ac.in/courses/111/105/111105122/>

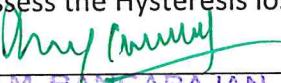
**Mapping of COs with POs and PSOs**

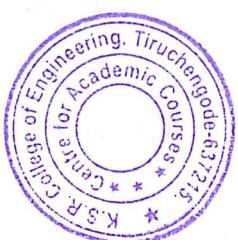
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	2	-	-	1	-	-	2	-	-
CO2	3	3	3	3	2	-	-	1	-	-	2	-	-
CO3	3	3	3	3	2	-	-	1	-	-	2	-	-
CO4	3	3	3	3	2	-	-	1	-	-	2	-	-
CO5	3	3	3	3	2	-	-	1	-	-	2	-	-
Avg.	3	3	3	3	2	0	0	1	0	0	2	0	0

1-low, 2-medium, 3-high

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24PHI07	ENGINEERING PHYSICS	Category	L	T	P	SL	C						
		BSc	45	-	30	45	4						
(Common to AIDS, BME, CSE, CSE(IoT), CS, ECE, EEE & IT)													
<b>PREREQUISITE:</b> The students must have knowledge about basic concepts of light sources, dual nature of radiation, conductivity of metals, semiconducting materials, different types of magnetic materials, super conducting materials and their applications.													
<b>OBJECTIVES:</b> To provide a comprehensive understanding of the fundamental principles, mechanisms, applications of lasers, fiber optics, quantum physics, semiconductors, magnetic materials and superconductors in modern Science and technology.		( 9 )											
<b>UNIT – I</b>	<b>LASER AND FIBRE OPTICS</b>	( 9 )											
<b>Lasers:</b> Principles of spontaneous emission and stimulated emission - Einstein's co-efficient A & B- population inversion – CO <sub>2</sub> laser – semiconductor diode laser – homo – junction & hetero – junction (qualitative analysis only) – applications.													
<b>Fibre Optics:</b> propagation of light in optical fibre – numerical aperture and acceptance angle – types of optical fibre (materials, refractive index profile and modes of propagation) – applications -fibre optic sensors: pressure and displacement sensors.													
<b>UNIT – II</b>	<b>QUANTUM MECHANICS</b>	( 9 )											
Introduction – black body radiation – Planck's theory (derivation) – deduction of Wien's displacement law and Rayleigh – Jean's Law from Planck's theory – Compton effect (derivation) – de-Broglie concept of matter waves – physical significance of a wave function – Schrödinger wave equations (Time dependent & time independent) – particle in a box (one dimensional).													
<b>UNIT – III</b>	<b>CONDUCTING MATERIALS</b>	( 9 )											
Classical free electron theory – expression for electrical conductivity – thermal conductivity – Wiedemann-Franz law – drawbacks of classical free electron theory – quantum theory – Fermi energy – Fermi -Dirac distribution function – density of states and carrier concentration of metals.													
<b>UNIT – IV</b>	<b>SEMICONDUCTING MATERIALS</b>	( 9 )											
Introduction – Intrinsic semiconductor: carrier concentration in an intrinsic semiconductor – Fermi level of an intrinsic semiconductor – variation of Fermi energy level with temperature – Extrinsic semiconductors: carrier concentration in n- type and p-type semiconductors (qualitative analysis only) – Fermi level of extrinsic semiconductors – variation of Fermi energy level with temperature and carrier concentration in an extrinsic semiconductors – Hall effect – determination of Hall co-efficient for n – and p – type semiconductors – applications.													
<b>UNIT – V</b>	<b>MAGNETIC AND SUPERCONDUCTING MATERIALS</b>	( 9 )											
<b>Magnetic Materials:</b> Introduction – origin of magnetic moment – dia, para and ferromagnetic materials – domain theory of ferro-magnetism – Hysteresis – soft and hard magnetic materials.													
<b>Superconducting Materials:</b> Introduction to superconductivity – properties and types of superconductor – application of superconductors: magnetic levitation – SQUIDS – cryotron.													
<b>List of exercises/experiments:</b>													
<ol style="list-style-type: none"> <li>1. Determine the thickness of the given thin paper using Air wedge method.</li> <li>2. Find the acceptance angle and numerical aperture of a given optical fibre.</li> <li>3. Evaluate the wavelength of semiconductor laser.</li> <li>4. Estimate the particle size of the lycopodium powder using semiconductor laser</li> <li>5. Enumerate the thermal conductivity of a bad conductor by Lee's disc method.</li> <li>6. Compute the band gap of an intrinsic semiconductor.</li> <li>7. Calculate the width of the CD groove with a help of semiconductor laser.</li> <li>8. Assess the Hysteresis loss of magnetic materials using B-H curve.</li> </ol>													
 <b>Dr. R. V. M. RANGARAJAN</b> <sup>Chairman</sup>													
<b>Lecture: 45, Laboratory: 30, SL:45, TOTAL: 120 PERIODS</b>													
<sup>BOARD OF STUDIES (S&amp;H)</sup> <sup>K.S.R. COLLEGE OF ENGINEERING</sup> <sup>TIRUCHENGODE-637402</sup> <sup>* * Centre for Academic Courses * *</sup> <sup>K.S.R. College of Engineering and Syllabi (R 2024)</sup>													



At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive level
CO1	Elucidate laser principles, types, light propagation and the applications of optical fibers.	Understand
CO2	Apply quantum theory for Planck's theory, Compton Effect and Schrödinger's equation of matter waves.	Apply
CO3	Calculate electrical conductivity and Fermi energy by considering quantum free electron theory.	Apply
CO4	Infer charge carrier behavior in intrinsic, extrinsic semiconductors and Hall effect.	Understand
CO5	Describe principles, classifications, applications of magnetic materials and superconductors.	Understand

**Text Books :**

1. M.N. Avadhanulu and P.G. Kshirsagar, "A text book of Engineering Physics", S. Chand and Company, New Delhi, 11<sup>th</sup> Edition, 2018.
2. R.K. Gaur & S.L. Gupta, "Engineering Physics", Dhanpat Rai Publication, New Delhi, 7<sup>th</sup> Edition, 2014.

**Reference Books :**

1. R. Murugesan and Kiruthiga Sivaprasath, "Modern Physics", S. Chand & Company, New Delhi, 17<sup>th</sup> Edition, 2014.
2. V. Rajendran, "Engineering Physics", Tata McGraw-Hill, New Delhi, 1<sup>st</sup> Edition, 2011.
3. S.O. Pillai, "Solid State Physics", New Age Publication, Chennai, 10<sup>th</sup> Edition, 2023.
4. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "Concepts of Modern Physics", McGraw-Hill, New Delhi, 7<sup>th</sup> Edition, 2015.

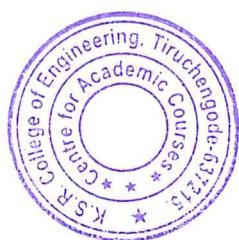
**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO 2
CO1	3	2	-	-	-	-	1	2	2	-	2	-	-
CO2	3	3	2	-	-	-	1	2	2	-	2	-	-
CO3	3	3	2	-	-	-	1	2	2	-	2	-	-
CO4	3	2	-	-	-	-	1	2	2	-	2	-	-
CO5	3	2	-	-	-	-	1	2	2	-	2	-	-
Avg.	3	2	-	-	-	-	1	2	2	-	2	-	-

1-low, 2-medium, 3-high

  
BoS chairman

**Chairman (BoS)**

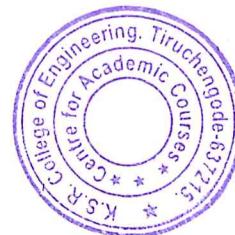


**24PHI07 - ENGINEERING PHYSICS**  
**I Year B.E (AIDS, BME, CSE, CSE (IOT), CS, ECE, EEE & B.Tech IT)**  
**Requirements for a batch of 30 students**  
**Regulation (2024)**

S.No.	Description of Equipment	Quantity required
1.	Air wedge apparatus. (with traveling microscope and accessories)	5 Nos
2.	Acceptance angle and numerical aperture of an optical fibre. (with accessories)	5 Nos
3.	Wavelength of semiconductor laser beam. ( with accessories)	5 Nos
4.	Particle size of Lycopodium powder. (with accessories)	5 Nos
5.	Lee's disc apparatus. (with accessories)	5 Nos
6.	Band gap apparatus. (with accessories)	5 Nos
7.	Width of the groove of CD using laser. (with accessories)	5 Nos
8.	B-H curve apparatus. (with accessories)	5 Nos



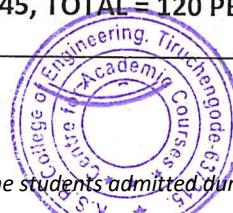
BoS chairman



24CHI06	CHEMISTRY FOR ENGINEERS	Category	L	T	P	SL	C						
		BSC	45	0	30	45	4						
(Common to AI&DS, BME, CSE, CSE(CS), CSE(CSD), CSE(IoT), ECE, EEE and IT)													
<b>PREREQUISITE</b>													
The students must have knowledge about the basic concepts of water parameters, electrochemistry, organic reactions and their applications.													
<b>OBJECTIVES:</b>													
To equip the learners to apply the chemical principles and their applications in the engineering fields.													
<b>UNIT - I</b>	<b>WATER TREATMENT</b>												
Hardness – types, units – estimation of hardness by EDTA method; Boiler feed water – requirements, disadvantages of using hard water in boilers – scale and sludge – priming and foaming – caustic embrittlement – boiler corrosion. Softening methods – internal conditioning – calgon, phosphate – external conditioning – zeolite process and ion exchange process; Desalination – reverse osmosis. Domestic water treatment (Sterilisation process Only).													
<b>UNIT - II</b>	<b>ELECTROCHEMISTRY AND CORROSION</b>												
Introduction – electrode potential – Nernst equation – EMF series and its significance; E – Vehicles - Need - Types – Advantages and Disadvantages; Corrosion – causes, consequences – classification – chemical corrosion – electro chemical corrosion – mechanism; Galvanic & differential aeration corrosion – factors influencing corrosion – corrosion control (Sacrificial anode and Impressed Current Cathodic protection method).													
<b>UNIT - III</b>	<b>ENERGY STORAGE DEVICES</b>												
Batteries – primary battery – Dry cell, secondary batteries – lead-acid and lithium-ion batteries. Fuel cells – H <sub>2</sub> -O <sub>2</sub> fuel cell, solar cells – principle, applications and advantages; Nuclear energy: Light water Nuclear power plant - breeder reactor.													
<b>UNIT - IV</b>	<b>POLYMER CHEMISTRY</b>												
Polymer – definition – degree of polymerization – functionality. Polymerization – addition, condensation and co-polymerization – free radical mechanism of addition polymerization; Preparation properties & uses of PVC, Nylon – 6,6 & Teflon. Plastics – classification – thermosetting and thermoplastics. Fabrication of polymers – compression and Injection moulding.													
<b>UNIT - V</b>	<b>NANO CHEMISTRY AND COMPOSITES</b>												
Introduction – basics of nanochemistry – distinction between nanoparticles, molecules and bulk materials - synthesis of nanomaterials [CVD, laser evaporation, pyrolysis] - applications of nanomaterials. Composite – Introduction: Definition and need for composite – Types of composites: Properties and application of FRP and MMC.													
<b>List of Exercise/Experiments:</b>													
<ol style="list-style-type: none"> <li>1. Estimation of total, permanent and temporary hardness of water sample By EDTA method</li> <li>2. Estimation of chloride content in water by Argentometric method [Mohr's Method]</li> <li>3. Conductometric titration of strong acid with strong base (HCl Vs NaOH)</li> <li>4. Estimation of dissolved oxygen in water (Winkler's Method)</li> <li>5. Conductometric titration of mixture of acids (HCl &amp; CH<sub>3</sub>COOH) with strong base</li> <li>6. Estimation of Fe<sup>2+</sup> ion by potentiometric titration</li> <li>7. Estimation of HCl by pH- Metry</li> <li>8. Conductometric precipitation titration using BaCl<sub>2</sub>-Na<sub>2</sub>SO<sub>4</sub></li> </ol>													
<b>L = 45, P = 30, SL = 45, TOTAL = 120 PERIODS</b>													

*Dharmendar*  
**Chairman (BoS)**



**COURSE OUTCOMES:****At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Interpret the treatment solutions for drinking water, boiler feed water, and wastewater reuse.	Understand
CO2	Describe different types of electrochemical cells, including galvanic and electrolytic cells.	Understand
CO3	Categorize different energy storage methods, such batteries, fuel cell and solar cell for the production of electricity.	Understand
CO4	Summarize the basics concepts of polymer chemistry in designing the materials for engineering and technology.	Understand
CO5	Illustrate the nano materials and composites for engineering and technology.	Understand

**TEXT BOOKS:**

1. S S. Dara and S. S. Umare, "A Text book of Engineering Chemistry", S.Chand & Co.Ltd., 12<sup>th</sup> Edition, 2015.
2. P.C. Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub. Co., 16<sup>th</sup> Edition, 2013.
3. Wiley, "Engineering Chemistry", Wiley India Pvt. Ltd., 2<sup>nd</sup> Edition, 2013.

**REFERENCES:**

1. Dr. A. Ravikrishnan, "Engineering Chemistry", Srikrishna Hi-tech Publishing Company Pvt. Ltd., 21<sup>st</sup> Edition, 2022.
2. J. Mendham, R. C. Denney, J. D. Barnes, M. J. K. Thomas and B. Sivasankar, "Vogel's Text book of Quantitative Chemical Analysis", Pearson Education Pvt., Ltd., 6<sup>th</sup> Edition, 2019.
3. Shashi Chala, "A Text book of Engineering Chemistry", Dhanpat Rai Pub. Co., 2015.
4. S. K. Bhasin and Sudha Rani, "Laboratory Manual of Engineering Chemistry", Dhanpat Rai Publishing Company Private Limited, 3<sup>rd</sup> Edition, 2012.

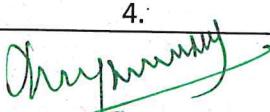
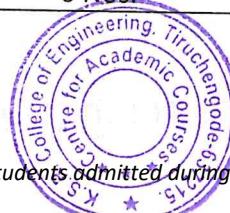
**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO 2
CO1	3	2	-	-	-	1	-	2	1	-	1	-	-
CO2	3	2	-	-	-	1	-	2	1	-	1	-	-
CO3	3	2	-	-	-	1	-	2	1	-	1	-	-
CO4	3	2	-	-	-	1	-	2	1	-	1	-	-
CO5	3	2	-	-	-	1	-	2	1	-	1	-	-

1-low, 2-medium, 3-high

**Laboratory Equipment Details  
(Requirements for a batch of 30 students)**

S.No.	Description of Equipment	Quantity required
1.	Electronic balance	1 No.
2.	pH meter	6 Nos.
3.	Conductivity meter	6 Nos.
4.	Potentiometer	6 Nos.


  
**Chairman (BoS)**


24ITP16	PROGRAMMING FOR PROBLEM SOLVING LABORATORY	Category	L	T	P	SL	C	
		ESC	0	0	30	0	1	
<b>(Common to AUTO, BME, CSE, CSE(CS), CSD, CSE (IoT), IT, ECE, EEE, MECH and SFE)</b>								
<b>PREREQUISITE:</b>								
<p>Students are expected to have foundational knowledge of basic programming principles. This includes an understanding of variables and data types such as integers, floats, and characters, as well as familiarity with fundamental control structures like conditional statements (if-else) and loops (for, while).</p>								
<b>OBJECTIVE:</b>								
<p>The lab is designed to provide hands-on experience with fundamental computer applications like MS Word, Excel, PowerPoint, and MS Access. It also aims to develop practical programming skills in C, enabling students to write, debug, and execute programs that incorporate core concepts such as control flow, functions, strings, pointers, and file handling. The lab will help students apply theoretical knowledge to real-world problems, enhancing their problem-solving and programming proficiency.</p>								
<b>LIST OF EXPERIMENTS:</b>								
<ol style="list-style-type: none"> <li>1. Prepare a Bio-data using MS Word with appropriate page, text and table formatting options and send the same to too many recipients using mail merge.</li> <li>2. Prepare a mark sheet with five subjects for five students in MS Excel File using Formulas, Functions and charts.</li> <li>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.</li> <li>4. Design an algorithm and flowchart with example.</li> <li>5. Program using I/O statements and expressions.</li> <li>6. Programs using decision-making constructs: if-else, goto, switch-case, break-continue.</li> <li>7. Loops: for, while, do-while.</li> <li>8. Arrays: 1D and 2D</li> <li>9. Functions: passing parameters by (value, reference), Recursion.</li> <li>10. Strings: operations.</li> <li>11. Pointers.</li> <li>12. Structures and File operations.</li> </ol>								
<b>L = 0, T = 0, P = 30, SL = 0, TOTAL: 30 PERIODS</b>								
<b>COURSE OUTCOMES:</b>								
<b>At the end of the course, the students will be able to:</b>								
COs	Course Outcome	Experiment	Cognitive Level					
CO1	Apply the basic concept of MS word, Excel, Power Point presentation and MS Access.	1,2,3,4	Apply					
CO2	Develop the program using the concept of control statements.	5,6,7	Apply					
CO3	Demonstrate the use of functions and arrays in Programming.	8,9	Apply					
CO4	Apply the concepts of pointers and strings.	10,11	Apply					
CO5	Develop the program using the files and structure operations.	12	Apply					



**REFERENCES:**

1. Jeff Szuha, "Learn C Programming", Packt Publishing, United Kingdom, Second Edition, 2022.
2. E Balagurusamy, "Programming In Ansi C", McGraw Hill Education, Eighth Edition, 2019.

**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	-	-	1	1	-	-	-	-
CO2	3	3	2	-	-	-	-	1	1	-	-	-	-
CO3	3	3	2	-	-	-	-	1	1	-	-	-	-
CO4	3	3	2	-	-	-	-	1	1	-	-	-	-
CO5	3	3	2	-	-	-	-	1	1	-	-	-	-

1 - Low, 2 - Medium, 3 - High

**LIST OF EQUIPMENTS (For a Batch of 30 Students)**

Sl. No	Name of the Equipment's	Qty.
1.	A computer with a modern processor and sufficient RAM.	30 Nos.
2.	Microsoft Office Suite (preferably MS Office 2016 or later) including: <ul style="list-style-type: none"> <li>• MS Word (for document preparation and mail merge)</li> <li>• MS Excel (for mark sheet creation, formulas, functions, and charts).</li> <li>• MS PowerPoint (for presentations with animations and timers).</li> <li>• MS Access (for database creation, data manipulation, and report generation).</li> <li>• Email Client (e.g., Outlook or any configured email system) for sending mail merge outputs.</li> </ul>	30 Nos.
3.	Turbo C software or any standard C Compiler (e.g., GCC, Code Blocks)	30 Nos.

  
 S. **Chairman (BoS)**



24MEP16	ENGINEERING GRAPHICS LABORATORY	Category	L	T	P	SL	C
		ESC	15	0	30	15	2

(Common to BME, CSE, CSE(CS), CSD, CSE(IoT), IT, ECE, EEE)

#### PREREQUISITE

Engineering Graphics Laboratory requires a good understanding of geometry. This includes knowledge of shapes, angles, dimensions, and spatial reasoning. The ability to visualize and interpret three-dimensional objects from two-dimensional drawings is crucial.

#### OBJECTIVES:

Instruct the utility of drafting & modeling packages in orthographic and isometric drawings and train the usage of 2D and 3D modeling

#### List of Exercise/Experiments:

1. Study of drawing tools, commands and coordinate systems in 2D software.
2. Cycloid and Conic curves.
3. Orthographic projections of pictorial views.
4. Orthographic views of straight lines.
5. Orthographic views of planes.
6. Orthographic views of simple solids.
7. The sectional view and the true shape of simple solids.
8. Development of lateral surfaces of simple solids.
9. Isometric projection of simple solids.
10. Drafting the 2D multi-view drawings from 3D model.

#### LIST OF EQUIPMENT (for a batch of 30 Students)

S.No.	Name of the Equipment	Quantity
1.	Intel i3 Processor, 8 GB RAM with 2 GB Graphics Card	30 Nos
2.	Licensed software for drafting and modeling	30 Nos

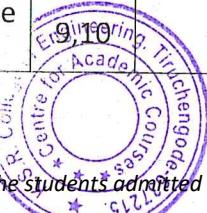
L:15 P:30 SL:15 TOTAL: 60 PERIODS

#### COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Exp. No.	Cognitive Level
CO1	Explain the fundamentals of engineering drawing and AutoCAD tool.	1	Understand
CO2	Construct projections of points, lines, and planes, then develop a virtual drawing using AutoCAD tool.	2,3 & 4	Apply
CO3	Apply projection principles to convert pictorial views into orthographic drawings	5,6	Apply
CO4	Model the Solid Projections and Sectioning of the solids by the AutoCAD tool.	7,8	Apply
CO5	Develop isometric drawings of simple objects reading the orthographic projections of those objects.		Apply

*(A)*  
Chairman (BoS)



**REFERENCES:**

1. Bhatt. N. D., Engineering Drawing, Charotar Publishing House, Fifty Third Edition, 2014.
2. Basant Agarwal and Agarwal. C. M., Engineering Drawing, Tata McGraw Hill Publishing Company Limited, 2018.

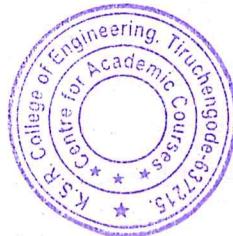
**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6.	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	3	-	-	-	-	-	-	-	-
CO2	3	3	2	-	3	-	-	-	-	-	-	-	-
CO3	3	3	2	-	3	-	-	-	-	-	-	-	-
CO4	3	3	2	-	3	-	-	-	-	-	-	-	-
CO5	3	3	2	-	3	-	-	-	-	-	-	-	-

1-low, 2-medium, 3-high



**Chairman (BoS)**



24GEP16	ENGINEERING EXPERIENCE LABORATORY	Category	L	T	P	SL	C
		ESC	0	0	30	0	1

(Common to BME, CSE, CSE(CS), CSD, CSE(IoT), ECE, EEE, IT)

#### PREREQUISITE:

A solid foundation in basic electrical components such as switches, wires, fuses, and light bulbs, including the roles of line, neutral, and ground wires. Basic understanding of physics and core principles of electrical and mechanical engineering.

#### OBJECTIVE:

To develop practical skills in basic electrical wiring, electronic interfacing with Arduino and IoT, and fundamental mechanical tools and systems.

#### LIST OF EXPERIMENTS

##### GROUP - A (ELECTRICAL)

1. Fluorescent lamp wiring.
2. Stair-case wiring.
3. Residential house wiring using switches, fuse, indicator and lamp.
4. Measurement of Energy in single phase system.

##### GROUP - B (ELECTRONICS)

1. Study of Electronic Components, Instruments, Internet of Things (IoT) and Arduino IDE.
2. Controlling the Light Emitting Diode (LED) with a push button using Arduino.
3. Interfacing of a Sensor (Ultrasonic, Rain, Voltage, Current & PIR) with Arduino Uno.
4. Controlling of LED through Wi-Fi using ESP8266.

##### GROUP - C (MECHANICAL)

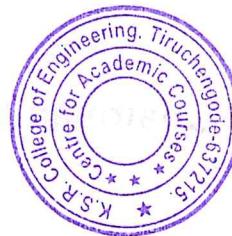
1. Study of plumbing line sketches for water supply and carpentry tools.
2. Study of welding tools and centrifugal pump.

#### COURSE OUTCOMES:

At the end of the course, the students will be able to:

COs	Course Outcome	Bloom's Taxonomy Level
CO1	Construct different types of wiring used in residential houses.	Apply
CO2	Measure the energy in single-phase system.	Apply
CO3	Demonstrate different electronic components, instruments, IoT and Arduino IDE.	Apply
CO4	Construct the control circuit with the help of Arduino and sensors.	Apply
CO5	Describe the plumbing, carpentry, welding components and centrifugal pump works for engineering practices and applications.	Understand

  
Chairman (Bos)



**REFERENCES:**

1. Gupta J.P., "A Course in Electrical Installation Estimating and Costing", S.K. Kataria and Sons, Delhi, Reprint 2013 Edition, 2013.
2. Mike Cheich, "Arduino Book for Beginners", Programming Electronics Academy, 2021.

**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	2	2	3	2	-	3	-	-
CO2	3	3	2	-	-	2	2	3	2	-	3	-	-
CO3	3	3	2	-	-	-	2	3	2	-	3	-	-
CO4	3	3	2	-	-	-	2	3	2	-	3	-	-
CO5	3	3	2	-	-	-	2	3	2	-	3	-	-

**LIST OF EQUIPMENT (For a Batch of 30 Students)**

S.No.	Name of the Equipment	Qty.
1.	Single-phase house wiring setup	2 Nos.
2.	Staircase wiring setup	2 Nos.
3.	Fluorescent lamp wiring setup	2 Nos.
4.	Energy Meter	5 Nos.
5.	Electrical Measuring Instruments	10 Nos.
6.	Ultrasonic Sensor	5 Nos.
7.	Rain Sensor	5 Nos.
8.	Voltage Sensor	5 Nos.
9.	Current Sensor	5 Nos.
10.	PIR Sensor	5 Nos.
11.	ESP8266 & Cable	15 Nos.
12.	Arduino UNO & Cable	15 Nos.
13.	DHT 11	5 Nos.
14.	Temperature sensor	5 Nos.
15.	Red LED	15 Nos.
16.	2-leg push Button	15 Nos.
17.	4-leg push Button	15 Nos.
18.	Personal Computer	15 Nos.

  
Chairman (BoS)



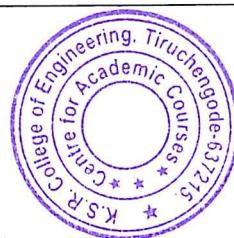
24SSP19	APTITUDE AND CODING SKILLS – I	Category	L	T	P	SL	C						
		EEC	0	0	30	0	1						
(Common to All Branches)													
<b>OBJECTIVES:</b>													
The course aims to introduce students to the fundamentals of aptitude, highlighting its importance and real-world applications. It is designed to build proficiency in verbal reasoning, thereby enhancing analytical and problem-solving skills. The curriculum also focuses on developing a strong foundation in English grammar, essential for effective communication.													
UNIT - I	<b>BASIC OF NUMBER SYSTEMS &amp; FOUNDATION</b>						(6)						
Introduction to Number System and its Classification - Divisibility Rules and Problems –Place Value & Face Value - HCF & LCM and its properties.													
UNIT - II	<b>BASICS OF SHARE BASED CONCEPTS</b>						(6)						
Introduction to Average – Basics of Ratio and proportion – Basics of Partnership–Introduction to Percentage													
UNIT - III	<b>LOGICAL REASONING</b>						(4)						
Analogies - Alpha and numeric series - Number Series - Coding and Decoding - Direction and distance													
UNIT - IV	<b>VERBAL ABILITY</b>						(7)						
Introduction to Grammar – Tenses – Parts of Speech – Preposition – Articles – Modal Verbs													
UNIT - V	<b>C PROGRAMMING</b>						(7)						
C Basics-Control Statements Decision making – Functions – Arrays & Strings – Pointers - User Defined Data Types - Storage Classes - Memory Management - Preprocessor.													
<b>TOTAL: 30 PERIODS</b>													

**COURSE OUTCOMES:**

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Explain the classification of number systems, apply divisibility rules to identify number properties	Understand
CO2	Apply the concepts of averages, ratios, and proportions to solve real-life problems and interpret data effectively.	Apply
CO3	Solve number series problems by identifying and applying suitable numerical patterns or rules.	Apply
CO4	Apply the rules of grammar to enhance written and spoken communication.	Apply
CO5	Apply the fundamental concepts of C programming to develop efficient and structured programs.	Apply

  
Chairman (BoS)



<b>TEXT BOOKS:</b> <ol style="list-style-type: none"> <li>1. R S Aggarwal, Quantitative Aptitude for Competitive Examinations.</li> <li>2. R.S. Aggarwal, A Modern Approach to Verbal &amp; Non-Verbal Reasoning</li> <li>3. Wren &amp; Martin, High School English Grammar &amp; Composition</li> <li>4. Brian W. Kernighan and Dennis Ritchie, The C Programming Language 2e, Pearson Education, 2015.</li> <li>5. Yashavant Kanetkar, The C Programming Language 2e, BPB publications, 15<sup>th</sup> Edition, 2016</li> </ol>													
<b>REFERENCES:</b> <ol style="list-style-type: none"> <li>1. <a href="https://www.geeksforgeeks.org/quantitative-aptitude/?ref=shm">https://www.geeksforgeeks.org/quantitative-aptitude/?ref=shm</a></li> <li>2. Stephen G. Kochana, Programming in C, 3<sup>rd</sup> Edition.</li> <li>3. K. N. King, C Programming: A Modern Approach, 2e, 2008.</li> <li>4. Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein, Data Structures Using C, Pearson Education India, 1990.</li> <li>5. Robert L. Kruse and Bruce P. Leung, Data Structures and Program Design in C, Pearson Education 2007.</li> <li>6. <a href="https://www.geeksforgeeks.org/c-programming-language/">https://www.geeksforgeeks.org/c-programming-language/</a></li> <li>7. <a href="https://www.geeksforgeeks.org/data-structures/">https://www.geeksforgeeks.org/data-structures/</a></li> </ol>													
<b>Mapping of COs with POs and PSOs</b>													
<b>COs/ POs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PSO1</b>	<b>PSO2</b>
CO1	3	2	-	-	2	-	-	2	-	-	3	-	-
CO2	3	3	2	-	2	-	-	2	-	-	3	-	-
CO3	3	3	2	-	2	-	-	2	-	-	3	-	-
CO4	3	3	2	-	2	-	-	2	-	-	3	-	-
CO5	3	3	2	-	2	-	-	2	-	-	3	-	-
Avg.	3	3	3	-	2	-	-	2	-	-	3	-	-

  
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<b>24CST29</b>	<b>PYTHON PROGRAMMING</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SL</b>	<b>C</b>						
		<b>ESC</b>	<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>	<b>3</b>						
<b>(Common to All Branches)</b>													
<b>PREREQUISITE:</b>													
A basic understanding of programming principles such as variables and loops, paired with good problem-solving abilities is required. Logical thinking and analytical skills are critical for effective programming.													
<b>OBJECTIVE:</b>													
<ul style="list-style-type: none"> <li>To provide a comprehensive foundation in Python programming, covering core concepts, data structures, OOP principles, file and database handling as well as web and GUI development using frameworks like Django and Tkinter.</li> </ul>													
<b>UNIT – I</b>	<b>FUNDAMENTALS OF PYTHON</b>						<b>(9)</b>						
Introduction to Python – Advantages of Python programming – Variables and Data types – Comments – Indentation – I/O function – Operators – Selection control structures – Looping control structures – Functions: Declaration – Types of arguments – Anonymous functions: Lambda.													
<b>UNIT – II</b>	<b>HANDLING STRINGS AND EXCEPTIONS</b>						<b>(9)</b>						
Strings – List – Tuples – Dictionaries – Sets – Exception Handling: Built-in Exceptions – User-defined exception – Modules and Packages.													
<b>UNIT – III</b>	<b>OBJECT ORIENTED PROGRAMMING CONCEPTS</b>						<b>(9)</b>						
Object Oriented Programming basics – Inheritance and Polymorphism – Operator Overloading and Overriding – Get and Set Attribute Values – Name Mangling – Duck Typing – Relationships.													
<b>UNIT – IV</b>	<b>FILES AND DATABASES</b>						<b>(9)</b>						
File I/O operations – Directory Operations – Reading and Writing in Structured Files: CSV and JSON – Data manipulation using MySQL.													
<b>UNIT – V</b>	<b>WEBPROGRAMMINGAND GUI USING PYTHON</b>						<b>(9)</b>						
Frameworks: Introduction to Django – Django CRUD – Socket Programming – Sending email – UI design: Tkinter – Events – CGI: Introduction to CGI Programming, GET and POST Methods.													
<b>L = 45, SL = 45, TOTAL: 90 PERIODS</b>													



**COURSE OUTCOMES:****At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Describe Python syntax to write code using data types, operators, loops and conditionals.	Understand
CO2	Interpret string manipulation, data structures and exception handling to build robust applications.	Understand
CO3	Implement object-oriented programming principles including inheritance and polymorphism to design effective solutions.	Apply
CO4	Apply file I/O operations and database management techniques to efficiently manage and manipulate data.	Apply
CO5	Develop web applications and graphical user interfaces using Python frameworks and libraries.	Apply

**TEXT BOOKS:**

- Yashwant Kanetkar, Aditya Kanetkar, "Let Us Python", BPB Publications, Fifth Edition, 2023.
- Wesley J.Chun, "Core Python Programming", Pearson Education, Second Edition, 2017.

**REFERENCES:**

- Robert Oliver, "Python Quick Start Guide: The Simplified Beginner's Guide to Python Programming Using Hands-On Projects and Real-World Applications", Clyde Bank Media LLC, 1st Edition, 2023
- Allen B. Downey, "Think Python", O'Reilly Media, Second Edition, 2016.
- David Beazley, Brian K. Jones, "Python Cookbook", O'Reilly Media, Third Edition, 2013
- Mark Lutz, "Python Pocket Reference", O'Reilly Media, Fifth Edition, 2014
- [www.python.org](http://www.python.org)
- [https://onlinecourses.swayam2.ac.in/cec22\\_cs20/preview](https://onlinecourses.swayam2.ac.in/cec22_cs20/preview)

**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	1	1	-	2	-	1
CO2	3	2	-	-	-	-	-	1	1	-	2	-	1
CO3	3	3	2	-	-	-	-	1	1	-	2	-	1
CO4	3	3	2	-	-	-	-	1	1	-	2	-	1
CO5	3	3	2	-	-	-	-	1	1	-	2	-	1

1 - Low, 2 - Medium, 3 - High



24ECT21	DESIGN THINKING	Category	L	T	P	SL	C						
		PCC	30	0	0	30	2						
(COMMON TO BME, EEE & ECE)													
<b>PRE-REQUISITE:</b> Nil													
<b>OBJECTIVE:</b> To equip learners with a structured, human-centered approach to problem-solving using the principles and stages of Design Thinking, including empathy, problem definition, ideation, prototyping, and effective communication.													
UNIT - I	FUNDAMENTALS OF DESIGN THINKING						(6)						
What is Design Thinking? - When to use Design Thinking? - How to do it? - Who are involved in this? - Design The Thinking™- Personal Visualization, The Wheel of Life & Balancing Priorities – Appreciating 'Design' – The 3 Laws of Design Thinking.													
UNIT - II	STEP 1: THE 'FEEL' STAGE						(6)						
What is this stage about? – What role does a Design Thinker play in this stage? Tools – What is the purpose in this stage? – Persona – Journey Mapping – Stakeholder Mapping & CATWOE Analysis - Cartographic Perspective (LO) – Empathy Map – Case Study: Understanding the Stakeholders.													
UNIT - III	STEP 2: THE 'DEFINE' STAGE						(6)						
What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – Five-Whys – Anti-Pattern – Paraphrasing the Problem – Challenge Mapping – LORD: Definitive skill set for a Design Thinker – Case Study: Relooking at the Problem.													
UNIT - IV	STEP 3: THE 'DIVERGENCE' & 'CONVERGENCE' STAGE						(6)						
What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – Brainstorming – Metaphor – Random Association Technique – End-State Visualization - 10gm-100gm-1000gm – Prototyping – Wire framing for digital products – Case Study: Prototyping and Communicating for Effective Outcome.													
UNIT - V	STEP 5: THE 'COMMUNICATION' STAGE						(6)						
What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – The 4Cs Framework – Naming – Packaging – Story boarding – Presentation – Distribution.													
<b>TOTAL (L:30, SL:30): 60 PERIODS</b>													
<b>COURSE OUTCOMES:</b>													
At the end of the course, the students will be able to:													
COs	Course Outcome						Cognitive Level						
CO1	Demonstrate an understanding of Design Thinking concepts and principles by explaining their relevance in real-world contexts.						Understand						
CO2	Articulate the significance of a Design Mindset and its impact on creative problem-solving.						Understand						
CO3	Apply Design Thinking methods effectively at each stage of the problem-solving process.						Apply						

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Chairman (BoS)



CO4	Identify and implement the phases of Design Thinking to address complex challenges systematically.	Apply
CO5	Use a variety of Design Thinking tools to develop innovative solutions and refine ideas through iteration.	Apply

**TEXT BOOKS:**

1. UnMukt – The Science & Art of Design Thinking, Arun Jain
2. Don Norman ,The Design of Everyday Things, MIT Press, 2013
3. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and inspires innovation, Harper Collins Publishers Ltd, New York, First Edition, 2009.

**REFERENCES:**

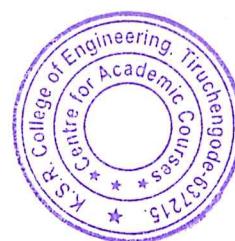
1. Chrisitan Mueller-Roterberg, Handbook of Design Thinking – Tips & Tools for how to design thinking, Kindle Direct Publishing, First Edition, 2018.
2. Johnny Schneider, Understanding Design Thinking, Lean and Agile, O'Reilly Media, California, First Edition, 2017
3. Roger Martin, The Design of Business, Why Design Thinking is the next competitive advantage, Harvard Business Press, United States, First Edition, 2009.
4. Idris Mootee, Design Thinking for Strategic Innovation, John Wiley & Sons Inc, New Jersey, First Edition, 2013.

**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	2	2	2	2	3	2	3	3	-	-
CO2	3	3	2	2	2	2	2	3	2	3	3	-	-
CO3	3	3	3	3	3	2	2	3	2	3	3	-	-
CO4	3	3	3	3	3	2	2	3	2	3	3	-	-
CO5	3	3	3	3	3	2	2	3	2	3	3	-	-

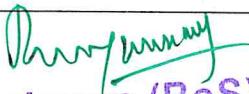
1-low, 2-medium, 3-high

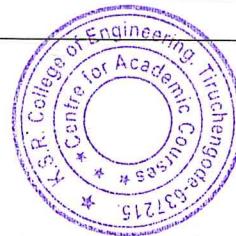
*C. Girish*  
Chairman (BoS)



24GET29	தமிழ்ரும் தொழில் நுட்பமும்	CATEGORY HSMC	L 15	T 0	P 0	SL 15	C 1							
(அனைத்து துறைகளுக்கும் பொதுவானது)														
முன் கூட்டிய துறைசார் அறிவு : தேவை இல்லை														
அலகு - I	நெசவு மற்றும் பானைத் தொழில்நுட்பம்		[03]											
சங்ககாலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் கருப்பு சிவப்பு பான்டகள்-பான்டகளில் கீறல் குறியீடுகள்														
அலகு - II	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்		[03]											
சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்ககாலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும்-சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள்-மாமல்லபுரச் சிற்பங்களும், கோவில்களும்-சோழர்காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள்-நாயக்கர்காலக்கோயில்கள்-மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாடசி அம்மன்ஆலயம் மற்றும் திருமலைநாயக்கர்மஹால் - செட்டிநாட்டுவீடுகள்-பிரிடிடிஷ்காலத்தில் சென்னை இந்தோ-சாரோசெனிக் கட்டிடக் கலை.														
அலகு - III	உற்பத்தித் தொழில்நுட்பம்		[03]											
கப்பல் கட்டும் கலை-உலோகவியல்-இரும்புத் தொழிற்சாலை-இரும்பை உருக்குதல், எஃகு-வரலாற்றுச்சான்றுகளாக செம்பு மற்றும் தங்கநாண்யங்கள்-நாண்யங்கள் அச்சடித்தல்-மணி உருவாக்கும் தொழிற்சாலைகள்-கல் மணிகள்-கண்ணாடி மணிகள்-சடு மண்மணிகள்-சங்குமணிகள்-எலும்புத்துண்டுகள்-தொல்லியல் சான்றுகள்-சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.														
அலகு - IV	வேளாண்மை மற்றும் நீர்ப் பாசனத் தொழில்நுட்பம்		[03]											
அணை, ஏரி, குளங்கள், மதகு-சோழர்காலகுழித்தூம்பின் முக்கியத்துவம்-காலநடை பராமரிப்பு-காலநடைகளுக்காக 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 மின்நூல்கம்-இணையத்தில் தமிழ் அகராதிகள் சொற்குவைத் திட்டம்.														
Total (L= 15, SL=15) =30 Periods														

பாடம் கற்றத்துன் விளைவுகள் : பாடத்தை வெற்றிகரகமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்			அறிவாற்றல் நிலை
C01	சங்ககாலத் தமிழிர்களின் நெசவு மற்றும் பானைவனைதல் தொழில் நுட்பம் குறித்து கற்றுணர்தல்.		புரிதல்
C02	சங்ககாலத் தமிழிர்களின் கட்டிட தொழில் நுட்பம் கட்டுமான பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்து அறிவு.		புரிதல்
C03	சங்ககாலத் தமிழிர்களின் உலோகத் தொழில், நாண்யங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு.		புரிதல்
C04	சங்ககாலத் தமிழிர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் குறித்த தெளிவு.		புரிதல்
C05	நவீன அறிவியல் தமிழ் மற்றும் கணினி தமிழ் குறித்த புரிந்துகொள்ளலும் மற்றும் பயன்படுத்தலும்.		பகுப்பாய்வு

  
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Text Books :	
1	தமிழகவரலாறு- மக்களும் பண்பாடும்- கேகேபிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்)
2	கணினித்தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசரம்)
Reference Books :	
1	கீழடி-வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம் (தொல்லியல் துறை வெளியீடு)
2	பொருநை - 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 Corporation, Tamilnadu)

Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	3	3	-	2	-	3	-	-
Avg.	-	-	-	-	-	3	3	-	2	-	3	-	-

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

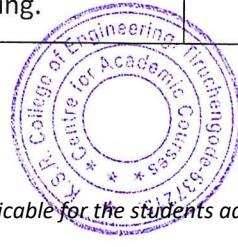
*Amulya*

Chairman (BoS)



24GET29	TAMILS AND TECHNOLOGY	CATEGORY	L	T	P	SL	C						
		HSMC	15	0	0	15	1						
(Common to All Branches)													
<b>Prerequisite(s):</b> No prerequisites are needed for enrolling into the course													
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) – Thirumalai Nayakar 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 Kumizhi Thoompu 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, SL=15) =30 Periods													
<b>Course Outcomes:</b> At the end of the course, the student will be able to													
CO1 Understand the weaving and ceramic technology of ancient Tamil People nature. CO2 Comprehend the construction technology, building materials in sangam Period and case studies. CO3 Infer the metal process, coin and beads manufacturing with relevant archeological evidence CO4 Realize the agriculture methods, irrigation technology and pearl diving. CO5 Apply the knowledge of scientific Tamil and Tamil computing.													
<b>Cognitive Level</b> Understand Understand Understand Understand Apply													

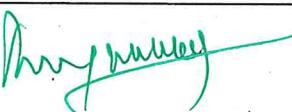
*Dr. Jayaram*  
Chairman (BoS)



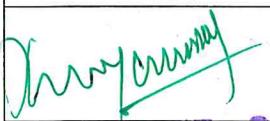
<b>Text Books:</b>	
1	Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
2	Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).
<b>Reference Books:</b>	
1	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies)
2	The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi)(Published 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)

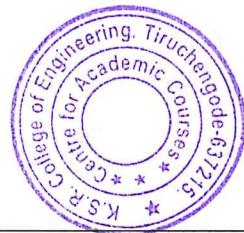
Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	3	3	-	2	-	3	-	-
Avg.	-	-	-	-	-	3	3	-	2	-	3	-	-

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

  
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24MAI29	PROBABILITY AND STATISTICS	Category	L	T	P	SL	C	
		BSC	30	15	30	45	4	
<b>SEMESTER II - B.E / B.TECH ( Common to All Branches )</b>								
<b>PREREQUISITE:</b>								
A basic understanding of algebra, calculus, and introductory statistics is required to grasp the concepts of probability, hypothesis testing, and statistical methods used in engineering and quality control.								
<b>OBJECTIVES:</b>								
To build a foundational understanding of probability and random variables, enable the application of two-dimensional random variables in engineering contexts, develop the ability to perform hypothesis testing for both small and large samples, introduce the principles of experimental design in agricultural studies, and provide knowledge of statistical quality control techniques.								
<b>UNIT - I</b>	<b>ONE DIMESIONAL RANDOM VARIABLES</b>						<b>(9)</b>	
One dimensional Random Variable - Discrete and continuous random Variables -Expectations - Moment generating functions and their properties - Binomial, Poisson, Uniform and Normal distributions.								
<b>UNIT - II</b>	<b>TWO - DIMENSIONAL RANDOM VARIABLES</b>						<b>(9)</b>	
Joint distributions – Marginal and conditional distributions – Covariance – Karl Pearson's Coefficient of Correlation - Spearman's Rank Correlation - Regression Analysis.								
<b>UNIT - III</b>	<b>TESTING OF HYPOTHESIS</b>						<b>(9)</b>	
One sample and two sample test for means of large samples (Z- test), One sample and two sample test for means of small samples (t-test), Chi-square - Independent of Attributes - F test for equality of variances.								
<b>UNIT - IV</b>	<b>DESIGN OF EXPERIMENTS</b>						<b>(9)</b>	
Analysis of variance - One way and two way classifications - Completely Randomized Design - Randomized Block Design - Latin Square Design.								
<b>UNIT - V</b>	<b>STATISTICAL QUALITY CONTROL</b>						<b>(9)</b>	
Control charts for measurements ( $\bar{X}$ and R charts) – Control charts for C and P charts – Acceptance sampling for construction of an OC curve.								
<b>List of Exercise/Experiments (R Software):</b>								
<ol style="list-style-type: none"> <li>1. Determine the probability by using binomial distribution.</li> <li>2. Find the probability with the help of normal distribution.</li> <li>3. Determine the correlation co-efficient between X and Y.</li> <li>4. Calculate and plot the regression lines.</li> <li>5. Test the significance of difference between experimental and theoretical values of the data by using chi-square test.</li> <li>6. Examine the small samples using F distribution.</li> <li>7. Analyze the data using Randomized Block Design (RBD).</li> <li>8. Inspect the data using Latin Square Design (LSD).</li> <li>9. Find the <math>\bar{X}</math> and R charts.</li> <li>10. Compute c and p charts.</li> </ol>								
<i>L = 30 , T = 15 &amp; P = 30 &amp; SL = 45, TOTAL: 120 PERIODS</i>								
 <b>Chairman (BoS)</b>								



**COURSE OUTCOMES:**

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Apply the concepts of one dimensional random variables to compute expectations and analyze the standard distributions.	Apply
CO2	Apply statistical methods to compute marginal and conditional distributions, and perform correlation and regression analysis.	Apply
CO3	Apply Z-test, t-test, Chi-square test, and F-test to analyze sample data and draw inferences on independence of attributes.	Apply
CO4	Apply analysis of variance techniques for one-way and two-way classifications, and implement experimental designs using CRD, RBD and LSD.	Apply
CO5	Construct control charts for measurements Mean and Range charts and attributes charts to assess process control and product quality.	Apply

**TEXT BOOKS:**

1. S.P. Gupta, "Statistical Methods", Sulthan Chand & Sons, 46<sup>th</sup> Edition ,2021.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4<sup>th</sup> edition, 2007.

**REFERENCES:**

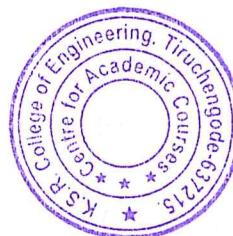
1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8<sup>th</sup> Edition, 2014.
2. Spiegel. M.R., Schiller. J. and Srinivasan, R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.
3. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 9<sup>th</sup> Edition, 2010.
4. R.C.Gupta, "Statistical Quality Controls", Khanna Publishers, Delhi, 8<sup>th</sup> Edition , 2008.

**Mapping of COs with POs and PSOs**

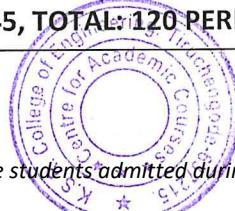
COs/ POs	PO1	PO2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	2	-	-	1	-	-	2	-	-
CO2	3	3	3	3	2	-	-	1	-	-	2	-	-
CO3	3	3	3	3	2	-	-	1	-	-	2	-	-
CO4	3	3	3	3	2	-	-	1	-	-	2	-	-
CO5	3	3	3	3	2	-	-	1	-	-	2	-	-
Avg.	3	3	3	3	2	-	-	1	-	-	2	-	-

1-low, 2-medium, 3-high

  
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24EEI21	ELECTRIC CIRCUIT ANALYSIS	Category	L	T	P	SL	C						
		PCC	45	0	30	45	4						
<b>PREREQUISITE:</b>													
Basic knowledge of electrical quantities, circuit laws, and algebra/trigonometry for analyzing DC and AC circuits.													
<b>OBJECTIVE:</b>													
<ul style="list-style-type: none"> <li>To develop a comprehensive understanding of analysis techniques for DC and AC circuits, network theorems, three-phase systems, resonance, and two-port network parameters.</li> </ul>													
UNIT - I	DC CIRCUITS	(9)											
Basic definitions – Circuit terminologies – Ohm's law and its limitations – Kirchhoff's laws – Series and parallel resistive circuits – Voltage and current division techniques – Source transformation – Mesh current and Node voltage methods (Independent Sources).													
UNIT - II	REDUCTION TECHNIQUES AND NETWORK THEOREMS	(9)											
Star to delta and delta to star conversion – Thevenin's Theorem – Norton Theorem – Superposition Theorem – Maximum Power Transfer Theorem – Reciprocity Theorem (DC Circuits only).													
UNIT - III	STEADY-STATE ANALYSIS OF AC CIRCUITS	(9)											
Characteristics of Sinusoids – Average and RMS Value – Form Factor – Peak Factor – Phase Difference – Phasor Representation. Analysis of Purely Resistive Circuit – Purely Inductive Circuit – Purely Capacitive Circuit – Series RL, RC and RLC Circuit: Phasor diagram – Voltage triangle, Impedance triangle, Power factor, Power triangle.													
UNIT - IV	THREE PHASE CIRCUITS AND RESONANCE	(9)											
<b>Three Phase Circuits:</b> Advantages of Three Phase System – Star and Delta connected balanced and unbalanced loads – Two wattmeter method of power measurements.													
<b>Series Resonance Circuit:</b> Phasor diagram – Properties – Variation of $X_L$ , $X_C$ , and $Z$ with frequency – Q Factor – Half-power frequencies – Selectivity – Bandwidth.													
UNIT - V	TWO PORT NETWORKS	(9)											
Introduction – Impedance, admittance, hybrid and transmission Parameters – Reciprocity and Symmetry – Relationship between different parameters – Interconnections of Two-Port Networks (Quantitative Approach Only).													
<b>LIST OF EXPERIMENTS:</b>													
<ol style="list-style-type: none"> <li>1. Simulation and verification of Ohm's Law.</li> <li>2. Simulation and verification of Kirchhoff's Laws.</li> <li>3. Simulation and verification of Mesh analysis.</li> <li>4. Simulation and verification of Nodal analysis.</li> <li>5. Simulation and verification of Superposition theorem.</li> <li>6. Simulation of the frequency response of RL circuit.</li> <li>7. Simulation of the frequency response of RC circuit.</li> <li>8. Measurement of power in the three-phase circuit by two-wattmeter method.</li> <li>9. Simulation of Two-port impedance network.</li> </ol>													
LECTURE: 45, PRACTICAL: 30, SELF LEARNING: 45, TOTAL: 120 PERIODS													



<b>COURSE OUTCOMES:</b>												
<b>At the end of the course, the students will be able to:</b>												
<b>COs</b>	<b>Course Outcome</b>											<b>Cognitive Level</b>
<b>CO1</b>	Solve the problems of DC circuits using fundamental laws.											Apply
<b>CO2</b>	Apply various network reduction techniques, including network theorems for simplifying the electric circuits.											Apply
<b>CO3</b>	Determine the parameters of series RL, RC and RLC AC circuits.											Apply
<b>CO4</b>	Compute the parameters of three-phase systems and series resonance circuits.											Apply
<b>CO5</b>	Determine the different parameters of two-port networks.											Apply

**TEXT BOOKS:**

- 1 Sudhakar, A., and Shyam Mohan S.P., "Circuits and Network Analysis and Synthesis", Tata McGraw Hill Publishing Company Limited, New Delhi, Fifth Edition, 2017.
- 2 Mahadevan K., and Chitra C., "Electrical Circuit Analysis", PHI Learning Pvt. Ltd, Second Edition, 2018.

**REFERENCES:**

- 1 Charles K.Alexander, Matthew N.O.Sadiku, "Fundamentals of Electric Circuits", McGraw Hill, Sixth Edition, 2019.
- 2 William, H., HaytJr, Jack E., Kemmerly, Steven M. Durbin, Jamie Phillips, "Engineering Circuit Analysis", McGraw Hill, New Delhi, Tenth Edition, 2023.
- 3 Chakrabarti, A, "Circuit Theory Analysis and Synthesis", Dhanpat Rai & Co, New Delhi, Seventh Edition, 2018.
- 4 Chattopadhyay D., Rakshit P.C., "Fundamentals of Electric Circuit Theory", S. Chand and Company Limited, Ninth Edition, 2020.

**Mapping of COs with POs and PSOs**

<b>COs/ POs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	3	3	1	-	1	2	-	-	-	-	2	3	2
<b>CO2</b>	3	3	1	-	1	2	-	-	-	-	2	3	2
<b>CO3</b>	3	3	1	-	1	2	-	-	-	-	2	3	2
<b>CO4</b>	3	3	1	-	1	2	-	-	-	-	2	3	2
<b>CO5</b>	3	3	1	-	1	2	-	-	-	-	2	3	2

1- Low, 2 - Medium, 3 - High

**List of Equipment (For a Batch of 30 Students)**

<b>S. No.</b>	<b>Description of Equipment</b>	<b>Qty.</b>
1.	Regulated Power Supply (0-30V )	10 Nos.
2.	Function Generator (MHz Range)	5 Nos.
3.	Oscilloscope (20 MHz)	10 Nos.
4.	AC/DC - Voltmeters of required rating	10 Nos.
5.	AC/DC - Ammeters of required rating	10 Nos.
6.	Decade Resistance Box, Decade Inductance Box, Decade Capacitance Box	6 Nos. each
7.	Three phase star & delta connected load / Single phase load bank of suitable rating	2 Nos.
8.	Resistors of various range	50 Nos.
9.	Capacitors of various ranges	25 Nos. each
10.	MultiSim software (Multi user)	01

  
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24EEI22	ANALOG ELECTRONICS	Category	L	T	P	SL	C						
		PCC	45	0	30	45	4						
<b>PREREQUISITE:</b>													
Basic understanding of semiconductor physics, electronic components, and fundamental of electric circuit are essential.													
<b>OBJECTIVE:</b>													
<ul style="list-style-type: none"> <li>To understand the principles, characteristics, and applications of semiconductor devices, amplifiers, oscillators, operational amplifiers, and timer circuits.</li> </ul>													
<b>UNIT - I</b>	<b>SEMICONDUCTOR DEVICES</b>						<b>(9)</b>						
PN junction diode: structure, operation and V-I characteristics, dynamic resistance, temperature coefficients, drift and diffusion currents – Rectifiers: half-wave and full-wave bridge rectifiers – Zener diode: structure, operation and V-I characteristics – Zener diode as voltage regulators.													
<b>UNIT - II</b>	<b>TRANSISTOR AND ITS APPLICATIONS</b>						<b>(9)</b>						
Bipolar Junction Transistor: structure, operation – Configurations: CE, CB and CC – Applications as switch and amplifier – H-parameter analysis of CE configuration – Junction Field Effect Transistor: structure, operation and characteristics – Application as voltage variable resistor.													
<b>UNIT - III</b>	<b>FEEDBACK AMPLIFIERS AND OSCILLATORS</b>						<b>(9)</b>						
Introduction to feedback amplifiers – Effect of positive and negative feedbacks – voltage series, current series, voltage shunt, current shunt feedback amplifiers. Oscillator: condition for oscillation, RC phase shift, Wein bridge, Crystal oscillator, UJT Relaxation Oscillator.													
<b>UNIT - IV</b>	<b>IC FABRICATION AND CHARACTERISTICS OPERATIONAL AMPLIFIERS</b>						<b>(9)</b>						
Basic planar process for IC fabrication – Op Amp: Ideal characteristics – inverting and non-inverting operational amplifiers – DC and AC characteristics of op-amp– differential amplifiers – CMRR.													
<b>UNIT - V</b>	<b>APPLICATIONS OF OPAMP AND 555 TIMER</b>						<b>(9)</b>						
Differentiator, Integrator, V to I and I to V converters – DAC: R-2R ladder, Weighted resistor types – ADC: Flash type, Successive approximation type – 555 timers: Mode of operations and its applications.													
<b>LIST OF EXPERIMENTS:</b>													
<ol style="list-style-type: none"> <li>Real-time verification of V-I Characteristics of PN Junction diode.</li> <li>Real-time verification of single-phase full-wave rectifiers with and without capacitive filters.</li> <li>Real-time verification of V-I Characteristics of Zener diode.</li> <li>V-I characteristics of the transistor under common emitter configuration.</li> <li>Simulation of V-I Characteristics of FET.</li> <li>Simulation of RC phase shift Oscillator using BJT.</li> <li>Simulation of inverting and non-inverting operational amplifiers.</li> <li>Implement an Op-Amp-based digital-to-analog converter.</li> <li>Implement an Op-Amp-based analog-to-digital converter.</li> <li>Design an Astable and Monostable multivibrator using an NE/SE 555 timer.</li> </ol>													
<b>LECTURE: 45, PRACTICAL: 30, SELF-LEARNING: 45, TOTAL: 120 PERIODS</b>													



**COURSE OUTCOMES:****At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Illustrate the V-I characteristics of different diodes and their applications in rectification and voltage regulation.	Understand
CO2	Describe the characteristics of FET and various configurations of transistors.	Understand
CO3	Interpret the various oscillatory and feedback amplifier circuits.	Understand
CO4	Infer the DC and AC characteristics of op-amp and its effect on output.	Understand
CO5	Describe the various applications of linear ICs like 741 and 555 timers.	Understand

**TEXTBOOKS:**

1. Sedha, R.S, "A textbook of Applied Electronics", S.Chand and Company, New Delhi Ltd., Revised Edition, 2022.
2. Roy Choudhary D and Shell B. Jani, "Linear Integrated Circuits", New Age International, Seventh Edition, 2025.

**REFERENCES:**

1. Albert Malvino and David Bates, "Electronic Principles", Tata McGraw Hill, Eighth Edition, 2016.
2. David A Bell, "Fundamentals of Electronic Devices and Circuits", Oxford University Press India, Fifth Edition, PHI. 2009.
3. David A. Bell, "Op-amp & Linear ICs", Oxford University Press India, Third Edition, 2011.
4. Gray and Mayer, "Analysis and design of Analog Integrated Circuits", Wiley International, Fifth Edition, 2009.

**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	-	-	-	-	3	2	-	-	2	-
CO2	3	2	2	-	-	-	-	3	2	-	-	2	-
CO3	3	2	2	-	2	-	-	3	2	-	-	2	-
CO4	3	2	2	-	2	-	-	3	2	-	-	2	-
CO5	3	2	2	-	-	-	-	3	2	-	-	2	-

1 - Low, 2 - Medium, 3 - High

**List of Equipment (For a Batch of 30 Students)**

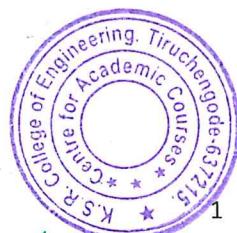
S. No.	Description of Equipment	Qty.
1.	CRO	5 Nos.
2.	Components and bread boards	10 each
3.	Chip IC – 555	10 Nos.
4.	Work tables	13 Nos.
5.	Semiconductor diode – IN4007	10 Nos.
6.	Transistor – BC107	10 Nos.
7.	Various Range of Ammeter	15 Nos.
8.	Low Range Voltmeter	15 Nos.
9.	Various Range of Resistor	40 Nos.
10.	Various Range of Capacitor	40 Nos.
11.	Multisim software (Multiuser)	01 Nos.

  
**Chairman (Bos)**



24ENP29	PROFESSIONAL COMMUNICATION LABORATORY	Category	L	T	P	SL	C						
		HSMC	0	0	30	0	1						
(Common to All Branches)													
<b>OBJECTIVE:</b>													
To enhance learners' proficiency in listening, speaking, reading, and writing through structured activities and professional communication practices relevant to academic and workplace settings.													
UNIT - I	VERBAL AND CRITICAL REASONING												
<b>Syllogism</b> – Drawing conclusions from given logical statements, <b>Assertion and Reason</b> – Judging the link between a claim and its reason, <b>Verbal Analogies</b> – Completing word pairs based on relationships, <b>Statement and Assumption</b> – Identifying hidden assumptions in statements, <b>Statement and Conclusion</b> – Choosing valid conclusions from given data, <b>Critical Reasoning</b> – Evaluating arguments for logic and consistency.													
UNIT - II	LISTENING												
<b>Listening to Announcement</b> – Understanding key details and context from public messages, <b>Short Conversation</b> – Extracting specific information from brief dialogues, <b>Motivational Speech</b> – Grasping main ideas, tone, and speaker's intent, <b>Telephone Conversation</b> – Comprehending spoken exchanges over the phone.													
UNIT - III	SPEAKING												
<b>Talking about Oneself</b> – Sharing personal details clearly and confidently, <b>Oral-presentation on a General Topic</b> – Presenting ideas briefly with clarity and structure, <b>Group Discussion on Current Affairs</b> – Expressing and support opinions in group settings, <b>Role Play</b> – Performing situational conversations using appropriate language, <b>Mock &amp; HR Interview</b> – Answering common interview questions with clarity and confidence.													
UNIT - IV	READING												
<b>Reading Short Texts</b> – Understanding the main message and key ideas, <b>Reading for General and Specific Information</b> – Locating relevant details in various texts, <b>Case Studies on Problem Solving</b> – Analyzing real-life scenarios to identify issues and solutions.													
UNIT - V	WRITING												
<b>Written communication: Letters (Apology &amp; Complaint)</b> – Writing formal letters using appropriate tone and structure, <b>E-mails (Appreciation &amp; Permission)</b> – Composing clear and courteous emails, <b>Technical Report</b> – Using standard format for preparing structured technical report, <b>Agenda / Minutes</b> – Preparing format for meeting agendas and recording minutes.													
<b>TOTAL (P:30) = 30 PERIODS</b>													

  
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**List of Experiments:**

1. Syllogism, Assertion & Reason and Verbal Analogies
2. Statement & Assumption, Statement & Conclusion and Critical Reasoning
3. Listening: Announcement and Short Conversation
4. Listening: Motivational Speech and Telephone Conversation
5. Speaking: Taking about oneself, Mock & HR Interview and Mini-presentation
6. Speaking: Group Discussion and Role Play
7. Reading: Multiple Choice & Fill in the Blanks
8. Reading: Analyzing Case Studies on Problem Solving
9. Writing: Complaint/Apology Letter and Appreciation/Permission Email
10. Writing: Format of Technical Report and Format of Agenda/Minutes

**COURSE OUTCOMES:**

Upon completion of the course, the students will be able to:

COs	Description	Ex. No.	Cognitive Level
CO1	Comprehend assumptions and draw conclusions from verbal reasoning tasks.	1 & 2	Understand
CO2	Understand spoken texts to identify key points and the speaker's intent.	3 & 4	Understand
CO3	Use appropriate language and tone in personal, group, and interview conversations.	5 & 6	Understand
CO4	Recognize main ideas and supporting points in short texts and case studies.	7 & 8	Understand
CO5	Draft formal letters, emails, reports, and meeting notes in the correct format.	9 & 10	Understand

**TEXT BOOKS:**

1. Bhatnagar Nitin, Communicative English for Engineers and Professionals, Pearson India, 2010.
2. Kulbhushan Kumar, RS Salaria, Effective Communication Skill, Khanna Publishing House, 2018.

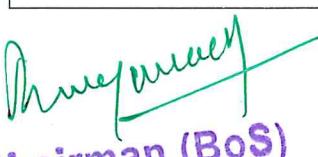
**REFERENCES:**

1. Jack C Richards, Interchange, Cambridge University Press, 2022.
2. RS Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S Chand, 2024.

**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	2	3	-	-	-	-
CO2	2	-	-	-	-	-	-	2	3	-	-	-	-
CO3	2	-	-	-	-	-	1	2	3	-	-	-	-
CO4	2	-	-	-	-	-	1	-	3	-	-	-	-
CO5	2	-	-	-	-	-	1	-	3	-	-	-	-

1-Low, 2-Medium, 3-High

  
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## Lab Requirement for a batch of 30 Students

Sl. No.	Description of Equipment / Software	Quantity required
1.	Server	1
	Intel core i3 - 2120	
	4 GB RAM / 240 GB SSD	
	OS: Windows 2011	
	Headphones with mike	
2.	Client Systems	30
	Intel core i3 - 2120	
	4 GB RAM / 240 GB SSD	
	OS: Windows 2011	
	Headphones with mike	
3.	Software	1
	a) Interactive Teacher control software	
	b) English Language Lab Software	
	c) Career Lab Software	

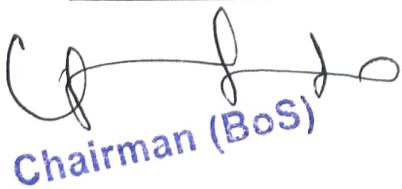


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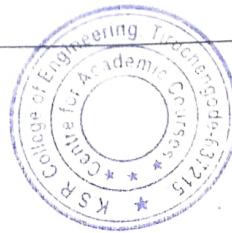




24CSP29	PYTHON PROGRAMMING LABORATORY	Category	L	T	P	SL	C	
		ESC	0	0	30	0	1	
<b>(Common to All Branches)</b>								
<b>PREREQUISITE:</b>								
Students must have basic knowledge on programming principles, such as variables, simple data types, control structures, problem solving and logical thinking skills.								
<b>OBJECTIVE:</b>								
To develop programming skills in Python by performing string operations using functions for mathematical problem-solving, applying conditionals and loops, exploring sets and dictionaries for data handling and gaining foundational knowledge in polymorphism, exception handling, GUI design and web development.								
<b>LIST OF EXERCISE/EXPERIMENTS:</b>								
<ol style="list-style-type: none"> <li>1. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters).</li> <li>2. Implementing programs using Functions (GCD of two numbers, Factorial).</li> <li>3. Scientific problems using conditional statements and loops. (Largest among three numbers, Number series, Number Patterns).</li> <li>4. Implementing real-time applications using Sets, Dictionaries (Sorting, Searching, Remove Duplicates).</li> <li>5. Implementing real-time/technical applications using Lists, Tuples. (Swapping two elements, Reversing a List / Sorting Tuples).</li> <li>6. Create a Python program to demonstrate polymorphism with inheritance. (Single, Multilevel Inheritance, Hierarchical).</li> <li>7. Implement a simple calendar in python program without using the calendar module using string array or list.</li> <li>8. Write a program to demonstrate the user-defined exception handling mechanism in Python.</li> <li>9. Design and implement a graphical user interface to perform any arithmetic operation.</li> <li>10. Implementing a web application with MySQL database integration for CRUD operations (Flask / Django Framework).</li> </ol>								
<b>L = 0, T = 0, P = 30, TOTAL: 30 PERIODS</b>								



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<b>COURSE OUTCOMES:</b> At the end of the course, the students will be able to:		Course Outcome	Exp.	Cognitive Level
<b>COs</b>				
CO1	Apply string operations and functions to solve problems like reversing text, palindrome check, GCD, and factorial.		1,2	Apply
CO2	Solve problems and manage data efficiently using conditionals, loops, sets, and dictionaries.		3,4	Apply
CO3	Develop applications using lists, tuples, and demonstrate polymorphism through inheritance in Python.		5,6	Apply
CO4	Build programs in Python that effectively use arrays or lists along with custom exception handling.		7,8	Apply
CO5	Implement GUI applications and web-based systems with MySQL integration to perform CRUD operations.		9,10	Apply

**REFERENCES:**

- Yashwant Kanetkar, Aditya Kanetkar, "Let Us Python", BPB Publications, Fifth Edition, 2023.
- Wesley J.Chun, "Core Python Programming", Pearson Education, Second Edition, 2017.

**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	-	1	-	1	-	2	-	2
CO2	3	3	2	-	-	-	1	-	1	-	2	-	2
CO3	3	3	2	-	-	-	1	-	1	-	2	-	2
CO4	3	3	2	-	-	-	1	-	1	-	2	-	2
CO5	3	3	2	-	-	-	1	-	1	-	2	-	2

1 - Low, 2 - Medium, 3 - High

**LIST OF EQUIPMENTS (For a Batch of 30 Students)**

SI.No	Name of the Equipment's	Qty.
1.	A computer with a modern processor, RAM and Windows or Linux.	30 Nos.
2.	Programming Tools: Python 2.7.11 / 3.x with IDLE	30 Nos.
3.	IDEs: Eclipse (PyDev), VS Code, Jupyter Notebook	30 Nos.


  
Chairman (BSc)

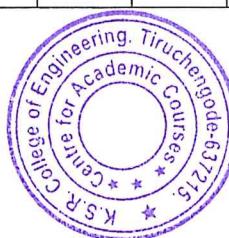

24SSP29	APTITUDE AND CODING SKILLS –II	Category	L	T	P	SL	C						
		EEC	0	0	30	0	1						
<b>(Common to All Branches)</b>													
<b>OBJECTIVES:</b>													
This course aims to expose students to various concepts of aptitude problem solving, enabling them to tackle problems effectively and enhance their analytical skills in alignment with company-specific requirements. It also focuses on developing proficiency in verbal reasoning to strengthen critical thinking abilities.													
<b>UNIT - I</b>	<b>NUMBERS AND SHARE BASED CONCEPTS</b>						(6)						
Problems on Numbers – Unit Digits – Squares and Cubes – Remainder Theorem – Averages - Ratio Proportions and Partnership – Percentage – Profit and Loss.													
<b>UNIT - II</b>	<b>BASICS OF WORK BASED CONCEPTS</b>						(6)						
Introduction to time and work –Introduction to Time, Speed and Distance, Problems on Trains.													
<b>UNIT - III</b>	<b>LOGICAL REASONING</b>						(4)						
Blood Relations – Ranking and Ordering – Inequalities – Cause and Effect.													
<b>UNIT - IV</b>	<b>VERBAL ABILITY</b>						(7)						
Yes or No and “WH” Questions – Conjunctions – Count / Uncounted Nouns – Direct and Indirect Speech – Active and Passive Voice.													
<b>UNIT - V</b>	<b>PYTHON PROGRAMMING FUNDAMENTALS</b>						(7)						
Introduction-Features-Environment setup; Basic syntax: variable-data types-operators-control statements-if-if-else- loop-break-continue, etc. List- operations on list; String operations- access; Tuple: operations on tuple; Dictionaries: Accessing dictionaries, working with dictionaries; Functions-Exception Handling-Input & Output-Modules-OOPs concepts-Numerical Programming.													
<b>TOTAL: 30 PERIODS</b>													
<b>COURSE OUTCOMES:</b>													
At the end of the course, the students will be able to:													
<b>COs</b>	<b>Course Outcome</b>			<b>Cognitive Level</b>									
CO1	Interpret fundamental concepts to analyse and approach basic quantitative problems effectively.			Understand									
CO2	Apply the concepts of time and work, time, speed and distance, to solve real-time quantitative aptitude problems effectively.			Apply									
CO3	Apply logical reasoning techniques to solve problems related to ranking and ordering, decision-making and analytical skills.			Apply									
CO4	Apply grammatical concepts to construct grammatically-correct and contextually appropriate sentences.			Apply									
CO5	Apply fundamental Python programming concepts to develop and implement basic computational solutions.			Apply									

Om Prakash  
Chairman (BoS)

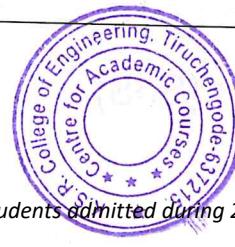


	<b>TEXT BOOKS:</b>												
	1. R S Aggarwal, Quantitative Aptitude for Competitive Examinations. 2. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning. 3. Wren & Martin, High School English Grammar & Composition 4. Allen B. Downey, Think Python: How to Think like a Computer Scientist, 2 <sup>nd</sup> Edition, O'Reilly Publishers, 2016 5. Karl Beecher, Computational Thinking: A Beginner's Guide to Problem Solving and Programming, 1 <sup>st</sup> Edition, BCS Learning & Development Limited, 2017.												
	<b>REFERENCES:</b>												
	1. Paul Deitel and Harvey Deitel, Python for Programmers, Pearson Education, 1 <sup>st</sup> Edition, 2021. 2. Martin C. Brown, Python: The Complete Reference, 4 <sup>th</sup> Edition, Mc-Graw Hill, 2018. 3. <a href="https://www.python.org/">https://www.python.org/</a>												
	<b>Mapping of COs with POs and PSOs</b>												
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	2	-	-	2	-	-	3	-	-
CO2	3	3	2	-	2	-	-	2	-	-	3	-	-
CO3	3	3	2	-	2	-	-	2	-	-	3	-	-
CO4	3	3	2	-	2	-	-	2	-	-	3	-	-
CO5	3	3	2	-	2	-	-	2	-	-	3	-	-
Avg.	3	3	3	-	2	-	-	2	-	-	3	-	-

  
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24MAT38	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	Category	L	T	P	SL	C						
		BSC	45	15	0	60	4						
<b>SEMESTER III - (Common to Bio-Medical and EEE Branches)</b>													
<b>PREREQUISITE</b>													
The students must have the knowledge on the basic concepts of differentiation, integration and partial derivatives.													
<b>OBJECTIVES:</b>													
To equip students with the knowledge of Fourier series, Laplace and Z-transforms, build a strong understanding of the underlying mathematics, and develop the skills to apply these methods in solving engineering problems such as heat transfer and wave motion.													
<b>UNIT - I</b>	<b>FOURIER SERIES</b>												
Dirichlet's conditions – General Fourier series - Odd and even functions – Half range sine and cosine series - Parseval's theorem – Harmonic analysis.													
<b>UNIT - II</b>	<b>LAPLACE TRANSFORMS</b>												
Laplace transforms – Conditions for existence – Transform of elementary functions – Basic properties – Transform of Derivatives – Transform of periodic functions. Inverse Laplace transforms – Partial fraction method – Solution of linear ordinary differential equations of second order with constant coefficients.													
<b>UNIT - III</b>	<b>Z - TRANSFORMS</b>												
Z transform – Elementary properties – Initial and final value theorem – Inverse Z transform (Partial fraction method) – Convolution theorem – Solution of difference equation by using Z transform.													
<b>UNIT - IV</b>	<b>PARTIAL DIFFERENTIAL EQUATIONS</b>												
Formation of partial differential equations by eliminating of arbitrary constants and arbitrary functions - Lagrange's linear equation – Solutions of linear partial differential equations of the second and higher order with constant coefficient.													
<b>UNIT - V</b>	<b>APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS</b>												
Classification of second order partial differential equations – Solutions of One dimensional wave equation – One dimensional heat equation – Two dimensional heat equation (insulated edges only).													
<i>Dr. M. Venkatesan</i> <span style="float: right;"><b>L = 45, T = 15, SL = 60, TOTAL = 120 PERIODS</b></span>													

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**COURSE OUTCOMES:At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Apply Fourier Series concepts to solve practical engineering problems in signal processing, communication, and control systems.	Apply
CO2	Solve the linear differential equations using Laplace Transforms for circuit and system analysis.	Apply
CO3	Apply Z-transform techniques to solve partial differential equations in discrete-time systems.	Apply
CO4	Apply methods to form partial differential equations and solve Lagrange's linear equation and higher-order linear PDE's with constant coefficients.	Apply
CO5	Apply analytical techniques to solve one-dimensional wave and heat equations and the two-dimensional heat equations.	Apply

**TEXT BOOKS:**

1. Grewal B.S., "Higher Engineering Mathematics", 44<sup>th</sup> Edition, Khanna Publishers, New Delhi, 2018.
2. Kreyszig E, "Advanced Engineering Mathematics ", 10<sup>th</sup> Edition, John Wiley, New Delhi, India, 2016.

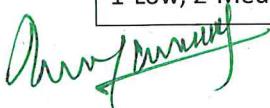
**REFERENCES:**

1. Andrews. L.C and Shivamoggi. B, "Integral Transforms for Engineers" SPIE Press, 1999.
2. Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 10<sup>th</sup> Edition, Laxmi Publications Pvt. Ltd, 2015.
3. James. G., "Advanced Modern Engineering Mathematics", 4<sup>th</sup> Edition, Pearson Education, New Delhi, 2016.
4. Narayanan. S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.
5. Ramana. B.V., "Higher Engineering Mathematics", Mc Graw Hill Education Pvt. Ltd, New Delhi, 2018.
6. Wylie. R.C. and Barrett . L.C., "Advanced Engineering Mathematics" Tata Mc Graw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	-	-	2	-	-
CO2	3	3	3	3	-	-	-	1	-	-	2	-	-
CO3	3	3	3	3	-	-	-	1	-	-	2	-	-
CO4	3	3	3	3	-	-	-	1	-	-	2	-	-
CO5	3	3	3	3	-	-	-	1	-	-	2	-	-

1-Low, 2-Medium, 3-High


**Chairman (BoS)**


24EET31	ELECTROMAGNETIC FIELD THEORY	Category	L	T	P	SL	C
		PCC	45	15	0	60	4

**PREREQUISITE:**

Basic knowledge of vector calculus, electromagnetic field concepts, and fundamental laws of electricity and magnetism is required.

**OBJECTIVE:**

- To understand and apply vector calculus and coordinate systems to analyse electrostatics, magnetostatics, electrodynamic fields, and electromagnetic wave propagation in various media.

<b>UNIT - I</b>	<b>VECTOR CALCULUS AND CO-ORDINATE SYSTEMS</b>	<b>(9+3)</b>
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Sources and effects of electromagnetic fields – Scalar and Vector fields – Different Co-ordinate Systems: Rectangular, Cylindrical and Spherical – Relationship between Coordinate systems – Vector Calculus – Gradient, Divergence and Curl – Divergence theorem – Stoke's theorem.

<b>UNIT - II</b>	<b>ELECTROSTATICS</b>	<b>(9+3)</b>
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Coulomb's Law – Electric field intensity (E) – Field due to point and continuous charges – Electric field due to finite line charge, circular disc and infinite sheet of charge – Electric flux density (D) – Gauss's law and its applications – Electrical potential – Electric field in dielectric and Electric Dipole, Electric field in multiple dielectrics – Boundary conditions between dielectric media – Capacitance: Two dielectric media, concentric spheres, co-axial cables.

<b>UNIT - III</b>	<b>MAGNETOSTATICS</b>	<b>(9+3)</b>
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Lorentz Law of force, magnetic field intensity (H) – Biot-Savart's Law – Ampere's Law – Magnetic field intensity due to straight conductors, infinite sheet of current, at the centre of the toroid, along the axis of the circular loop and solenoid – Magnetic flux density (B) – Magnetic field in multiple media – Boundary conditions – Magnetic force – Torque – Inductance: Toroid, co-axial cable, two transmission line – Applications: Magnetic Levitation.

<b>UNIT - IV</b>	<b>ELECTRODYNAMIC FIELDS</b>	<b>(9+3)</b>
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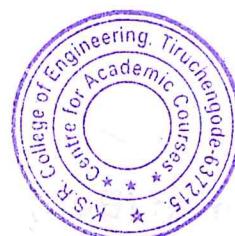
Faraday's laws, Induced EMF – Transformer and Motional EMF, Maxwell's Equations (differential and integral forms) – Conduction and Displacement Current – Continuity Equation of Current – Ohm's law in point form – Relation between field theory and circuit theory. Applications: Time-varying Electric and Magnetic Fields.

<b>UNIT - V</b>	<b>ELECTROMAGNETIC WAVES</b>	<b>(9+3)</b>
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Generation – Electro Magnetic Wave equations – Wave parameters; velocity, intrinsic impedance, propagation constant – uniform plane wave and its properties – Waves in free space, lossy and lossless dielectrics – Skin depth, Poynting vector and Poynting Theorem.

**LECTURE: 45, TUTORIAL: 15, SELF LEARNING: 60, TOTAL: 120 PERIODS**

  
**Chairman (BoS)**



**COURSE OUTCOMES:****At the end of the course, the learners will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Recognize spatial variations of physical quantities using coordinate systems and outline the concepts of divergence and curl.	Understand
CO2	Apply electrostatic laws and principles to determine electric fields, potentials, and capacitance in various dielectric configurations.	Apply
CO3	Interpret the laws and principles governing magnetic fields, forces, and inductance in various physical and engineering contexts.	Understand
CO4	Summarize the fundamental laws and equations governing time-varying electric and magnetic fields.	Understand
CO5	Recognize the electromagnetic wave propagation in different media using the Poynting vector and theorem.	Understand

**TEXT BOOKS:**

1. Mathew N.O. Sadiku, Elements of Electromagnetics, Oxford University Press, Seventh Edition, 2020.
2. William. H. Hayt, Engineering Electromagnetics, Tata McGraw-Hill, Seventh Edition, 2019.

**REFERENCES:**

1. Gangadhar, K.A, Field Theory, Khanna Publishers, New Delhi, Sixteenth Edition, 2020.
2. Ghosh, S.P and Lipika Datta, Electromagnetic Field Theory, Tata McGraw-Hill Educational Private Limited, New Delhi, First Edition, 2017.
3. Joseph. A. Edminister, Theory and problems of Electromagnetics, Schaum Series, Tata McGraw-Hill, Second Edition, 2018.
4. David J. Griffiths, Introduction to Electrodynamics, Pearson Education, Fifth Edition, 2023.

**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	-	1	1	2	1	-	1	2	2
CO2	3	2	2	-	-	1	1	2	1	-	1	2	2
CO3	3	2	1	-	-	1	1	2	1	-	2	2	2
CO4	3	2	1	-	-	1	1	2	1	-	2	2	2
CO5	3	2	1	-	-	1	1	2	1	-	2	2	2

1 - Low, 2 - Medium, 3 - High


  
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24EET32	ELECTRICAL MACHINES - I	Category	L	T	P	SL	C
		PCC	45	15	0	60	4

**PREREQUISITE:**

Basic knowledge of electrical circuits, electromagnetic principles and fundamental laws of electromagnetism and energy conversion is required.

**OBJECTIVE:**

- To understand the principles, construction, operation, and performance analysis of magnetic circuits, transformers, DC generators, and DC motors.

<b>UNIT - I</b>	<b>MAGNETIC CIRCUITS</b>	<b>(9+3)</b>
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Introduction to Electrical Machines – Review of magnetic circuit: MMF, flux, Reluctance and Inductance – Series and Parallel Magnetic Circuits – Magnetic Vs Electric Circuits – Statically and Dynamically Induced EMF – Hysteresis and Eddy Current losses – BH curve – AC Operation: Single and Multiple Excited Magnetic System.

<b>UNIT - II</b>	<b>SINGLE-PHASE TRANSFORMERS</b>	<b>(9+3)</b>
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Constructional Details: Shell type and Core Type – Principle of Operation – EMF Equation – Transformation Ratio – Ideal transformer – Transformer on load – Regulation, Losses and Efficiency – All day Efficiency – Equivalent Circuit – Parallel Operation – Testing of Transformer: Load Test, Open and Short Circuit Test, Sumpner's Test.

<b>UNIT - III</b>	<b>THREE-PHASE AND AUTO TRANSFORMER</b>	<b>(9+3)</b>
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Three Phase Transformer: Construction and working – Three Phase Transformer Connections: Star-Start, Delta-Delta, Star-Delta, Delta-Star – Scott Connection – Parallel Operation of Transformer. Auto Transformer: Construction and working – Copper Saving – Comparison with two winding transformers – Applications of autotransformer.

<b>UNIT - IV</b>	<b>DC GENERATORS</b>	<b>(9+3)</b>
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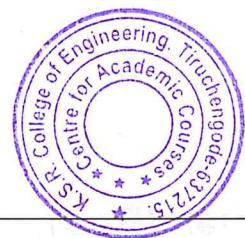
Constructional Details – Lap and wave winding – Principle of Operation – EMF Equation – Types of DC generator – Characteristics of DC Generators – Applications of DC Generator – Armature Reaction – Commutation – Methods for Improving Commutation – Losses and Efficiency – Parallel Operation of DC Generator.

<b>UNIT - V</b>	<b>DC MOTORS</b>	<b>(9+3)</b>
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Principle of Operation – Back EMF – Types of DC Motor – Characteristics of DC Motors – Torque Equation – Losses and Efficiency – Speed control of DC Shunt and Series Motor – Necessity of Starters – Starters: Three Point and Four Point Starters – Testing of DC Motor: Brake Test, Swinburne Test and Hopkinson's Test.

**LECTURE: 45, TUTORIAL: 15, SELF LEARNING: 60, TOTAL: 120 PERIODS**

  
Chairman (BoS)



**COURSE OUTCOMES:****At the end of the course, the learners will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Interpret the concepts of magnetic circuits and electromagnetic phenomena and classification of electrical machines.	Understand
CO2	Apply the principles of single-phase transformers to evaluate their efficiency and regulation.	Apply
CO3	Explain the construction, working, and connections of three-phase and autotransformers, including their operation, comparisons, and applications.	Understand
CO4	Interpret the construction, operation, and characteristics of DC generators, including winding types, commutation, and performance aspects.	Understand
CO5	Apply the basic principles of DC motors to analyze their operational characteristics, torque, speed control and performance testing.	Apply

**TEXT BOOKS:**

1. Nagrath I.J and Kothari D. P, "Electrical machines", Tata McGraw-Hill Publishing Company Ltd, Fifth Edition, 2017.
2. Bhimbhra, P.S, "Electrical Machinery", Khanna Publishers, Fully Revised Edition, 2021.

**REFERENCES:**

1. Fitzgerald, A.E. Charles Kingsly Jr, Stephen D. Umans, "Electric Machinery", McGraw-Hill Books Company, Seventh Edition, 2013.
2. Murugesh Kumar, K, "Electric Machines", Vikas Publishing House Pvt Ltd, Second Edition, 2010.
3. Theraja B.L. and Theraja, A.K, "A Textbook of Electrical Technology", S. Chand Publishing, First Multicolor Edition 2005, Reprint 2015.
4. Samarajit Ghosh, "Electrical Machines", Pearson Education, Second Edition, 2012.

**Mapping of COs with POs and PSOs**

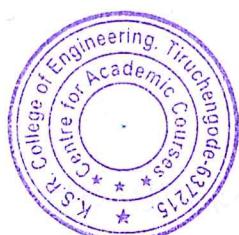
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	2	1	-	3	3	-
CO2	3	3	2	-	-	-	-	2	1	-	3	3	-
CO3	3	2	-	-	-	-	-	2	1	-	3	3	-
CO4	3	3	-	-	-	-	-	2	1	-	3	3	-
CO5	3	3	2	-	-	-	-	2	1	-	3	3	-

1 - Low, 2 - Medium, 3 - High



**Chairman (BoS)**



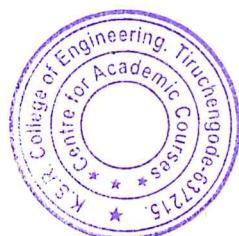
24EET33	LINEAR INTEGRATED CIRCUITS	Category	L	T	P	SL	C	
		PCC	45	0	0	45	3	
<b>PREREQUISITE:</b>								
A knowledge in semiconductor devices such as diodes and transistors, and fundamental knowledge of circuit analysis techniques and basic mathematics are essential.								
<b>OBJECTIVE:</b>								
● To understand monolithic IC fabrication, operational amplifier applications, and the functions of specialized ICs like 555 Timer, VCO (IC-566), and PLL (IC-565).								
<b>UNIT - I</b>	<b>IC FABRICATION</b>						<b>(9)</b>	
IC classification – Fundamental of monolithic IC technology – Basic planner process: epitaxial growth, masking and etching – Diffusion of impurities – Realization of monolithic ICs and packaging – Fabrication of diodes, capacitors, resistors, monolithic transistors and FETs.								
<b>UNIT - II</b>	<b>CHARACTERISTICS OF OP-AMP</b>						<b>(9)</b>	
Op-amp circuit symbol, terminals, packages, power supply connections and specifications – Ideal Op-amp – Open loop operation of op-Amp – Feedback in ideal and practical op-amp: inverting amplifier, non-inverting amplifier – Differential amplifier, CMRR – DC characteristics – AC characteristics.								
<b>UNIT - III</b>	<b>APPLICATIONS OF OP-AMP</b>						<b>(9)</b>	
Basic Op-amp applications: Scale changer, Summing amplifier, Subtractor – Instrumentation amplifier – AC amplifier, AC voltage follower – V-to-I & I-to-V converter – Op-Amp circuits using diodes: rectifier, peak detector, clipper, clamper – Sample and Hold circuit – Differentiator – Integrator – Comparators and its applications – Schmitt trigger.								
<b>UNIT - IV</b>	<b>SPECIAL ICs</b>						<b>(9)</b>	
IC 555 Timer: Functional block diagram, Monostable operation and its applications, Astable operation and its applications – Phase locked loop: Basic principles, Phase detector/Comparator, voltage-controlled oscillator (IC566), Low pass filter – Monolithic PLL (IC 565) – PLL applications.								
<b>UNIT - V</b>	<b>APPLICATION ICs</b>						<b>(9)</b>	
IC Voltage regulators: Fixed voltage series regulators (78XX/79XX) – LM723 general purpose voltage regulator – LM317 adjustable voltage regulators – ICL8038 Function generator IC – D/A converter: (R-2R ladder and weighted resistor types) – A/D converters: (flash type and successive approximation).								
<b>LECTURE: 45, SELF LEARNING: 45, TOTAL: 90 PERIODS</b>								
 <b>Chairman (BoS)</b> 								

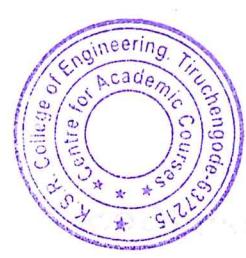
<b>COURSE OUTCOMES:</b> At the end of the course, the learners will be able to:																									
<b>COs</b>	<b>Course Outcome</b>												<b>Cognitive Level</b>												
<b>CO1</b>	Explain the fabrication process of monolithic ICs including the creation of passive and active components.												Understand												
<b>CO2</b>	Interpret the structure, characteristics, and basic configurations of ideal and practical operational amplifiers with and without feedback.												Understand												
<b>CO3</b>	Apply operational amplifier configurations in various analog circuits.												Apply												
<b>CO4</b>	Discuss the functional blocks and real-time applications of special ICs, including the 555 Timer, 566 VCO, and 565 PLL.												Understand												
<b>CO5</b>	Describe the working principles and applications of commonly used application-specific ICs.												Understand												
<b>TEXT BOOKS:</b>																									
1. D. Roy Choudhary, Sheil B. Jani, "Linear Integrated Circuits", New Age, Fourth Edition, 2018. 2. Ramakant A. Gayakward, "Op-amps and Linear Integrated Circuits", Fourth Edition, Pearson Education, PHI 2021.																									
<b>REFERENCES:</b>																									
1. David A. Bell, "Op-amp & Linear ICs", Oxford, Third Edition, 2011. 2. Fiore, "Op-amps, Linear Integrated Circuits Concepts & Applications", Cengage, 2010. 3. Floyd, Buchla, "Fundamentals of Analog Circuits", Pearson, 2013. 4. Jacob Millman, Christos C. Halkias, "Integrated Electronics - Analog and Digital circuits system", McGraw Hill, Second Edition, 2017.																									
<b>Mapping of COs with POs and PSOs</b>																									
<b>COs/ POS</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PSO1</b>	<b>PSO2</b>												
<b>CO1</b>	3	2	-	-	-	-	-	1	1	-	2	2	2												
<b>CO2</b>	3	2	-	-	-	-	-	1	1	-	2	2	3												
<b>CO3</b>	3	3	2	-	-	-	-	1	1	-	2	2	3												
<b>CO4</b>	3	2	-	-	-	-	-	1	1	-	2	2	3												
<b>CO5</b>	3	3	-	-	-	-	-	1	1	-	2	2	3												

1 - Low, 2 - Medium, 3 - High



**Chairman (BoS)**



24EET34	DIGITAL LOGIC CIRCUITS	Category	L	T	P	SL	C						
		PCC	45	15	0	60	4						
<b>PREREQUISITE:</b>													
Basic understanding of number systems, elementary algebra, and logical reasoning is essential for analyzing digital systems.													
<b>OBJECTIVE:</b>													
<ul style="list-style-type: none"> <li>To apply Boolean algebra for logic minimization and design of sequential circuits, asynchronous counters, memory devices, and implement digital systems using VHDL.</li> </ul>													
<b>UNIT - I</b>	<b>BOOLEAN ALGEBRA AND GATE MINIMIZATION</b>	<b>(9+3)</b>											
Number Systems – Conversions – Digital Logic Gates: AND, OR, NOT, NAND, NOR and Exclusive-OR operations – NAND – NOR Implementation – Binary Arithmetic – One's and Two's complements Arithmetic – Boolean postulates and laws – De-Morgan's Theorem – Principle of Duality – Boolean expression – Gate Minimization: Standard representation for logic functions – Karnaugh map Minimization – Don't care conditions – Quine-McCluskey method.													
<b>UNIT - II</b>	<b>COMBINATIONAL CIRCUITS</b>	<b>(9+3)</b>											
Introduction – Half adder – Full adder – Half subtractor – Full subtractor – Multiplexer and Demultiplexer – Encoder and Decoders – Parity checker/ generator – Magnitude Comparator – Code Converters: Binary to Gray, BCD to Excess-3, Gray to Binary.													
<b>UNIT - III</b>	<b>SEQUENTIAL CIRCUITS</b>	<b>(9+3)</b>											
Introduction – Storage Elements: Latches, Flip-Flop: SR, D, JK & T – operation and excitation tables – Realization using other flip flops – Analysis of Clocked Sequential Circuits – State Equation, State Table, State Diagram, State reduction and Assignment – Registers: Shift registers and its types.													
<b>UNIT - IV</b>	<b>ASYNCHRONOUS SEQUENTIAL CIRCUITS AND COUNTERS</b>	<b>(9+3)</b>											
Analysis of Asynchronous sequential circuits – Fundamental mode sequential circuit. Races and Cycles – Hazards: Static Hazards – Dynamic Hazards – Hazard-free Realization – Essential Hazards; Asynchronous counter: Up, Down and Up/Down counter – Modulo-n counter.													
<b>UNIT - V</b>	<b>MEMORY AND VHDL</b>	<b>(9+3)</b>											
Classification of memories – ROM: ROM organization, PROM, EPROM, EEPROM. RAM: Static RAM cell – Dynamic RAM cell – Programmable Logic Devices: PAL, PLA – Implementation of combinational logic circuits – Introduction to field Programmable Gate Arrays; Introduction to VHDL, VHDL data flow modelling for adder, subtractor, multiplexer and Demultiplexer.													
<b>LECTURE: 45, TUTORIAL: 15, SELF LEARNING: 60, TOTAL: 120 PERIODS</b>													
 													

**COURSE OUTCOMES:****At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Analyze different methods used for the simplification of Boolean expressions.	Analyze
CO2	Construct the different types of combinational circuits.	Apply
CO3	Implement the sequential circuits using flip-flops, registers.	Apply
CO4	Design the asynchronous sequential circuits and various counters.	Apply
CO5	Apply the knowledge of memory devices and construct digital models using VHDL for basic logic components.	Apply

**TEXT BOOKS:**

1. Morris Mano M., "Digital Design", Prentice Hall of India Pvt. Ltd, Sixth Edition, 2018.
2. Salivahanan, S, and Arivazhagan, S, "Digital Circuits and Design", Oxford University Press, New Delhi, Fifth Edition, 2023.

**REFERENCES:**

1. Samir Palnitkar, "Verilog HDL: Guide to Digital Design and Synthesis", Pearson Education, New Delhi, Seventh Edition, 2017.
2. Donald P. Leach, Albert Paul Malvino and Goutam Saha, "Digital Principles and Applications", McGraw-Hill Education, Eighth edition, 2015.
3. Thomas L. Floyd, "Digital Fundamentals", Pearson India, New Delhi, Eleventh Edition, 2018.
4. Anand Kumar, A., "Fundamentals of Digital Circuits", PHI Publication, New Delhi, Fourth Edition, 2016.

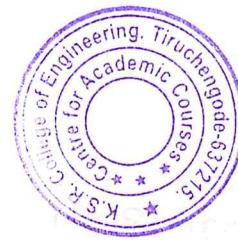
**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	2	2	-	-	1	1	-	2	-	2
CO2	3	3	2	-	2	-	-	1	1	-	2	-	2
CO3	3	3	2	-	2	-	-	1	1	-	2	-	2
CO4	3	3	2	-	2	-	-	1	1	-	2	-	2
CO5	3	3	2	-	2	-	-	1	1	-	2	-	2

1 - Low, 2 - Medium, 3 - High



Chairman (BoS)



24EEP31	ELECTRICAL MACHINES – I LABORATORY	Category	L	T	P	SL	C
		PCC	0	0	45	0	1.5

**PREREQUISITE:**

Basic knowledge of transformer construction, working principles, and equivalent circuits is essential. Familiarity with DC machines, their types, and fundamental electrical testing methods is required for a better understanding of performance and control techniques.

**OBJECTIVE:**

- To experimentally evaluate the performance, characteristics, and control methods of DC machines and single-phase and three-phase transformers.

**LIST OF EXPERIMENTS:**

1. Load test on single-phase transformer.
2. Open circuit and short circuit tests on a single-phase transformer.
3. Sumpner's Test on single-phase transformer.
4. Load test on three-phase transformers.
5. Open circuit and load characteristics of a separately excited DC generator.
6. Load characteristics of DC compound generator with differential and cumulative connection.
7. Load characteristics of DC shunt and DC Compound motor.
8. Load characteristics of DC series motor.
9. Swinburne's tests on DC shunt motor.
10. Speed control of DC shunt motor.

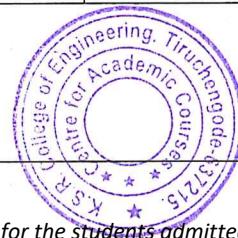
**PRACTICAL: 45, TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level	Exp.
CO1	Conduct transformer tests such as load test, open circuit, and short circuit tests to determine efficiency, regulation, and equivalent circuit parameters.	Analyze	1, 2, 3, 4
CO2	Analyze the open-circuit and load characteristics of various DC generators, including separately excited, self-excited, and compound types.	Analyze	5, 6
CO3	Analyze the performance of DC motors by conducting load tests on shunt, series, and compound motors under different operating conditions.	Analyze	7, 8
CO4	Perform Swinburne's test on DC shunt motor to estimate efficiency under different load conditions.	Analyze	9
CO5	Demonstrate speed control techniques of DC shunt motor and analyze its performance at varying speeds.	Analyze	10

  
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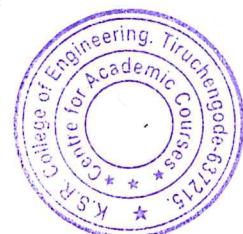
Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	2	-	-	1	2	1	-	2	3	-
CO2	3	3	3	2	-	-	1	2	1	-	2	3	-
CO3	3	3	3	2	-	-	1	2	1	-	2	3	-
CO4	3	3	3	2	-	-	1	2	1	-	2	3	-
CO5	3	3	3	2	-	-	1	2	1	-	2	3	-

1 - Low, 2 - Medium, 3 - High

### List of Equipment (For a Batch of 30 Students)

S. No.	Description of Equipment	Qty.
1.	D.C motor – Shunt Generator	2 set
2.	D.C motor – Compound Generator	2 set
3.	D.C. Shunt Motor	2 Nos.
4.	D.C. Series Motor	1 No.
5.	D.C. Compound Motor	1 No.
6.	Single-phase transformers	3 Nos.
7.	Three-phase transformers	2 Nos.
8.	Resistive load (Three-Phase: 2, Single Phase: 3)	5 Nos.
9.	Single-phase Auto transformer	5 Nos.
10.	Three-phase Auto transformer	3 Nos.
11.	Wire-wound Rheostats of different ratings	30 Nos.

  
Chairman (BoS)



24EEP32	LINEAR AND DIGITAL CIRCUITS LABORATORY	Category	L	T	P	SL	C
		PCC	0	0	45	0	1.5

**PREREQUISITE:**

Basic knowledge of analog and digital electronics, including op-amps, logic gates, number systems, and flip-flops is essential for designing and implementing electronic circuits.

**OBJECTIVE:**

- To design and implement analog and digital electronic circuits using op-amps, timers, logic gates, and flip-flops for fundamental signal processing and logic operations.

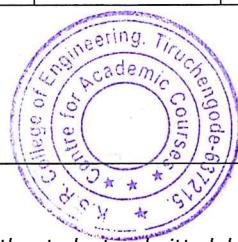
**LIST OF EXPERIMENTS:**

1. Implement inverting and non-inverting amplifiers using IC 741 op-amp.
2. Design and implement the applications of op-amp as Integrator and Differentiator.
3. Design a Schmitt trigger using an op-amp.
4. Design Astable and Monostable multivibrators using NE555 Timer.
5. Design a Variable Voltage Regulator using IC LM317.
6. Design and implementation of Boolean expression using basic gates.
7. Design and implement Full adder and Full subtractor.
8. Design and implement the following code converter: Binary to Gray, Gray to Binary.
9. Implementation and verification of the truth table for S-R and T flip-flop.
10. Design and implementation of synchronous counters using J-K flip-flops.

**PRACTICAL: 45, TOTAL: 45 PERIODS****COURSE OUTCOMES:**

**At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level	Exp.
CO1	Design Op-Amp circuits for various applications.	Apply	1, 2, 3
CO2	Analyze the applications of 555 IC in waveform generation, timing, and pulse modulation.	Analyze	4
CO3	Implement a regulated power supply circuit using LM317 to provide a variable DC output voltage.	Apply	5
CO4	Apply the principles of Boolean algebra to design and implement simplified logic expressions and combinational circuits using basic logic gates.	Apply	6, 7, 8
CO5	Reveal the behavior of sequential circuits by implementing S-R and T flip-flops, and design synchronous counters using J-K flip-flops.	Analyze	9, 10



Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	2	-	1	2	1	-	2	-	3
CO2	3	3	2	2	2	-	1	2	1	-	2	-	3
CO3	3	3	2	-	2	-	1	2	1	-	2	-	2
CO4	3	3	2	-	-	-	1	2	1	-	2	-	2
CO5	3	3	2	2	-	-	1	2	1	-	2	-	2

1 - Low, 2 - Medium, 3 - High

### List of Equipment (For a Batch of 30 Students)

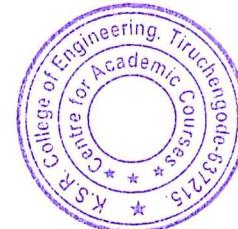
S. No.	Description of Equipment	Qty.
1.	Op-Amp IC 741	20 Nos.
2.	Timer IC NE555	20 Nos.
3.	Voltage Regulator IC LM317	10 Nos.
4.	AND Gate IC 7408	15 Nos.
5.	OR Gate IC 7432	15 Nos.
6.	NOT Gate IC 7404	15 Nos.
7.	XOR Gate IC 7486	15 Nos.
8.	NAND Gate IC 7400	15 Nos.
9.	JK Flip Flop	10 Nos.
10.	Resistors various range	20 Nos.
11.	Capacitors various range	20 Nos.
12.	Breadboards	15 Nos.
13.	Dual Power Supply ( $\pm 12$ V)	6 Nos.
14.	Regulated Power Supply	10 Nos.
15.	Dual Channel Oscilloscope	5 Nos.
16.	Function Generator	5 Nos.
17.	Multimeter	5 Nos.
18.	Trainer Kit	8 Nos.

  
Chairman (BoS)



24ECP36	DESIGN STUDIO – I	Category	L	T	P	SL	C	
		ESC	0	0	30	0	1	
(Common to BME, CSE (IoT), ECE, EEE)								
<b>PREREQUISITE:</b>								
Basic understanding of design thinking principles, including empathy, problem identification, and user-centered design, is essential for engaging in the Design Studio.								
<b>OBJECTIVE:</b>								
To apply design thinking and system design principles to develop, prototype, and present user-centered electronic solutions through hands-on projects.								
<p><b>Identification of components</b></p> <p>Ex: 1 Resistor colour coding, Capacitors etc</p> <p>Ex: 2: Soldering Practice</p> <p><b>Realizing the functionality of components</b></p> <p>Ex: 3: Connecting LED with fixed resister, variable resistors</p> <p>Ex: 4: LED Go- No Go using Diode</p> <p>Ex: 5: Multiple LED Circuit</p> <p>Ex: 6: Switch on LED using Transistor</p> <p>Ex: 7: Electronic LED Lantern</p> <p>Ex: 8: Light Detector</p> <p>Ex: 9: IC555 LED Flasher / Beeper</p> <p>Ex: 10: LED Blinking</p> <p>Ex: 11: Autodesk Fusion - Simulation</p> <p><b>Prototyping</b></p> <p>Ex: 11: Mini project</p> <p>(Choose the problem and apply Design Thinking Concepts - empathy, Define, Ideation, Prototype to solve the problem)</p>								
<b>TOTAL(P:30) : 30 PERIODS</b>								

*C. Guruprasad*  
Chairman (BoS)



**COURSE OUTCOMES:****At the end of the course, the students will be able :**

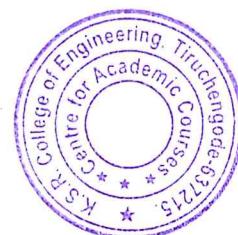
COs	Course Outcome	Cognitive Level
CO1	To identify and interpret the characteristics of basic electronic components such as resistors, capacitors, diodes, LEDs, transistors, and LDRs through visual inspection and standard coding schemes.	Analyze
CO2	To experience hands-on training in soldering techniques and assembling electronic circuits using discrete components on breadboards and PCBs.	Apply
CO3	To understand the working principles of passive and active components by constructing basic circuits and observing their electrical behavior under different conditions.	Apply
CO4	To design and implement functional circuits including switching, blinking, and multiple output systems using fundamental electronics	Create
CO5	To document and effectively communicate the design process, implementation, and outcomes of a project through formal reporting and presentations.	Evaluate

**Mapping of COs with POs and PSOs**

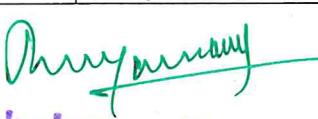
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	3	3	3	-	3	3	3	3	3	3	3	3
CO2	-	3	.3	3	-	3	3	3	-	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	-	3	3	3	3
CO5	2	3	3	3	3	3	3	3	3	3	3	3	3

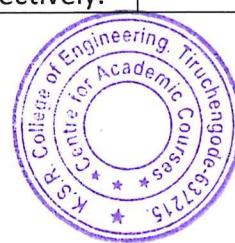
1 - Low, 2 - Medium, 3 - High

*C. Guvaf*  
Chairman (BOS)



24SDP39	SOFT SKILLS DEVELOPMENT – III	Category	L	T	P	SL	C						
		EEC	0	0	30	0	1						
(Common to All Branches)													
<b>OBJECTIVES:</b>													
To the concept of aptitude and its relevance in various fields. It highlights the need for aptitude skills and emphasizes their importance in academic and career development. It also focuses on building a strong foundation in English grammar to improve communication skills.													
UNIT - I	TIME SPEED AND DISTANCE												
Relationship Between Time Speed and Distance Time Conversion – Relative Speed – Chasing – Problems on Late, Early and Usual Time													
UNIT - II	PROBLEMS ON TRAINS												
Crossing a Static objects – Crossing a Moving Object: Same and Opposite Direction – Time Difference based Problems.													
UNIT - III	BOATS AND STREAM												
Introduction to Boat in Still Water and Current – Down Stream Speed – Upstream Speed – Speed in Still Water – Rate of Stream.													
UNIT - IV	LOGICAL REASONING												
Seating Arrangements: Circular and Linear Arrangements – Inequalities – Assertion & reasoning.													
UNIT - V	VERBAL ABILITY												
Parts of Speech – Sentence Completion – Idioms and Phrases – Reading Comprehension.													
<b>TOTAL: 30 PERIODS</b>													
<b>COURSE OUTCOMES:</b>													
At the end of the course, the students will be able to:													
COs	Course Outcome						Cognitive Level						
CO1	Apply time, speed, and distance concepts to solve problems involving relative speed, time conversion, and punctuality scenarios.						Apply						
CO2	Solve problems on trains with object crossing and time differences using concepts of relative speed and direction.						Apply						
CO3	Solve problems involving boats and streams using concepts of upstream, downstream, and current speed.						Apply						
CO4	Apply logical reasoning to solve problems on seating arrangements, inequalities, and assertion-reasoning statements.						Apply						
CO5	Demonstrate understanding of grammar, vocabulary, and comprehension to complete sentences and interpret texts effectively.						Understand						

  
Chairman (BoS)



**TEXT BOOKS:**

1. R S Aggarwal, "Quantitative Aptitude for Competitive Examinations".
2. Abhijit Guha, "Quantitative Aptitude for Competitive Examinations".
3. Nishit K. Sinha, "Logical Reasoning and Data Interpretation for CAT".
4. R.S. Agarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning".
5. Wren & Martin, "High School English Grammar & Composition".

**REFERENCES:**

1. Arun Sharma, Quantitative Aptitude for CAT, 11e, 2025.
2. Arun Sharma, Logical Reasoning for CAT, 7e, 2025.
3. English for Competitive Examinations – by Edgar Thorpe & Showick Thorpe.
4. <https://preinsta.com/>.
5. <https://www.geeksforgeeks.org/quantitative-aptitude/?ref=shm>.
6. <https://www.youtube.com/@FeelFreeToLearn/playlists>.

**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	2	-	-	2	-	-	3	-	-
CO2	3	3	2	-	2	-	-	2	-	-	3	-	-
CO3	3	3	2	-	2	-	-	2	-	-	3	-	-
CO4	3	3	2	-	2	-	-	2	-	-	3	-	-
CO5	3	2	-	-	2	-	-	3	3	-	3	-	-
Avg.	3	3	2	-	2	-	-	2	3	-	3	-	-



**Chairman (BoS)**

