



# RAJALAKSHMI ENGINEERING COLLEGE CURRICULUM AND SYLLABUS

## CHOICE BASED CREDIT SYSTEM

### B.E. COMPUTER SCIENCE AND ENGINEERING (Cyber Security) REGULATION 2023

#### **Vision**

To promote highly ethical and innovative computer professionals through excellence in teaching, training and research.

#### **Mission**

- To produce globally competent professionals, motivated to learn the emerging technologies and to be innovative in solving real world problems.
- To promote research activities amongst the students and the members of faculty that could benefit the society.
- To impart moral and ethical values in their profession.

#### **PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)**

**PEO 1:** To equip students with essential background in computer science, basic electronics and applied mathematics.

**PEO 2:** To prepare students with fundamental knowledge in programming languages and tools and enable them to develop applications.

**PEO 3:** To encourage the research abilities and innovative project development in the field of networking, security, data mining, web technology, mobile communication and also emerging technologies for the cause of social benefit.

**PEO 4:** To develop professionally ethical individuals enhanced with analytical skills, communication skills and organizing ability to meet industry requirements.

## **PROGRAMME OUTCOMES (POs)**

**PO1: Engineering knowledge:** Apply the knowledge of Mathematics, Science, Engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2: Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3: Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO 4: Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO 5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO 6: The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO 7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO 8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO 9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## **PROGRAM SPECIFIC OUTCOMES (PSOs)**

A graduate of the Computer Science and Engineering Program will demonstrate

**PSO 1: Foundation Skills:** Ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, web design, machine learning, data analytics, and networking for efficient design of computer-based systems of varying complexity. Familiarity and practical competence with a broad range of programming language and open source platforms.

**PSO 2: Problem-Solving Skills:** Ability to apply mathematical methodologies to solve computational task, model real world problem using appropriate data structure and suitable algorithm. To understand the standard practices and strategies in software project development, using open-ended programming environments to deliver a quality product.

**PSO 3: Successful Progression:** Ability to apply knowledge in various domains to identify research gaps and to provide solution to new ideas, inculcate passion towards higher studies, creating innovative career paths to be an entrepreneur and evolve as an ethically social responsible computer science professional.

**CURRICULUM**  
**B.E. COMPUTER SCIENCE AND ENGINEERING (Cyber Security)**  
**Regulation 2023 | Total Credits: 160**

<b>SEMESTER I</b>								
SI. NO.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
<b>THEORY COURSES</b>								
1.	HS23111	Technical Communication I	HS	2	2	0	0	2
2.	MA23111	Linear Algebra and Calculus	BS	4	3	1	0	4
3.	GE23117	தமிழர் மரபு/Heritage of Tamils	HS	1	1	0	0	1
<b>LAB ORIENTED THEORY COURSES</b>								
4.	GE23131	Programming using C	ES	7	1	0	6	4
5.	EE23133	Basic Electrical and Electronics Engineering	ES	5	3	0	2	4
6.	PH23132	Physics for Information Science	BS	5	3	0	2	4
<b>LABORATORY COURSES</b>								
7	GE23121	Engineering Practices-Civil and Mechanical	ES	2	0	0	2	1
<b>NON CREDIT COURSES</b>								
8.	MC23111	Indian Constitution and Freedom Movement	MC	3	3	0	0	0
<b>TOTAL</b>				<b>29</b>	<b>16</b>	<b>1</b>	<b>12</b>	<b>20</b>

<b>SEMESTER II</b>								
SI. NO.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
<b>THEORY COURSES</b>								
1.	MA23213	Discrete Mathematical Structures	BS	4	3	1	0	4
2.	GE23217	தமிழரும் தொழில்நுட்பமும்/Tamils and Technology	HS	1	1	0	0	1
<b>LAB ORIENTED THEORY COURSES</b>								
3.	EC23232	Digital Logic and Microprocessor	ES	5	3	0	2	4
4.	GE23111	Engineering Graphics	ES	6	2	0	4	4
5.	CS23231	Data Structures	PC	7	3	0	4	5
<b>LABORATORY COURSES</b>								
6.	HS23221/ HS23222	Technical Communication II / English for Professional Competence	HS	2	0	0	2	1
7.	GE23122	Engineering Practices- Electrical and Electronics	ES	2	0	0	2	1
8.	CS23221	Python Programming Lab	PC	4	0	0	4	2
<b>NON CREDIT COURSES</b>								
9.	MC23112	Environmental Science and Engineering	MC	3	3	0	0	0
<b>TOTAL</b>				<b>34</b>	<b>15</b>	<b>1</b>	<b>18</b>	<b>22</b>

SEMESTER III								
Sl. NO.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
<b>THEORY COURSES</b>								
1.	MA23312	Fourier Series and Number Theory	BS	4	3	1	0	4
<b>LAB ORIENTED THEORY COURSES</b>								
2.	CS23332	Database Management Systems	PC	7	3	0	4	5
3.	CS23333	Object Oriented Programming Using Java	PC	7	1	0	6	4
4.	CS23532	Computer Networks	PC	7	3	0	4	5
5.	CR23331	Cryptography	PC	5	3	0	2	4
<b>TOTAL</b>				<b>30</b>	<b>13</b>	<b>1</b>	<b>16</b>	<b>22</b>

SEMESTER IV								
Sl. NO.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
<b>THEORY COURSES</b>								
1.		Open Elective – I	OE	3	3	0	0	3
<b>LAB ORIENTED THEORY COURSES</b>								
2.	MA23435	Probability, Statistics and Simulation	BS	4	3	0	2	4
3.	CS23431	Operating Systems	PC	7	3	0	4	5
4.	CR23431	Network Security	PC	5	3	0	2	4
5.	CS23331	Design and Analysis of Algorithms	PC	5	3	0	2	4
6.	CR23432	Design Thinking for Innovation in Computer Science	EEC	3	1	0	2	2
<b>EMPLOYABILITY ENHANCEMENT COURSES</b>								
7.	GE23421	Soft Skills–I	EEC	2	0	0	2	1
8.	CS23421	Industry Internship (2/4 weeks)	EEC	0	0	0	0	1
<b>TOTAL</b>				<b>29</b>	<b>16</b>	<b>0</b>	<b>14</b>	<b>24</b>

SEMESTER V								
Sl. NO.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
<b>THEORY COURSES</b>								
1.		Professional Elective-I	PE	3	3	0	0	3
<b>LAB ORIENTED THEORY COURSES</b>								
2.	CS23531	Web Programming	PC	7	1	0	6	4
3.	AI23231	Principles of Artificial Intelligence	PC	5	3	0	2	4
4.	CR23531	Ethical Hacking	PC	5	3	0	2	4
5.	CR23532	Cyber and Digital Forensics	PC	5	3	0	2	4
6.	CS23432	Software Construction	PC	5	3	0	2	4
<b>EMPLOYABILITY ENHANCEMENT COURSES</b>								
7.	GE23521	Soft Skills-II	EEC	2	0	0	2	1
<b>TOTAL</b>				<b>32</b>	<b>16</b>	<b>1</b>	<b>16</b>	<b>24</b>

SEMESTER VI								
Sl. NO.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
<b>THEORY COURSES</b>								
1.	CR23611	Cyber Laws and Security Policies	PC	3	3	0	0	3
2.		Professional Elective-II	PE	3	3	0	0	3
<b>LAB ORIENTED THEORY COURSES</b>								
3.	CR23631	Malware Analysis	PC	5	3	0	2	4
4.	CR23632	Blockchain Technologies	PC	5	3	0	2	4
5.	AI23331	Fundamentals of Machine Learning	PC	5	3	0	2	4
<b>LABORATORY COURSES</b>								
6.	CS23621	Mobile Application Development Laboratory	PC	4	0	0	4	2
<b>EMPLOYABILITY ENHANCEMENT COURSES</b>								
7.	GE23622	Problem Solving Techniques	EEC	2	0	0	2	1
<b>TOTAL</b>				<b>27</b>	<b>15</b>	<b>0</b>	<b>12</b>	<b>21</b>

SEMESTER VII								
SI. NO.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
<b>THEORY COURSES</b>								
1.		Professional Elective-III	PE	3	3	0	0	3
2.		Professional Elective-IV	PE	3	3	0	0	3
3.		Professional Elective-V	PE	3	3	0	0	3
4.		Open Elective – II	OE	3	3	0	0	3
<b>LAB ORIENTED THEORY COURSES</b>								
	CR23731	Blockchain Development in Hyper ledger Fabric	PC	4	2	0	2	3
<b>LABORATORY COURSES</b>								
5.	CR23721	Project Phase I	EEC	6	0	0	6	3
<b>TOTAL</b>				<b>22</b>	<b>14</b>	<b>0</b>	<b>8</b>	<b>18</b>

SEMESTER VIII								
SI. NO.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
<b>THEORY COURSES</b>								
1.		Professional Elective-VI	PE	3	3	0	0	3
<b>LABORATORY COURSES</b>								
2.	CR23821	Project Phase II	EEC	12	0	0	12	6
<b>TOTAL</b>				<b>15</b>	<b>3</b>	<b>0</b>	<b>12</b>	<b>9</b>

**TOTAL NO. OF CREDITS: 160**

## PROFESSIONAL ELECTIVES (PE)

<b>Cyber Security</b>								
Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	CR23A11	Security Assessment and Risk Analysis	PE	3	3	0	0	3
2.	CS23A11	Malware Detection and Analysis	PE	3	3	0	0	3
3.	CR23A31	Ethical Hacking and Security	PE	4	2	0	2	3
4.	CR23A32	Digital and Mobile Forensics	PE	4	2	0	2	3
5.	CR23A33	Cryptocurrency and Blockchain Technologies	PE	4	2	0	2	3
6.	CR23A34	Security and Privacy in Cloud	PE	4	2	0	2	3
7.	CR23A35	Social Network Security	PE	4	2	0	2	3
8.	CS23A35	Web Application Security	PE	4	2	0	2	3
9.	CR23A36	Information Security and Management	PE	4	2	0	2	3

<b>Data Science</b>								
Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	AI23A31	Social Network Analysis	PE	4	2	0	2	3
2.	AD23B33	Explorative and Forecasting Analytics	PE	4	2	0	2	3
3.	AI23A35	Recommendation System	PE	4	2	0	2	3
4.	IT23D31	Deep Learning Concepts	PE	4	2	0	2	3
5.	AD23B34	Text and Speech Analysis	PE	4	2	0	2	3
6.	CS23A31	Business Analytics	PE	4	2	0	2	3
7.	AD23A36	Image and Video Analytics	PE	4	2	0	2	3
8.	AD23A31	Image Processing and Computer Vision	PE	4	2	0	2	3
9.	AI23A36	Big Data Analytics	PE	4	2	0	2	3
10.	AD23A32	Natural Language Processing	PE	4	2	0	2	3

<b>Virtual and Augmented Reality</b>								
Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
1.	CS23A37	Augmented Reality and Virtual Reality	PE	4	2	0	2	3
2.	CD23B21	Data Visualization	PE	6	0	0	6	3
3.	CS23A39	Game Development	PE	4	2	0	2	3
4.	CS23B31	Introduction to Metaverse	PE	4	2	0	2	3
5.	IT23B35	Graphics and Multimedia	PE	4	2	0	2	3
6.	CS23A38	Digital Marketing	PE	4	2	0	2	3
7.	CD23721	Visual Effects	PE	6	0	0	6	3
8.	CD23731	Film Making and Radio Podcasting	PE	4	2	0	2	3
9.	CS23A34	User Interface Design	PE	4	2	0	2	3

## Emerging Technologies

SI. NO.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
1.	CS23A31	Business Analytics	PE	4	2	0	2	3
2.	CS23A32	Robotic Process Automation	PE	4	1	0	4	3
3.	CS23A33	Cyber Security and Forensics	PE	4	2	0	2	3
4.	CS23A34	User Interface Design	PE	4	2	0	2	3
5.	CS23A35	Web Application Security	PE	4	2	0	2	3
6.	CS23A36	3D Printing and Design	PE	4	2	0	2	3
7.	CR23A33	Cryptocurrency and Blockchain Technologies	PE	4	2	0	2	3
8.	CB23G11	Quantum Computation and Quantum Information	PE	3	3	0	0	3
9.	IT23431	Software Testing	PE	4	2	0	2	3
10.	IT23B33	DevOps	PE	4	2	0	2	3
11.	IT23B31	C# and .Net Framework	PE	4	2	0	2	3
12.	IT23A31	Internet of Things	PE	4	2	0	2	3
13.	IT23B32	UI and UX Design	PE	4	2	0	2	3



## Credit Distribution

Category	R2023
Humanities and Social Sciences including Management courses HS	8
Basic Science courses BS	20
Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc. ES	18
Professional core courses PC	72
Professional Elective courses PE	21
Open Electives from other technical and /or emerging Courses OE	6
Project work, seminar and internship in industry or elsewhere EEC	15
Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition] MC	0
<b>Total</b>	<b>160</b>

## SUMMARY OF ALL COURSES

B.E. COMPUTER SCIENCE AND ENGINEERING										
S.NO	Course Category	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HS	3	2							5
2	BS	8	4	4	4					20
3	ES	9	9							18
4	PC		7	18	13	20	17	3		78
5	PE					3	3	9	3	18
6	OE				3			3		6
7	EEC				4	1	1	3	6	15
8	MC									
	<b>Total</b>	<b>20</b>	<b>22</b>	<b>22</b>	<b>24</b>	<b>24</b>	<b>21</b>	<b>18</b>	<b>9</b>	<b>160</b>

## Semester - I

Course Code	Course Title	Category	L	T	P	C
HS23111	TECHNICAL COMMUNICATION I	HS	2	0	0	2
Common to all branches of B.E/B. Tech programmes						

<b>Objectives:</b>
<ul style="list-style-type: none"> <li>• To facilitate students develop their comprehension skills</li> <li>• To enable students to improve their receptive skills</li> <li>• To equip learners with better vocabulary and enhance their writing skills</li> <li>• To aid students speak effectively in all kinds of communicative contexts.</li> <li>• To improve the learners' basic proficiency in workplace communication</li> </ul>

<b>UNIT-I</b>	<b>DEVELOPING COMPREHENSION SKILLS</b>	<b>6</b>
<b>Listening:</b> Introduction to Informational listening – Listening to Podcasts, News <b>Reading:</b> Intentional Reading - Short Narratives and Passages. <b>Speaking:</b> Introducing Oneself, Narrating a Story / Incident. <b>Writing:</b> Sequential Writing – connecting ideas using transitional words (Jumbled Sentences), Process Description <b>Grammar:</b> Verbs – Main & Auxiliary: Simple Tenses – Form, Function and Meaning. <b>Vocabulary:</b> Word formation – Prefix, Suffix, Compound Words.		
<b>UNIT-II</b>	<b>LISTENING AND EXTENDED READING</b>	<b>6</b>
<b>Listening:</b> Deep Listening – Listening to Talk Shows and Debates <b>Reading:</b> In-depth Reading - Scanning Passages <b>Speaking:</b> Describing Current Issues, Happenings, etc., <b>Writing:</b> Note Making, Note Taking – Paragraph Writing <b>Grammar:</b> Continuous Tenses, Prepositions, Articles <b>Vocabulary:</b> One Word Substitutes, Phrasal Verbs.		
<b>UNIT-III</b>	<b>FORMAL WRITING AND VERBAL ABILITY</b>	<b>6</b>
<b>Listening:</b> Listening to Lectures and Taking Notes <b>Reading:</b> Interpretation of Tables, Charts and Graphs <b>Speaking:</b> SWOT Analysis on Oneself <b>Writing:</b> Formal Letter Writing and Email Writing <b>Grammar:</b> Perfect Tenses, Phrases and Clauses, Discourse Markers <b>Vocabulary :</b> Verbal Analogy / Cloze Exercise		
<b>UNIT-IV</b>	<b>ENHANCING SPEAKING ABILITY</b>	<b>6</b>
<b>Listening:</b> Listening to eminent voices of one's interest (Martin Luther King, APJ Abdul Kalam, etc.) <b>Reading:</b> Timed Reading, Filling KWL Chart. <b>Speaking:</b> Just a Minute, Impromptu <b>Writing:</b> Check-list, Instructions. <b>Grammar:</b> 'Wh' Questions / 'Yes' or 'No' Questions, Imperatives <b>Vocabulary:</b> Synonyms, Antonyms, Different forms of the same words.		
<b>UNIT-V</b>	<b>LANGUAGE FOR WORKPLACE</b>	<b>6</b>
<b>Listening:</b> Extensive Listening (Audio books, rendering of poems, etc.) <b>Reading:</b> Extensive reading (Jigsaw Reading, Short Stories, Novels) <b>Speaking:</b> Short Presentations on Technical Topics <b>Writing:</b> Recommendations, Essay Writing <b>Grammar:</b> Impersonal Passive, Reported Speech, Concord <b>Vocabulary :</b> Informal Vocabulary and Formal Substitutes		
<b>Total Contact Hours: 30</b>		

<b>Course Outcomes:</b>
<b>On completion of the course students will be able to</b>
<ul style="list-style-type: none"> <li>• Apply their comprehension skills and interpret different contents effortlessly</li> <li>• Read and comprehend various texts and audio visual contents</li> <li>• Infer data from graphs and charts and communicate it efficiently in varied contexts</li> <li>• Participate effectively in diverse speaking situations</li> <li>• To present, discuss and coordinate with their peers in workplace using their language skills</li> </ul>

<b>SUGGESTED ACTIVITIES</b>
<ul style="list-style-type: none"> <li>• Ice breaker</li> <li>• Just A Minute</li> <li>• Ship wreck</li> <li>• Hot seat</li> <li>• Vocabulary building</li> <li>• Chinese whispers</li> <li>• Case study</li> </ul>

<b>SUGGESTED EVALUATION METHODS</b>
<ul style="list-style-type: none"> <li>• Assignment topics</li> <li>• Quizzes</li> <li>• Class Presentation/Discussion</li> <li>• Continuous Assessment Tests</li> </ul>

<b>Text Book(s):</b>
1. Effective Technical Communication by M. Ashraf Rizvi, 2nd Edition, 2017
2. Sylvan Barnet and Hugo Bedau, 'Critical Thinking Reading and Writing', Bedford/st. Martin's: Fifth Edition, 2004
3. Meenakshi Upadhyay, Arun Sharma – Verbal Ability and Reading Comprehension
4. Teaching Speaking: A Holistic Approach, Book by Anne Burns and Christine ChuenMeng Goh, Cambridge University Press

<b>Reference Books(s):</b>
1. Basic Vocabulary in Use: 60 Units of Vocabulary Practice in North American English With Answers 2nd Edition by Michael McCarthy, Felicity O'Dell, John D. Bunting
2. Reading Development and Difficulties By Kate Cain
3. The 7 Habits of Highly Effective People by Stephen Covey, Simon and Schuster, UK
4. Everybody Writes: Your Go-To Guide to Creating Ridiculously Good Content Hardcover by Ann Handley

**CO - PO – PSO matrices of course**

PO/PSO  CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
HS23111. 1	-	-	-	1	-	-	-	-	-	3	-	-	-	2	-
HS23111. 2	-	-	-	1	-	-	-	-	-	3	-	-	2	-	-
HS23111. 3	-	1	-	1	-	-	-	-	-	3	-	-	2	-	-
HS23111. 4	-	-	-	2	-	-	-	-	1	3	-	-	3	-	1
HS23111. 5	-	-	-	1	-	-	-	-	1	3	-	-	1	-	-
<b>Average</b>	-	1.0	-	1.2	-	-	-	-	1	3	-	-	2.0	2	1.0

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low)    2: Moderate (Medium)

3: Substantial (High) No correlation: “-“

Course Code	Course Title	Category	L	T	P	C
MA23111	LINEAR ALGEBRA AND CALCULUS	BS	3	1	0	4
Common to B.E. - CSE, EEE, ECE, BME and B.Tech. IT.						

Objectives:
<ul style="list-style-type: none"> <li>To introduce the matrix techniques and to explain the nature of the matrix.</li> </ul>
<ul style="list-style-type: none"> <li>To collect the matrix algebra techniques and the concepts of basis and dimension in vector spaces.</li> </ul>
<ul style="list-style-type: none"> <li>To construct normalization of vectors and ortho-normal vectors.</li> </ul>
<ul style="list-style-type: none"> <li>To understand techniques of calculus which are applied in the Engineering problems.</li> </ul>
<ul style="list-style-type: none"> <li>To apply the techniques of Integration in finding area and volumes.</li> </ul>

<b>UNIT-I</b>	<b>MATRICES</b>	<b>12</b>
Matrices - Eigenvalues and eigenvectors - Diagonalization of matrices using orthogonal transformation - Cayley-Hamilton Theorem (without proof) - Quadratic forms - Reduction to canonical form using orthogonal transformation - Numerical computation of Eigen value using Power method.		
<b>UNIT-II</b>	<b>LINEAR TRANSFORMATION</b>	<b>12</b>
Vector spaces – Subspaces – Linear combinations and system of Linear equations – Linear independence and Linear dependence – Bases and Dimensions – Linear Transformation – Matrix representation of Linear Transformation - Null space, Range space and dimension theorem (without proof).		
<b>UNIT-III</b>	<b>INNER PRODUCT SPACES</b>	<b>12</b>
Inner product and norms - Gram Schmidt orthonormalization process - QR Factorization - Singular value decomposition.		
<b>UNIT-IV</b>	<b>FUNCTIONS OF SEVERAL VARIABLES</b>	<b>12</b>
Partial differentiation–Total derivative–Change of variables–Jacobians–Partial differentiation of implicit functions–Taylor’s series for functions of two variables–Maxima and minima of functions of two variables–Lagrange’s method of undetermined multipliers.		
<b>UNIT-V</b>	<b>MULTIPLE INTEGRALS</b>	<b>12</b>
Double integrals–Change of order of integration–Area enclosed by plane curves–Triple integrals–Volume of solids–Numerical computation of double integrals-trapezoidal rule.		
<b>Total Contact Hours: 60</b>		

Course Outcomes: On completion of the course, students will be able to
<ul style="list-style-type: none"> <li>Demonstrate the matrix techniques in solving the related problems in engineering and technology.</li> </ul>
<ul style="list-style-type: none"> <li>Apply the concepts of basis and dimension in vector spaces to the solution of related complex engineering problems.</li> </ul>
<ul style="list-style-type: none"> <li>Construct orthonormal basis by the concepts of normalization in inner products and to analyse complex engineering problems.</li> </ul>
<ul style="list-style-type: none"> <li>Interpret the problems in Engineering and Technology using the principles of mathematical calculus.</li> </ul>
<ul style="list-style-type: none"> <li>Evaluate multiple integrals to conduct investigations of complex problems.</li> </ul>

Text Book(s):	
1.	Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.
2.	T Veerarajan , Linear Algebra and Partial Differential Equations, Mc Graw Hill Education,2019.
3.	Friedberg, A.H., Insel, A.J. and Spence, L., Elementary Linear Algebra, a matrix approach,2 <sup>nd</sup> edition, Pearson, 2014.

**Reference Books(s):**

1.	Ramana. B.V., " Higher Engineering Mathematics ", McGraw Hill Education Pvt. Ltd, New Delhi, 2018.
2.	Erwin Kreyszig ," Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2016.

**CO - PO – PSO matrices of course**

PO/PSO  CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
MA23111.1	3	2	1	-	-	-	-	-	-	-	1	-	1	1	-
MA23111.2	3	3	-	-	-	-	-	-	-	-	-	-	1	1	-
MA23111.3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
MA23111.4	2	2	-	-	-	-	-	-	-	-	1	1	-	-	-
MA23111.5	2	2	-	-	-	-	-	-	-	-	-	1	1	-	-
<b>Average</b>	2.6	2.2	1	-	-	-	-	-	-	-	1	1	1	1	-

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low) 2: Moderate (Medium)

3: Substantial (High) No correlation: "--"

Course Code	Course Title	Category	L	T	P	C
GE23117	<b>தமிழர் மரபு/HERITAGE OF TAMILS</b>	HS	1	0	0	1
Common to all branches of B.E/B. Tech programmes						

<b>அலகு I</b>	<b>மொழி மற்றும் இலக்கியம்:</b>	3
இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமய சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழிக் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.		
<b>அலகு II</b>	<b>மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை:</b>	3
நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளூர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.		
<b>அலகு III</b>	<b>நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:</b>	3
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.		
<b>அலகு IV</b>	<b>தமிழர்களின் திணைக் கோட்பாடுகள்:</b>	3
தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.		
<b>அலகு V</b>	<b>இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு:</b>	3
இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்ச வரலாறு.		
<b>Total Contact Hours: 15</b>		

<b>Text Book(s):</b>
1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருறை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr. K. K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr. S. Singaravelu)(Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr. S. V. Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies).
9. Keeladi – ‘Sangam City Civilization on the banks of river Vaigai’ (Jointly Published by: Department of archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.



Course Code	Course Title	Category	L	T	P	C
GE23131	PROGRAMMING USING C	ES	1	0	6	4

**Objectives:**

• To develop C Programs using basic programming constructs
• To develop C programs using arrays and strings
• To do searching and sorting algorithms in C
• To develop applications in C using user defined functions and recursive functions
• To develop applications in C using pointers and structures

**List of Experiments**

1	Overview of C, Constants, Variables and Data Types
2	Operators and Expressions, Managing Input and Output Operations
3	Decision Making and Branching
4	Decision Making and Looping
5	Nested Loops - while and for, Jumps in Loops
6	One-Dimensional Arrays
7	Searching Algorithms - Linear and Binary
8	Sorting Algorithms - Bubble and Selection
9	Two-Dimensional and Multi-dimensional Arrays
10	Character Arrays and Strings Handling Functions
11	User-Defined Functions - Recursive Functions
12	Passing Arrays and Strings to Functions
13	Scope, Visibility and Lifetime of Variables
14	Structures and Unions
15	Pointers
16	The Preprocessor
<b>Platform Needed:</b> GCC Compiler for Windows/Linux	
<b>Total Contact Hours</b>	
75	

**Text Book(s):**

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Second Edition, PHI
2. Byron Gottfried, "Programming in C", Second Edition, Schaum Outline Series

**Reference Books(s):**

1. Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGraw Hill.
2. Yashavant Kanetkar, "Let Us C", BPB Publications
3. E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill
4. NPTEL course, "Problem Solving Through Programming In C", By Prof. Anupam Basu, IIT Kharagpur

**Course Outcomes:** On completion of the course, the students will be able to

•	Formulate simple algorithms for arithmetic and logical problems.
•	Implement conditional branching, iteration and recursion.
•	Decompose a problem into functions and synthesize a complete program using divide and conquer approach.
•	Use arrays, pointers and structures to formulate algorithms and programs.
•	Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

**Suggested Activities**

Practice small and tricky codes
Practice problems in portals like Digital Café
Debugging the codes
Completing the function definitions etc

**CO - PO – PSO matrices of course**

PO/PSO  CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
GE23131.1	1	2	2	2	1	-	-	-	1	2	1	1	2	3	-
GE23131.2	1	1	1	1	1	-	-	-	-	-	1	1	2	2	-
GE23131.3	1	1	2	1	1	-	-	-	-	-	1	1	2	2	-
GE23131.4	2	2	3	2	1	-	-	-	1	-	2	1	2	2	2
GE23131.5	2	2	3	2	1	-	-	-	-	-	2	1	2	2	2
<b>Average</b>	1.4	1.6	2.2	1.6	1.0	-	-	-	1.0	2.0	1.4	1.0	2.0	2.2	2.0

Correlation levels 1, 2 or 3 are as defined below:

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

No correlation: “-“

Course Code	Course Title	Category	L	T	P	C
EE23133	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	ES	3	0	2	4

**Objectives:**

- To provide knowledge on the analysis of DC circuits.
- To provide knowledge on the analysis of AC circuits
- To expose the principles of electrical machines and electronic devices.
- To teach the concepts of different types of electrical measuring instruments and transducers.
- To experimentally analyze the electrical circuits and machines, electronic devices and transducers.

<b>UNIT-I</b>	<b>DC CIRCUITS</b>	<b>9</b>
Electrical circuit elements (R, L and C), Voltage and current sources, Kirchhoff 's laws, Analysis of simple circuits with DC excitation, Superposition, Thevenin and Norton Theorems.		
<b>UNIT-II</b>	<b>AC CIRCUITS</b>	<b>9</b>
Representation of sinusoidal waveforms, Power and Power factor, Analysis of single-phase AC circuits consisting of R, L, C, RL, RC, RLC combinations, Series resonance, Three phase balanced circuits		
<b>UNIT-III</b>	<b>ELECTRICAL MACHINES</b>	<b>9</b>
Construction, Principles of operation of DC machines, Single phase Transformers, Synchronous machines, Single phase induction motors. (Qualitative Treatment Only).		
<b>UNIT-IV</b>	<b>ELECTRONIC DEVICES &amp; CIRCUITS</b>	<b>9</b>
Review of PN Junction diode – Forward and Reverse Bias – Bipolar Junction Transistor – Common Emitter characteristics – MOSFET - Introduction to operational Amplifier –Inverting and Non-Inverting Amplifier.		
<b>UNIT-V</b>	<b>MEASUREMENTS &amp; INSTRUMENTATION</b>	<b>9</b>
Introduction to transducers - Classification of Transducers: Resistive, Inductive, Capacitive, Piezoelectric, - Classification of instruments - PMMC and MI Ammeters and Voltmeters – Digital Storage Oscilloscope.		
<b>Total Contact Hours: 45</b>		

**List of Experiments**

<b>1</b>	Verification of Kirchhoff's Laws.
<b>2</b>	Load test on DC Shunt Motor (Virtual Lab)
<b>3</b>	Load test on Single phase Transformer (Virtual Lab)
<b>4</b>	Load test on Single phase Induction motor (Virtual Lab)
<b>5</b>	Characteristics of P-N junction Diode.
<b>6</b>	Characteristics of CE based NPN Transistor.
<b>7</b>	Characteristics of MOSFET
<b>8</b>	Characteristics of LVDT, RTD and Thermistor.
<b>Contact Hours : 30</b>	
<b>Total Contact Hours : 75</b>	

**Course Outcomes:** On completion of the course, students will be able to

- Analyse DC circuits and apply circuit theorems.
- Calculate the power and power factor in AC circuits
- Understand the principles of electrical machines.
- Comprehend the principles of different types of electronic devices, electrical measuring instruments and transducers.
- Experimentally analyze the electric circuits and machines, electronic devices, and transducers.

<b>Suggested Activities</b>
<ul style="list-style-type: none"> <li>• Problem solving sessions</li> </ul>
<b>Suggested Evaluation Methods</b>
<ul style="list-style-type: none"> <li>• Quizzes</li> <li>• Class Presentation / Discussion</li> </ul>

<b>Text Book(s):</b>	
1.	J.B.Gupta, “Fundamentals of Electrical Engineering and Electronics” S.K.Kataria & Sons Publications, 2010.
2.	Joseph A. Edminister, Mahmood, Nahri, “Electric Circuits” – Schaum Series and Systems”, Schaum’s Outlines, Tata McGrawHill, Indian. 5th Edition, 2017
3.	Thereja .B.L., “Fundamentals of Electrical Engineering and Electronics”, S. Chand & Co. Ltd., 2008

<b>Reference Books(s):</b>	
1.	Del Toro, “Electrical Engineering Fundamentals”, Pearson Education, New Delhi, 2015
2.	John Bird, “Electrical Circuit Theory and Technology”, Elsevier, First Indian Edition, 2007
3.	Allan S Moris, “Measurement and Instrumentation Principles”, Elsevier, Third Edition, 2006
4.	Rajendra Prasad, “Fundamentals of Electrical Engineering”, Prentice Hall of India, Third Edition, 2014
5.	A.E.Fitzgerald, David E Higginbotham and Arvin Grabel, “Basic Electrical Engineering”, McGraw Hill Education(India) Private Limited, 2009
6.	D P Kothari and I.J Nagarath, “Basic Electrical and Electronics Engineering”, McGraw Hill Education(India) Private Limited, Third Reprint, 2016
7.	<a href="https://nptel.ac.in/courses/108108076">https://nptel.ac.in/courses/108108076</a>

#### Lab Equipment Required:

Sl. No.	Name of the Equipment	Quantity Required (For a batch of 30 students)
1.	<b>Verification of ohms and Kirchoff’s Laws</b>	
	1. DC Regulated Power supply (0 - 30 V variable)	1
	2. Bread Board	1
	3. Resistors	1
	4. Multimeter	As Required
	5. Connecting wires	
2.	<b>Load test on DC Shunt Motor.</b>	
	1. Ammeter MC (0-20A)	1
	2. Voltmeter MC (0-300)V	1
	3. Tachometer	1
	4. Field Rheostat 500 $\Omega$ , 1.5 A	1
	5. Connecting wires	As Required
3.	<b>Load Test on Induction Motor</b>	
	1. Ammeter MI (0-20A)	1
	2. Voltmeter MI (0-300)V	1
	3. Wattmeter – 300V, 30 A	1
	4. Tachometer – Digital	1
	5. Connecting Wires	As Required
	6. Single phase Induction motor	1

<b>4.</b>	<b>Load test on Single phase Transformer</b> 1. Ammeter (0-30) A, (0-5 ) A 2. Voltmeter (0-150)V, (0-300)V 3. Wattmeter – 300V, 5A, UPF 4. Autotransformer 5. Single phase Transformer 6. Connecting Wires	1 1 1 1 1 As Required
<b>5.</b>	<b>Characteristics of PN and Zener Diodes</b> 1. PN Diode (IN4007), Zener diode (6.8V, 1A) 2. Resistor 1 K $\Omega$ , 100 $\Omega$ 3. Bread Board 4. DC Regulated Power supply (0 - 30 V variable) 5. Multimeter 6. Connecting wires	1 1 1 1 1 As Required
<b>6.</b>	<b>Characteristics of BJT</b> 1. Transistor (BC107) 2. Resistors- 1k $\Omega$ , 470K $\Omega$ , 1M $\Omega$ 3. Bread Board 4. DC Regulated Power supply (0 - 30 V variable) 5. Multimeter 6. Connecting wires	1 1 1 1 1 As Required
<b>7</b>	1. Characteristics of MOSFET 2. MOSFET (IRF510) 3. Resistors- 100k $\Omega$ , 1k $\Omega$ 4. Bread Board 5. DC Regulated Power supply (0 - 30 V variable) 6. Multimeter 7. Connecting wires	1 1 1 1 1 As Required
<b>8.</b>	<b>Measurement of displacement of LVDT, RTD and Thermistor</b> 1. LVDT Kit 2. RTD 3. Thermistor 4. Multimeter	1 1 1 1

#### CO - PO – PSO matrices of course

PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
<b>CO</b>															
EE23133.1	3	3	3	3	-	3	1	1	2	1	1	1	2	2	2
EE23133.2	3	3	3	3	-	3	1	1	2	1	1	1	1	-	1
EE23133.3	3	3	3	3	-	3	1	1	2	1	1	1	2	2	2
EE23133.4	3	3	3	3	-	3	1	1	2	1	1	1	2	1	2
EE23133.5	3	3	3	3	-	3	1	1	2	1	1	1	2	3	2
<b>Average</b>	3	3	3	3	-	3	1	1	2	1	1	1	1.8	2.0	1.8

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low)    2: Moderate (Medium)

3: Substantial (High) No correlation: “-“

Course Code	Course Title	Category	L	T	P	C
PH23132	<b>PHYSICS FOR INFORMATION SCIENCE</b> Common to -B.E.-CSE, CSD, Cyber Security & B. Tech.- IT, AIML, AI&DS.	BS	3	0	2	4

Objectives:
<ul style="list-style-type: none"> <li>To understand the principles of laser and fiber optics in engineering and technology.</li> </ul>
<ul style="list-style-type: none"> <li>To analyze the properties of magnetic and superconducting materials.</li> </ul>
<ul style="list-style-type: none"> <li>To understand the advanced concept of quantum theory and applications.</li> </ul>
<ul style="list-style-type: none"> <li>To become proficient in semiconductor applications</li> </ul>
<ul style="list-style-type: none"> <li>To become proficient in optoelectronic devices</li> </ul>

<b>UNIT-I</b>	<b>LASERS AND FIBER OPTICS</b>	<b>9</b>
Lasers: Characteristics, Einstein's A and B coefficients derivation – resonant cavity, optical amplification (qualitative) –Nd-YAG Laser, Semiconductor lasers: Homojunction and Heterojunction- Applications of Lasers. Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibers (material, mode and refractive index) – losses associated with optical fibers -Fiber optic communication system - fiber optic sensors: pressure and displacement.		
<b>UNIT-II</b>	<b>MAGNETIC AND SUPERCONDUCTING MATERIALS</b>	<b>9</b>
Magnetic dipole moment – atomic magnetic moments- magnetic permeability and susceptibility -Magnetic material classification: diamagnetism – paramagnetism – ferromagnetism – antiferromagnetism – ferrimagnetism – Domain Theory- M versus H behaviour – Hard and soft magnetic materials – examples and uses-- Magnetic principle in computer data storage. Superconductors: Properties - BCS theory (Qualitative)- Type-I and Type II superconductors - Magnetic levitation-SQUID-Cryotron.		
<b>UNIT-III</b>	<b>QUANTUM PHYSICS</b>	<b>9</b>
Introduction- Quantum free electron theory-De Broglie's concept-Schrodinger wave equation-Time independent and time dependent equations-Physical significance of wave function - Particle in a one dimensional box – electrons in metals -degenerate states – Fermi- Dirac statistics – Density of energy states -Size dependence of Fermi energy – Quantum confinement – Quantum wells, Quantum wires, Quantum dots and Quantum clusters - Band gap of nanomaterials.		
<b>UNIT-IV</b>	<b>SEMICONDUCTOR PHYSICS</b>	<b>9</b>
Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – Band gap determination- extrinsic semiconductors (Qualitative)- Hall effect - determination of Hall co-efficient -Formation of P-N junction-Forward bias- Reverse bias -Ohmic contact-Schottky diode- Tunnel diode.		
<b>UNIT-V</b>	<b>OPTOELECTRONICS</b>	<b>9</b>
Classification of optical materials – carrier generation and recombination processes – Absorption, emission and scattering of light in metals, insulators and semiconductors (concepts only) – Photo electric effect-Photo current in a P-N diode – Photo transistor-solar cell - LED – Organic LED- Non Linear Optical materials-properties and applications.		
<b>Total Contact Hours: 45</b>		

<b>List of Experiments</b>	
<b>1</b>	Determine the wavelength of the laser using grating and size of the particle using diode laser.
<b>2</b>	Determine the numerical aperture and acceptance angle of optical fiber.
<b>3</b>	Study the permeability of the free space using Helmholtz coil.
<b>4</b>	Determine the hysteresis loss in the transformer core using B-H curve unit.
<b>5</b>	Determine the band gap of given semiconductor.
<b>6</b>	Determine the Hall coefficient of semiconducting material.
<b>7</b>	Determine specific resistance of the material of given wires using metre bridge.
<b>8</b>	Study the resonance frequency in series connected LCR circuits.
<b>9</b>	Determine the V-I characteristics of the solar cell.
<b>10</b>	Determine the thickness of the given specimen by using air wedge method.
<b>Contact Hours : 30</b>	
<b>Total Contact Hours : 75</b>	

<b>Course Outcomes:</b> On completion of the course, students will be able to
<ul style="list-style-type: none"> <li>● Use the concepts of Laser and Fiber optics in communication.</li> <li>● Use the properties of magnetic and superconducting materials in data storage devices.</li> <li>● Apply the concepts of electron transport in nanodevices.</li> <li>● Analyse the physics of semiconductor devices</li> <li>● Analyze the properties of optical materials for optoelectronic applications.</li> </ul>

<b>Suggested Activities</b>
<ul style="list-style-type: none"> <li>● Problem solving sessions</li> </ul>
<b>Suggested Evaluation Methods</b>
<ul style="list-style-type: none"> <li>● Quizzes</li> <li>● Class Presentation / Discussion</li> </ul>

<b>Text Book(s):</b>	
1.	Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
2.	Jaspri Singh, "Semiconductor Devices: Basic Principles", Wiley 2012.
3.	Kasap, S.O. "Principles of Electronic Materials and Devices", McGraw-Hill Education, 2007.

<b>Reference Books(s):</b>	
1.	S. O. Pillai, Solid state physics, New Age International, 2015.
2.	Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers". Cengage Learning, 2010.
3.	Hanson, G.W. "Fundamentals of Nanoelectronics". Pearson Education, 2009.

**List of Equipment Available**  
(Common to B.E. CSD and CSE & B.Tech. AI&DS, AI & ML, IT)

S.No	Name of the Equipment	Quantity Required	Quantity Available
1	Wavelength of Laser and Characteristics -Laser source and grating plate	7	15
2	Laser - angle of divergence and NA acceptance angle	6	8
3	Determination of permeability of free space - Helmholtz coil setup	5	5
4	B-H curve Setup and CRO	6	7
5	Band gap of a semiconductor Setup	6	19
6	Hall coefficient of Semiconductor Setup	4	4
7	Determine specific resistance of the material of given wires-metre bridge	6	6
8	LCR circuit kit	6	7
9	Solar cell parameters setup	6	8
10	Thickness of thin wire-Air wedge method-Travelling Microscope, Glass Plate	8	13

**CO - PO – PSO matrices of course**

PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
<b>CO</b>															
PH23132.1	3	3	2	2	2	1	-	-	-	-	-	2	1	1	1
PH23132.2	3	3	2	2	3	1	1	-	-	-	-	2	1	1	1
PH23132.3	3	3	2	2	3	1	1	-	-	-	-	2	2	1	1
PH23132.4	3	3	2	2	3	1	1	-	-	-	-	2	2	1	1
PH23132.5	3	3	2	2	3	1	1	-	-	-	-	2	2	1	1
<b>Average</b>	3	3	2	2	2.80	1	1	0	0	0	0	2	1.80	1	1

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low)    2: Moderate (Medium)

3: Substantial (High) No correlation: “-“



Course Code	Course Title	Category	L	T	P	C
GE23121	ENGINEERING PRACTICES – CIVIL AND MECHANICAL	ES	0	0	2	1

**Objectives:**

To provide exposure to the students with hands on experience on various basic engineering practices in Civil and Mechanical Engineering.

List of Experiments							
<b>CIVIL ENGINEERING PRACTICE</b>							
1.	Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, and elbows in household fittings.						
2.	Preparation of basic plumbing line sketches for wash basins, water heaters, etc.						
3.	Hands-on-exercise: Basic pipe connections – Pipe connections with different joining components.						
<b>Carpentry Works:</b>							
4.	Study of joints in roofs, doors, windows and furniture.						
5.	Hands-on-exercise: Woodwork, joints by sawing, planning and chiselling.						
<b>MECHANICAL ENGINEERING PRACTICE</b>							
6.	Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.						
7	Gas welding practice.						
<b>Basic Machining:</b>							
8	Simple Turning and Taper turning						
9	Drilling Practice						
<b>Sheet Metal Work:</b>							
10	Forming & Bending:						
11	Model making – Trays and funnels						
12	Different type of joints.						
<b>Machine Assembly Practice:</b>							
13	Study of centrifugal pump						
14	Study of air conditioner						
					<b>Total Contact Hours</b>	<b>:</b>	<b>30</b>

**Course Outcomes:**

On completion of the course, the students will be able to

•	Able to perform plumbing activities for residential and industrial buildings considering safety aspects while gaining clear understanding on pipeline location and functions of joints like valves, taps, couplings, unions, reducers, elbows, etc.
•	Able to perform wood working carpentry activities like sawing, planning, cutting, etc. while having clear understanding of the joints in roofs, doors, windows and furniture.
•	Able to produce joints like L joint, T joint, Lap joint, Butt joint, etc. through arc welding process while acquiring in depth knowledge in the principle of operation of welding and other accessories
•	Able to perform operations like Turning, Step turning, Taper turning, etc. in lathe and Drilling operation in drilling machine
•	Able to perform sheet metal operations like Forming, Bending, etc. and fabricating models like Trays, funnels, etc.

**CO - PO – PSO matrices of course**

<b>PO/PSO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>
<b>CO</b>															
GE23121.1	1	1	1	-	-	2	1	-	2	-	-	2	-	2	1
GE23121.2	1	1	1	-	-	2	1	-	2	-	-	2	-	2	1
GE23121.3	1	1	1	-	-	2	1	-	2	-	-	2	-	2	1
GE23121.4	1	1	1	-	-	2	1	-	2	-	-	2	-	2	1
GE23121.5	1	1	1	-	-	2	1	-	2	-	-	2	-	2	1
<b>Average</b>	1	1	1	-	-	2	1	-	2	-	-	2	-	2	1

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low)    2: Moderate (Medium)

3: Substantial (High) No correlation: “-“

Course Code	Course Title	Category	L	T	P	C
MC23111	INDIAN CONSTITUTION AND FREEDOM MOVEMENT	MC	3	0	0	0
Common to all branches of B.E/B. Tech Programme						

**Objectives:**

<ul style="list-style-type: none"> <li>To apprehend the sacrifices made by the freedom fighters.</li> </ul>
<ul style="list-style-type: none"> <li>To inculcate the values enshrined in the Indian constitution.</li> </ul>
<ul style="list-style-type: none"> <li>To instil a sense of responsibility as the citizens of India.</li> </ul>
<ul style="list-style-type: none"> <li>To familiarise about the functions of the various levels of Government.</li> </ul>
<ul style="list-style-type: none"> <li>To be informed about Constitutional and Non- Constitutional bodies.</li> </ul>

<b>UNIT-I</b>	<b>INDIAN FREEDOM MOVEMENT</b>	9
British Colonialism in India-Colonial administration till 1857- Revolt of 1857- Early Resistance to British Rule-Rise of Nationalism in India-Indian Freedom Struggle under Mahatma Gandhi-Non- Cooperation Movement-Civil Disobedience Movement- Quit India Movement-British Official response to National movement- Independence of India Act 1947- Freedom and Partition.		
<b>UNIT-II</b>	<b>CONSTITUTION OF INDIA</b>	9
Historical Background – Indian Constitution: Constitution’ meaning of the term, Sources and constitutional history, Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.		
<b>UNIT-III</b>	<b>STRUCTURE AND FUNCTIONS OF CENTRAL GOVERNMENT</b>	9
Union Government – Structure of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.		
<b>UNIT-IV</b>	<b>STRUCTURE AND FUNCTION OF STATE GOVERNMENT AND LOCAL BODY</b>	9
State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts- Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati Raj: Introduction, Elected officials and their roles, Village level: Role of Elected and Appointed officials.		
<b>UNIT-V</b>	<b>CONSTITUTIONAL FUNCTIONS AND BODIES</b>	9
Indian Federal System – Centre – State Relations – President’s Rule – Constitutional Functionaries – Assessment of working of the Parliamentary System in India- CAG, Election Commission, UPSC, GST Council and other Constitutional bodies-. NITI Aayog, Lokpal, National Development Council and other Non –Constitutional bodies.		
<b>Total Contact Hours</b>		<b>: 45</b>

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

<ul style="list-style-type: none"> <li>Appreciate the sacrifices made by freedom fighters during freedom movement.</li> </ul>
<ul style="list-style-type: none"> <li>Be responsible citizens and abide by the rules of the Indian constitution.</li> </ul>
<ul style="list-style-type: none"> <li>Be aware of the functions of the Indian government.</li> </ul>
<ul style="list-style-type: none"> <li>Be knowledgeable about the functions of the state Government and the Local bodies.</li> </ul>
<ul style="list-style-type: none"> <li>Apply the knowledge on constitutional functions and role of constitutional bodies and non-constitutional bodies.</li> </ul>

**SUGGESTED ACTIVITIES**

- Famous speeches from around the world relating to independence
- Case study
- Quiz on Portfolio and Cabinet
- Discussions on International Associations like the UN, BRICS, QUAD
- Presentation on issues around the world

**SUGGESTED EVALUATION METHODS**

- Assignment topics
- Quizzes
- Class Presentation/Discussion
- Continuous Assessment Tests (CAT)

**Text Book(s):**

1. M. Laxmikanth , “Indian Polity:, McGraw-Hill, New Delhi.
2. Durga Das Basu, “Introduction to the Constitution of India “, Lexis Nexis, New Delhi. 21<sup>st</sup>ed 2013.
3. P K Agarwal and K N Chaturvedi ,PrabhatPrakashan, New Delhi, 1<sup>st</sup>ed , 2017.

**Reference Books(s):**

1. Sharma, Brij Kishore, “Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.
2. U.R.Gahai, “Indian Political System “, New Academic Publishing House, Jalaendhar
3. Bipan Chandra, India’s Struggle for Independence, Penguin Books, 2016.
4. Maciver and Page, “Society: An Introduction Analysis “, Mac Milan India Ltd., New Delhi.2<sup>nd</sup>ed, 2014.
5. Bipan Chandra, History of Modern India, Orient Black Swan, 2009.

**CO - PO – PSO matrices of course**

PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
<b>CO</b>															
MC23111.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MC23111.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MC23111.3	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-
MC23111.4	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
MC23111.5	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-
<b>Average</b>	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-

Correlation levels 1, 2 or 3 are as defined below:

- 1: Slight (Low)    2: Moderate (Medium)  
 3: Substantial (High) No correlation: “-“

## Semester - II

Course Code	Course Title	Category	L	T	P	C
MA23213	<b>DISCRETE MATHEMATICAL STRUCTURES</b>	BS	3	1	0	4
<b>Common to B.E. - CSE and B. Tech. IT</b>						

### Objectives:

- To extend student's Logical and Mathematical maturity and ability to deal with abstraction.
- To provide discrete structures of many levels and to know the principle of counting.
- To give an understanding of relations and functions and to determine their properties.
- To provide the basic principles of sets and operations in sets and to Prove basic set equalities.
- To model problems in Computer Science using graphs and trees.

<b>UNIT-I</b>	<b>LOGIC AND PROOFS</b>	<b>12</b>
Logic: Propositional equivalence, predicates and quantifiers - Methods of proofs - mathematical induction		
<b>UNIT-II</b>	<b>COMBINATORICS</b>	<b>12</b>
Counting: The basics of counting - The pigeonhole principle - Permutations and Combinations -Recurrence relations: solving recurrence relations, generating functions - Inclusion-Exclusion principle : application of inclusion-exclusion		
<b>UNIT-III</b>	<b>RELATIONS</b>	<b>12</b>
Relations - Equivalence relations – Functions - Bijections - Binary relations and graphs- Posets and Lattices -Hasse Diagrams – Boolean algebra		
<b>UNIT-IV</b>	<b>ALGEBRA</b>	<b>12</b>
Group theory: Groups, subgroups, Cosets and Lagrange's theorem - Permutation groups and Burnside's theorem - Isomorphism – Automorphisms - Homomorphism - Normal subgroups - Rings, Integral domains and Fields(only definitions)		
<b>UNIT-V</b>	<b>GRAPHS</b>	<b>12</b>
Graph theory: Introduction to graphs, graph terminology, representing graphs and graph isomorphism – Connectivity - Euler and Hamilton paths - Planar graphs - Graph coloring - Introduction to trees, application of trees.		
<b>Total Contact Hours: 60</b>		

### Course Outcomes:

On completion of the course, students will be able to

- Demonstrate the ability to write and evaluate a proof or outline the basic structure and give examples of each proof technique described.
- Apply counting principles to determine probabilities in engineering problems.
- Demonstrate the relations and functions and to determine their properties in solving engineering problems.
- Analyse the concepts and properties of algebraic structures in the solving complex engineering problems.
- Use different traversal methods for trees and graphs arising in the field of engineering and technology.

### SUGGESTED ACTIVITIES

- Problem solving sessions
- Visio for drawing graphs
- Online Calculators for PDNF and PCNF, recurrence relations and sets
- Calculators for Logic gates
- GeoGebra for Hasse diagrams and graphs

**SUGGESTED EVALUATION METHODS**

- Problem solving in Tutorial sessions
- Assignment problems
- Quizzes and class test
- Discussion in classroom

**Text Book(s):**

1.	Elements of Discrete Mathematics, (Second Edition) C. L. LiuMc Graw Hill, New Delhi.
2.	Digital Logic & Computer Design, M. Morris Mano, Pearson.
3.	Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
4.	Tremblay, J.P. and Manohar. R, " Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.
5.	Graph Theory with Applications, J. A. Bondy and U. S. R. Murty, Macmillan Press, London.

**Reference Books(s) / Web links:**

1.	Introduction to linear algebra, 5th Edition, Gilbert Strang.
2.	Introductory Combinatorics, R. A. Brualdi, North-Holland, New York
3.	Graph Theory with Applications to Engineering and Computer Science, N. Deo, Prentice Hall, Englewood Cliffs.
4.	Introduction to Mathematical Logic,(Second Edition), E. Mendelsohn, Van-Nostrand, London.
5.	Mathematical Logic for Computer Science, L. Zhongwan, World Scientific, Singapore.
6.	Topics in Algebra, I. N. Herstein, John Wiley and Sons.

**CO - PO – PSO matrices of course**

PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
<b>CO</b>															
MA23213.1	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
MA23213.2	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
MA23213.3	3	3	3	1	-	-	-	-	-	-	-	-	1	1	-
MA23213.4	3	2	3	-	-	-	-	-	-	-	-	-	-	1	-
MA23213.5	3	2	3	-	-	-	-	-	-	-	-	1	1	-	-
<b>Average</b>	3	2.2	2.2	1	-	-	-	-	-	-	-	1	1	1	-

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low)    2: Moderate (Medium)

3: Substantial (High) No correlation: “-“

Course Code	Course Title	Category	L	T	P	C
GE23217	<b>தமிழரும் தொழில்நுட்பமும்</b>	HS	1	0	0	1
Common to all branches of B.E/B. Tech programmes						

<b>அலகு I</b>	<b>நெசவு மற்றும் பானைத் தொழில்நுட்பம்:</b>	3
சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பண்டங்களில் கீறல் குறியீடுகள்.		
<b>அலகு II</b>	<b>வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:</b>	3
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாடு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக் கலை.		
<b>அலகு III</b>	<b>உற்பத்தித் தொழில் நுட்பம்:</b>	3
கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.		
<b>அலகு IV</b>	<b>வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்:</b>	3
அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கல்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.		
<b>அலகு V</b>	<b>அறிவியல் தமிழ் மற்றும் கணித்தமிழ் :</b>	3
அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.		
<b>Total Contact Hours: 15</b>		

<b>Text Book(s):</b>
1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr. K. K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr. S. Singaravelu)(Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr. S. V. Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies).
9. Keeladi – ‘Sangam City Civilization on the banks of river Vaigai’ (Jointly Published by: Department of archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.



Course Code	Course Title	Category	L	T	P	C
EC23232	DIGITAL LOGIC AND MICROPROCESSOR	ES	3	0	4	5

**Objectives:**

- To learn basic postulates of Boolean algebra and infer the methods for simplifying Boolean expressions.
- To illustrate the formal procedures for the analysis and design of Combinational and Sequential circuits.
- To understand the basic functionalities of 8085 and programming logic.
- To understand the concepts and basic functionalities of 8051 architecture and its functionalities.
- To peruse the knowledge of programming, peripherals and interface various devices.

<b>UNIT-I</b>	<b>MINIMIZATION TECHNIQUES AND LOGIC GATES</b>	<b>9</b>
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**Fundamentals:** Boolean postulates and laws, De-Morgan's Theorem, Principle of Duality, Boolean expression, Sum of Products (SOP), Product of Sums (POS).

**Minimization Techniques:** Minimization of Boolean expressions using Boolean laws, Karnaugh map, Quine McCluskey method of minimization, don't care conditions.

**Logic Gates:** Implementations of Logic Functions using gates, NAND-NOR implementations.

<b>UNIT-II</b>	<b>COMBINATIONAL AND SEQUENTIAL CIRCUITS</b>	<b>9</b>
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**Combinational Circuits:** Full Adder, Full Subtractor, Code Converters-Binary to Gray and Gray to Binary, 2-bit Magnitude Comparator, Multiplexer, Demultiplexer, Decoder, Encoder-Priority Encoder, Parallel Binary Adder/Subtractor.

**Sequential Circuits:** Memory element: Flip-flops: RS, JK, D, T, Shift Registers - SISO, SIPO, PISO, PIPO. Design: Synchronous & Asynchronous counters - Up/Down counter, Modulo-N counter.

<b>UNIT-III</b>	<b>THE 8085 MICROPROCESSOR</b>	<b>9</b>
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8085 Architecture - Pin configuration - Instruction Set - Addressing modes - Interrupts- Assembly Language Programming.

<b>UNIT-IV</b>	<b>THE 8051 MICROCONTROLLER</b>	<b>9</b>
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8051 Architecture - SFR - Instruction Set - Addressing modes - Programming 8051 Timers, Serial Port, Interrupt handling, Assembly Language Programming.

<b>UNIT-V</b>	<b>INTERFACING &amp; APPLICATIONS</b>	<b>9</b>
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Programmable Peripheral Interface (8255), Programmable Interval Timer (8253), DAC and ADC interfacing with 8085, Stepper Motor Control and Traffic Light Control interfacing with 8051.

**Total Contact Hours: 45**

<b>Description of the Experiments</b>	<b>Total Contact Hours: 60</b>
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1. Design and Implementation of adder, subtractor using logic gates.
2. Design and Implementation of Binary to Gray and Gray to Binary code converter
3. Design and Implementation of Multiplexer and De-multiplexer using logic gates.
4. Design and Implementation of 4-bit Synchronous counters.
5. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- Flop.
6. 8-bit Arithmetic, Logical and Decimal Arithmetic Operations using 8085.
7. 8 Searching an array of numbers using 8085.
8. 8-bit Arithmetic, Logical operations using 8051.
9. 8255 - Parallel interface with 8085.
10. 8253- Timer interface with 8085.
11. Stepper Motor Control using 8051.

**Course Outcomes:** On completion of the course students will be able to:

- Simplify the Boolean expressions using basic postulates of Boolean algebra with suitable minimization
- Apply the procedure to design and implement combinational and sequential circuits.
- Interpret the concepts of 8085 and develop programs using 8085.
- Analyze the concepts of 8051 and to infer the basic functionalities.
- Explore the knowledge of interfacing and use it for different applications.

**SUGGESTED ACTIVITIES (if any) (UNIT/ Module Wise) – Could suggest topic**

- Problem solving sessions- Tabulation Method
- Flipped classroom – 8051 architectures.
- **Activity based learning- Quiz- Instruction set**

**SUGGESTED EVALUATION METHODS (if Any) (UNIT/ Module Wise) – could suggest topic**

- Tutorial problems – K-map, Quine Mc-Cluskey method
- Assignment problems – Boolean expression based problems
- Quizzes- 8085, 8051 concepts
- Class Presentation/Discussion- Architecture topics

**Text Book(s):**

1. M. Morris Mano, “Digital Design”, 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. Ramesh S. Gaonkar, “Microprocessor Architecture, Programming and Applications with 8085”, Sixth edition, Penram International Publishing, 2012.
3. Mohamed Ali Mazidi, Janice GillispieMazidi, RolinMcKinlay, “The 8051 Microcontroller and Embedded Systems: Using Assembly and C”, Second Edition, Pearson education, 2011.

**Reference Books(s) / Web links:**

- Charles H.Roth. “Fundamentals of Logic Design”, 7th Edition, Thomson Learning, 2014.
- Krishna Kant, Microprocessor and Microcontroller Architecture, Programming and System design using 8085, 8086, 8051 and 8096, PHI, 2007, Seventh Reprint, 2011.
- Douglas V. Hall, “Microprocessor and Interfacing, Programming and Hardware”, Revised 2nd Edition 2006, eleventh reprint 2010.Tata McGraw Hill.

**Lab equipment required:**

S. No	Name of the Equipment
1	Digital IC Trainer Kit
2	8085 Microprocessor trainer kit
3	8051 Microcontroller trainer kit
4	8255 Parallel interface
5	8253 timer interface
6	CRO
7	Stepper motor interface

**CO - PO – PSO matrices of course**

PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
EC23232.1	3	3	3	3	3	2	2	2	3	2	3	3	3	3	2
EC23232.2	3	3	3	3	3	2	1	1	3	2	2	3	3	3	2
EC23232.3	3	3	2	3	3	2	2	2	2	1	2	2	3	3	1
EC23232.4	3	3	3	3	3	2	1	1	3	2	3	3	3	3	1
EC23232.5	3	3	3	3	3	2	2	1	3	2	3	3	3	3	1
<b>Average</b>	3.0	3.0	2.8	3.0	3.0	2.0	1.6	1.4	2.8	1.8	2.6	2.8	3.0	3.0	1.4

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation: “-“

Course Code	Course Title	Category	L	T	P	C
GE23111	ENGINEERING GRAPHICS	ES	2	0	4	4

**Objectives:**

- To understand the importance of the drawing in engineering applications
- To develop graphic skills for communication of concepts, ideas and design of engineering products
- To expose them to existing national standards related to technical drawings.
- To improve their visualization skills so that they can apply this skill in developing new products.
- To improve their technical communication skill in the form of communicative drawings

<b>CONCEPTS AND CONVENTIONS (Not for Examination)</b>						<b>1</b>	
Importance of graphics in engineering applications–Use of drafting instruments– BIS conventions and specifications– Size, layout and folding of drawing sheets– Lettering and dimensioning. Basic Geometrical constructions.							
<b>UNIT-I</b>	<b>PLANE CURVES AND PROJECTION OF POINTS</b>					<b>5+12</b>	
Curves used in engineering practices: Conics–Construction of ellipse, parabola and hyperbola by eccentricity method – Cycloidal Curves–Construction of cycloid, epicycloid and hypocycloid – Construction of involutes of square and circle–Drawing of tangents and normal to the above curves. Principles of Projection and Projection of points.							
<b>UNIT-II</b>	<b>PROJECTION OF LINES AND PLANE SURFACES</b>					<b>6+12</b>	
Projection of straight lines (First angle projection) inclined to both the principal planes – Determination of true lengths and true inclinations by rotating line method Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.							
<b>UNIT-III</b>	<b>PROJECTION OF SOLIDS AND PROJECTION OF SECTIONED SOLIDS</b>					<b>12</b>	
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method. Sectioning of solids in simple vertical position when the cutting plane is inclined to HP and perpendicular to VP – obtaining true shape of the section. Practicing three-dimensional modeling of simple objects by CAD software (Not for examination)							
<b>UNIT-IV</b>	<b>DEVELOPMENT OF SURFACE AND ISOMETRIC PROJECTIONS</b>					<b>12</b>	
Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Principles of isometric projection–isometric scale–Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders and cones Model making of isometric projection of combination of solids as assignment (Not for End semester)							
<b>UNIT-V</b>	<b>FREE HAND SKETCHING AND PERSPECTIVE PROJECTIONS</b>					<b>12</b>	
Free Hand sketching: Freehand sketching of multiple views from pictorial views of objects - Freehand sketching of pictorial views of object from multiple views Perspective projection of simple solids–Prisms, pyramids, cylinder and cone by visual ray method.							
<b>Total Contact Hours: (L=30; P=60) 90 Periods</b>							

<b>Course Outcomes:</b> After learning the course, the students should be able
<ul style="list-style-type: none"> <li>To construct different plane curves and to comprehend the theory of projection</li> </ul>
<ul style="list-style-type: none"> <li>To draw the basic views related to projection of lines and planes</li> </ul>
<ul style="list-style-type: none"> <li>To draw the projection of simple solids and to draw the projection of development of surfaces of Sectioned solids in simple vertical position</li> </ul>
<ul style="list-style-type: none"> <li>To draw the orthographic projection from pictorial objects and Isometric projections of simple solids</li> </ul>
<ul style="list-style-type: none"> <li>To visualize Perspective view of simple solids</li> </ul>

<b>Text Book(s):</b>	
1.	Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.
2.	Natarajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2017.
3.	Graph Theory with Applications, J. A. Bondy and U. S. R. Murty, Macmillan Press, London.

<b>Reference Books(s) :</b>	
1.	Varghese P I., “Engineering Graphics”, McGraw Hill Education (I) Pvt.Ltd., 2013.
2.	V.B Sikka “Civil Engineering Drawing”, S.K Kataria & Sons, New Delhi.
3.	Venugopal K. and PrabhuRaja V., “Engineering Graphics”, New Age International (P)Limited, 2008.
4.	Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore, 2017.
5.	Basant Agarwal and Agarwal C.M., “Engineering Drawing”, McGraw Hill Publishing Company Limited, New Delhi, 2018.

**CO - PO – PSO matrices of course**

PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
<b>CO</b>															
GE23111.1	3	2	2	1	-	1	-	2	2	2	-	2	-	-	-
GE23111.2	3	2	2	1	-	1	-	2	2	2	-	2	-	-	-
GE23111.3	3	2	2	1	-	1	-	2	2	2	-	2	-	-	-
GE23111.4	3	2	2	1	-	1	-	2	2	2	-	2	-	-	-
GE23111.5	3	2	2	1	-	1	-	2	2	2	-	2	-	-	-
<b>Average</b>	3	2	2	1	-	1	-	2	2	2	-	2	-	-	-

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low)    2: Moderate (Medium)

3: Substantial (High) No correlation: “-“

Course Code	Course Title	Category	L	T	P	C
CS23231	DATA STRUCTURES	PC	3	0	4	5

**Objectives:**

•	To apply the concepts of Linked List in the applications of various linear data structures.
•	To demonstrate the understanding of stacks, queues and their applications.
•	To apply the concepts of Linked List in the applications of various nonlinear data structures.
•	To understand the implementation of graphs and their applications.
•	To be able to incorporate various sorting and hashing techniques in real time scenarios

<b>UNIT-I</b>	<b>LINEAR DATA STRUCTURES – LIST</b>	<b>9</b>
Self-Referential Structures, Dynamic Memory Allocation, Linked list implementation - Singly Linked List, Doubly Linked List, Circular Linked List, Applications of List.		
<b>UNIT-II</b>	<b>LINEAR DATA STRUCTURES – STACKS, QUEUES</b>	<b>9</b>
Stack – Operations, Array and Linked list implementation, Applications – Evaluation of Arithmetic Expressions, Queues-Operations, Array and Linked list Implementation.		
<b>UNIT-III</b>	<b>NON LINEAR DATA STRUCTURES – TREES</b>	<b>9</b>
Tree Terminologies, Binary Tree Representation, Tree Traversals, Binary Search Trees, Binary Heap, Height Balance trees – AVL Trees.		
<b>UNIT-IV</b>	<b>NON LINEAR DATA STRUCTURES – GRAPHS</b>	<b>9</b>
Representation of Graphs, Topological Sort, Depth First Search and Breadth-First Search , Minimum Spanning Tree – Prim's Algorithm, Shortest path algorithm – Dijkstra's Algorithm.		
<b>UNIT-V</b>	<b>SEARCHING, SORTING AND HASHING TECHNIQUES</b>	<b>9</b>
Sorting Techniques –Insertion Sort, Quick Sort, Merge Sort, Hashing- Hashing functions – Mid square, Division, Folding, Collision Resolution Techniques – Separate Chaining – Open Addressing – Rehashing.		
		<b>Contact Hours : 45</b>

**Course Outcomes:**

•	Understand and apply the various concepts of Linear data Structures
•	Understand and apply the various concepts of Non Linear data Structures.
•	Understand and apply the various sorting and Hashing concepts.
•	Analyse and apply the suitable data structure for their research.
•	Choose efficient data structures and apply them to solve real world problems.

**SUGGESTED ACTIVITIES**

- Role play- Linked List (Unit 1).
- Mind Map, Poster Design - Stack and Queue (Unit 2).
- Flipped Classroom - Binary Heap (Unit 3).
- Poster Design - Graph (Unit4).
- Implementation of small module- Hashing (Unit5).

**SUGGESTED EVALUATION METHODS**

- Assignment problems - Linked List (Unit 1).
- Tutorial problems - Applications – Evaluation of Arithmetic Expressions (Unit 2).
- Quizzes - BST and Binary Heap (Unit 3).
- Tutorial problems- Graph traversal (Unit 4).
- Quizzes - Hashing and Sorting(Unit5) .

**Text Book(s):**

1	“Data Structures and Algorithm Analysis in C”, Mark Allen Weiss, 2nd Edition, Pearson Education, 2005
2	“Data Structures and Algorithm Analysis in C++ - Anna University, Mark Allen Weiss, Pearson Education, 2017.

Reference Books(s) :	
1	"Data Structures Using C and C++", Langsam, Augenstein and Tanenbaum, 2nd Edition, Pearson Education, 2015.
2	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms", Fourth Edition, Mcgraw Hill/ MIT Press, 2022.

List of Experiments	
1	Implementation of Single Linked List (Insertion, Deletion and Display).
2	Implementation of Doubly Linked List (Insertion, Deletion and Display).
3	Implementation of Stack using Array and Linked List implementation.
4	Implementation of Queue using Array and Linked List implementation.
5	Implementation of Binary Search Tree and perform Tree Traversal Techniques.
6	Program to perform Quick Sort
7	Program to perform Merge Sort
8	Program to perform Linear Probing.
9	Program to perform Rehashing.
10	Mini Project: <ul style="list-style-type: none"> <li>● Contact book application using Linked List.</li> <li>● Dictionary using Binary search trees.</li> <li>● Snake Game.</li> <li>● Chess Game.</li> <li>● Travel Planner (Shortest Path Algorithm).</li> <li>● Tic-Tac-Toe Game.</li> <li>● Library Management System.</li> <li>● Project Management System.</li> <li>● other projects .</li> </ul>
<b>Contact Hours : 60</b>	
<b>Total Contact Hours : 105</b>	
<b>Platform Needed:</b> GCC Compiler for Windows/Linux	

Course Outcomes:	
On completion of the course, the students will be able to	
●	Analyze the various data structure concepts.
●	Implement Stacks and Queue concepts for solving real-world problems.
●	Analyze and structure the linear data structure using tree concepts.
●	Critically Analyse various non-linear data structures algorithms.
●	Apply different Sorting, Searching and Hashing algorithms.
Web links for Theory & Lab(if any)	
1	<a href="#">Data Structures - GeeksforGeeks</a>
2	<a href="#">Data Structures   DS Tutorial - javatpoint</a>
3	<a href="#">Data Structure and Types (programiz.com)</a>

### CO - PO – PSO matrices of course

PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CS23231.1	1	2	1	2	1	-	-	-	-	-	-	1	1	2	-
CS23231.2	1	1	2	1	1	-	-	-	-	-	-	2	2	2	-
CS23231.3	1	1	2	1	1	-	-	-	-	-	-	2	2	2	-
CS23231.4	1	1	2	1	1	-	-	-	-	-	-	2	2	2	-
CS23231.5	1	1	2	1	1	-	-	-	-	-	-	1	1	2	-
<b>Average</b>	1.0	1.2	1.8	1.2	1.0	-	-	-	-	-	-	1.6	1.6	2.0	-

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation: “-

Course Code	Course Title	Category	L	T	P	C
HS23222	TECHNICAL COMMUNICATION II	HS	0	0	2	1
Common to all branches of B.E/B. Tech programmes						

Objectives:
• To facilitate students to improve their vocabulary for a better communication
• To enable learners to understand and reproduce language
• To aid students to write technical reports in a convincing manner
• To expose students to different sentence structures
• To equip learners to present their ideas in an efficient manner

<b>UNIT-I</b>	<b>VOCABULARY FOR BETTER COMMUNICATION</b>	<b>6</b>
<b>Listening:</b> Telephonic Conversations and TV News <b>Reading:</b> Newspapers and Magazines <b>Speaking:</b> Conversational Practice: Speaking in a given situation, asking permission and requesting etc., <b>Writing:</b> Job Application Letter and Resume <b>Grammar:</b> Reference words: pronouns and determiners <b>Vocabulary:</b> Guessing meanings of words in different contexts.		
<b>UNIT-II</b>	<b>FUNCTIONAL LANGUAGE ASPECTS</b>	<b>6</b>
<b>Listening:</b> Motivational listening – listening to real life challenges <b>Reading:</b> Articles and Technical reports <b>Speaking:</b> Using Polite Expressions, Indirect Questions <b>Writing:</b> Paraphrasing a Text, Poem <b>Grammar:</b> Purpose Statements, Cause and Effect Expressions <b>Vocabulary:</b> Neologisms.		
<b>UNIT-III</b>	<b>TECHNICAL REPORTWRITING</b>	<b>6</b>
<b>Listening:</b> Empathetic Listening – Giving Solutions to Problems <b>Reading:</b> Inferential Reading <b>Speaking:</b> Dialogues – Interviewing Celebrities / Leaders / Sportspersons, etc., <b>Writing:</b> Report Writing <b>Grammar:</b> Functional Usage of Expressions – used to, gone / been, etc., <b>Vocabulary:</b> Words Often Confused		
<b>UNIT-IV</b>	<b>STRUCTURAL GRAMMAR</b>	<b>6</b>
<b>Listening:</b> Comprehension (IELTS practice tests) <b>Reading:</b> Intensive Reading for specific information <b>Speaking:</b> Pick and Talk <b>Writing:</b> Proposals <b>Grammar:</b> Sentence Structures – Simple, Compound, Complex Sentences <b>Vocabulary:</b> Replacing dull words with vivid ones		
<b>UNIT-V</b>	<b>PRESENTATION SKILLS</b>	<b>6</b>
<b>Listening:</b> Discriminative listening – sarcasm, irony, pun, etc., <b>Reading:</b> Practice of chunking – breaking up reading materials <b>Speaking:</b> Mini presentation on some topic <b>Writing:</b> Minutes of the meeting <b>Grammar:</b> Correction of Errors <b>Vocabulary:</b> Advanced vocabulary – fixing appropriate words in the given context.		
<b>Total Contact Hours: 30</b>		

Course Outcomes:
On completion of the course students will be able to
• Communicate effectively using appropriate vocabulary
• Use the acquired language skills to comprehend various types of language contents
• Evaluate different texts and write effective technical content
• Use appropriate sentence structures to convey their thoughts in varied contexts
• Present their concepts and ideas in an effective manner

**SUGGESTED ACTIVITIES**

- Story Lines
- One truth and two lies
- Hang Man
- Pictionary
- Word Scramble
- Case study

**SUGGESTED EVALUATION METHODS**

- Assignment topics
- Quizzes
- Class Presentation/Discussion
- Continuous Assessment Tests

**Text Book(s):**

1. Raymond Murphy, "Intermediate English Grammar," Second Edition, Cambridge University Press, 2018
2. Meenakshi Raman & Sangeeta Sharma, "Technical Communication" Third Edition, Oxford University Press, 2015
3. Teaching Speaking: A Holistic Approach, Book by Anne Burns and Christine ChuenMeng Goh, Cambridge University Press

**Reference Books(s) / Web links:**

1. Michael McCarthy (Author), Felicity O'Dell (Author), John D. Bunting (Contributor), "Basic Vocabulary in Use: 60 Units of Vocabulary Practice in North American English With Answers" 2nd Edition
2. Dale Carnegie, "The Art of Public Speaking," Insight Press
3. Jack C. Richards & Theodore S. Rodgers, "Approaches and Methods in Language Teaching, Second Edition, Cambridge University Press

**CO - PO – PSO matrices of course**

PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO															
HS23221. 1	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-
HS23221. 2	-	-	-	1	-	-	-	-	-	3	-	-	-	-	-
HS23221. 3	-	2	-	1	-	-	-	-	-	3	-	-	-	-	-
HS23221. 4	-	-	-	1	-	-	-	-	2	3	-	-	-	-	-
HS23221. 5	-	-	-	1	-	-	-	-	2	2	-	-	-	-	-
<b>Average</b>	-	2	-	1	0	0	0	0	2	2.6	-	-	-	-	-

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation: "-"



Course Code	Course Title	Category	L	T	P	C
HS23223	ENGLISH FOR PROFESSIONAL COMPETENCE	HS	0	0	2	1
Common to all branches of B.E/B. Tech programmes						

Objectives:
<ul style="list-style-type: none"> <li>To facilitate the learners in acquiring listening and reading competence</li> </ul>
<ul style="list-style-type: none"> <li>To enable the learners to communicate effectively through written and oral medium</li> </ul>
<ul style="list-style-type: none"> <li>To assist the learners in preparing for competitive examinations</li> </ul>
<ul style="list-style-type: none"> <li>To train the students in acquiring corporate skills</li> </ul>
<ul style="list-style-type: none"> <li>To inculcate professional standards among the students and make them realize their responsibility in addressing the challenges</li> </ul>

<b>UNIT-I</b>	<b>RECEPTIVE SKILLS</b>	<b>6</b>
<b>Listening</b> – Comprehensive Listening – Watching the news – Listening to a peer giving presentation, etc. – Critical Listening – Watching a televised debate, Listening to poems – <b>Reading</b> – Extensive Reading – Short stories and One-act Plays – Intensive Reading – Articles or Editorials in Magazines, Blog posts on topics like science and technology, arts, etc.		
<b>UNIT-II</b>	<b>PRODUCTIVE SKILLS</b>	<b>6</b>
<b>Speaking</b> – Demonstrative Speaking – Process description through visual aids – Persuasive Speaking – Convincing the listener with the speaker’s view – <b>Writing</b> – Descriptive Writing - Describing a place, person, process – Courseive Writing – Autobiography, Writing based on personal opinions and interpretations.		
<b>UNIT-III</b>	<b>ENGLISH FOR COMPETITIVE EXAMS</b>	<b>6</b>
An introduction to International English Language Testing System (IELTS) – Test of English as a Foreign Language (TOEFL) – Graduate Record Examination (GRE) – Civil Service, Indian Economic Service Examination, Indian Statistical Service Examination, Combined Defence Services Examination, Staff Selection- (Language Related) – Aptitude tests.		
<b>UNIT-IV</b>	<b>CORPORATE SKILLS</b>	<b>6</b>
<b>Critical Thinking and Problem Solving</b> – Case Study, Brainstorming, Q & A Discussion – <b>Team work and Collaboration</b> – Activities like Office Debates, Perfect Square, Blind Retriever, etc. – <b>Professionalism and Strong Work Ethics</b> – Integrity, Resilience, Accountability, Adaptability, Growth Mind set.		
<b>UNIT-V</b>	<b>PROJECT WORK</b>	<b>6</b>
Case Study based on the challenges faced by the employers and the employees – Devise Plan, Provide Solution.		
<b>Total Contact Hours: 30</b>		

Course Outcomes:
On completion of the course students will be able to
<ul style="list-style-type: none"> <li>Interpret and respond appropriately in the listening and reading contexts.</li> </ul>
<ul style="list-style-type: none"> <li>Express themselves effectively in spoken and written communication</li> </ul>
<ul style="list-style-type: none"> <li>Apply their acquired language skills in writing the competitive examinations</li> </ul>
<ul style="list-style-type: none"> <li>Exhibit their professional skills in their work place</li> </ul>
<ul style="list-style-type: none"> <li>Identify the challenges in the work place and suggest strategies solutions</li> </ul>

SUGGESTED ACTIVITIES
<ul style="list-style-type: none"> <li>Online Quizzes on Vocabulary</li> <li>Online Quizzes on grammar</li> <li>Communication Gap Exercises</li> <li>Presentations</li> <li>Word Building Games</li> <li>Case study</li> </ul>

SUGGESTED EVALUATION METHODS
<ul style="list-style-type: none"> <li>Assignment topics</li> <li>Quizzes</li> <li>Class Presentation/Discussion</li> <li>Continuous Assessment Tests</li> </ul>

<b>Text Book(s):</b>	
1.	How to Read Better & Faster, Norman Lewis, Goyal Publishers
2.	Teaching Speaking: A Holistic Approach, Book by Anne Burns and Christine Chuen Meng Goh, Cambridge University Press
3.	The Official Cambridge Guide To IELTS by Pauline Cullen, Cambridge University Press
4.	The 7 Habits of Highly Effective People by Stephen Covey, Simon and Schuster, UK

<b>Reference Books(s) / Web links:</b>	
1.	Board of Editors. Sure Outcomes. A Communication Skills Course for Undergraduate Engineers and Technologists. Orient Black Swan Limited, Hyderabad, 2013.
2.	Hartley, Mary. "The Power of Listening," JaicoPublishing House; First Edition (2015).
3.	Chambers, Harry. "Effective Communication Skills for Scientific and Technical Professionals," Persues Publishing, Cambridge, Massachusetts, 2000.

**CO - PO – PSO matrices of course**

<b>PO/PSO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>
HS23222. 1	-	1	-	-	-	-	-	-	-	3	-	-	-	-	-
HS23222. 2	-	1	-	-	-	-	-	-	-	3	-	-	-	-	-
HS23222. 3	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
HS23222. 4	-	-	-	-	-	-	2	2	-	3	-	-	-	-	-
HS23222. 5	-	-	1	-	-	-	2	-	-	3	-	-	-	-	-
Average	0	1	1	0	0	0	2	2	0	3	0	0	-	-	-

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation: "-"

Course Code	Course Title	Category	L	T	P	C	
GE23122	ENGINEERING PRACTICES - ELECTRICAL AND ELECTRONICS	ES	0	0	2	1	
<b>Objectives:</b>							
<ul style="list-style-type: none"> <li>To provide hands-on experience on various basic engineering practices in Electrical Engineering.</li> <li>To provide hands-on experience on various basic engineering practices in Electronics Engineering.</li> </ul>							
<b>List of Experiments</b>							
<b>A. ELECTRICAL ENGINEERING PRACTICE</b>							
1	Residential house wiring using switches, fuses, indicators, lamp and energy meter.						
2	Fluorescent lamp wiring.						
3	Stair case wiring.						
4	Measurement of electrical quantities – voltage, current, power & power factor in RL circuit.						
5	Measurement of earth resistance using Megger.						
6	Study of Ceiling Fan and Iron Box						
<b>B. ELECTRONICS ENGINEERING PRACTICE</b>							
1	Study of electronic components and equipment – Resistor, colour coding, measurement of AC signal parameters (peak-peak, rms period, frequency) using CRO/DSO.						
2	(a) Measurement of electrical quantities using Multimeter (b) Testing of electronic components.						
3	Study of logic gates : AND, OR, EXOR and NOT.						
4	Generation of Clock Signals.						
5	Soldering practice – Components Devices and Circuits – Using general purpose PCB.						
6	Measurement of ripple factor of Half-wave and Full-wave Rectifiers.						
					<b>Total Contact Hours</b>	<b>:</b>	<b>30</b>
<b>Course Outcomes:</b> On completion of the course, the students will be able to							
<ul style="list-style-type: none"> <li>Fabricate the basic electrical circuits</li> <li>Implement the house wiring circuits</li> <li>Fabricate the electronic circuits</li> <li>Verify the truth table of logic gates</li> <li>Design the Half-wave and Full-wave Rectifiers using diodes and passive components</li> </ul>							
<b>Reference Books(s) / Web links:</b>							
1	Bawa H.S., “Workshop Practice”, Tata McGraw – Hill Publishing Company Limited, 2007.						
2	Jeyachandran K., Natarajan S. & Balasubramanian S., “A Primer on Engineering Practices Laboratory”, Anuradha Publications, 2007.						
3	Jeyapoovan T., Saravanapandian M. &Pranitha S., “Engineering Practices Lab Manual”,Vikas Publishing House Pvt.Ltd, 2006.						
4	Rajendra Prasad A. &Sarma P.M.M.S., “Workshop Practice”, SreeSai Publication, 2002.						

**Lab Equipment Required:**

S. No.	Name of the Equipment
1	Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2	Fluorescent lamp wiring.
3	Stair case wiring
4	Measurement of electrical quantities – voltage, current, power & power factor in RL circuit.
5	Study purpose items: Iron box, Ceiling fan.
6	Megger (250V/500V)
7	Soldering guns
8	Assorted electronic components for making circuits
9	Small PCBs
10	Multimeters
11	Digital trainer kit
12	CRO
13	Transformer
14	Function Generator

**CO - PO – PSO matrices of course**

PO/PSO  CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
GE23122.1	3	3	3	2	-	-	2	-	3	2	-	3	-	-	-
GE23122.2	3	3	2	2	-	-	2	-	3	2	-	3	-	-	-
GE23122.3	3	3	3	2	-	-	2	-	3	2	-	3	-	-	-
GE23122.4	3	3	3	2	-	-	-	-	3	2	-	3	-	-	-
GE23122.5	3	3	3	2	-	-	-	-	3	2	-	3	-	-	-
<b>Average</b>	3	3	2.67	2	-	-	2	-	3	2	-	3	-	-	-

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation: “-

Course Code	Course Title	Category	L	T	P	C
CS23221	PYTHON PROGRAMMING LAB	PC	0	0	4	2

#### Objectives:

<ul style="list-style-type: none"> <li>Learn the basics of Python Programming and Control statements</li> </ul>
<ul style="list-style-type: none"> <li>Demonstrate various Python data structures like Lists, Tuples, Sets and dictionaries</li> </ul>
<ul style="list-style-type: none"> <li>Understand about Strings, Functions, Modules and Regular Expressions in Python Programming</li> </ul>
<ul style="list-style-type: none"> <li>Understand the concepts of file handling using Python</li> </ul>
<ul style="list-style-type: none"> <li>Understand the concepts of Numpy, Pandas, sciPy modules</li> </ul>

#### Description of the Experiments

1. Experiments based on Variables, Datatypes and Operators in Python.	
2. Implement various control statements in python.	
3. Implement various String & List operations.	
4. Implement Inbuilt functions, User-defined functions and Lambda functions.	
5. Implementation of Tuples, sets, Dictionary and its operations.	
6. Implementation of Exception Handling and I/O files.	
7. Experiments based on Packages : math, datetime, platform.	
8. Experiments based on Packages : NumPy, pandas, matplotlib	
9. Experiments based on Packages : collections	
10. Experiments based on Packages :sciPy	
11. Mini Project	
<b>Total Contact Hours :</b>	<b>60</b>

#### Course Outcomes:

On completion of the course students will be able to:

<ul style="list-style-type: none"> <li>Use the basics of Python Programming in problem solving and conditionals and loops.</li> </ul>
<ul style="list-style-type: none"> <li>Use of Python Data structures such as List, Sets, Tuples, Dictionary for Compound Data</li> </ul>
<ul style="list-style-type: none"> <li>Use Strings, Functions, Modules and Regular Expressions in Python Programming</li> </ul>
<ul style="list-style-type: none"> <li>Implement the concepts of file handling and Exceptional handling.</li> </ul>
<ul style="list-style-type: none"> <li>Apply Numpy, Pandas and SciPy for numerical and statistical data</li> </ul>

#### Web links for virtual lab (if any)

- |   |
|---|
| <ul style="list-style-type: none"> <li><a href="https://www.python.org/shell/">https://www.python.org/shell/</a></li> </ul>                         |
| <ul style="list-style-type: none"> <li><a href="https://python-iitk.vlabs.ac.in/">https://python-iitk.vlabs.ac.in/</a></li> </ul>                   |
| <ul style="list-style-type: none"> <li><a href="https://www.hackerrank.com/domains/python">https://www.hackerrank.com/domains/python</a></li> </ul> |

**CO - PO – PSO matrices of course**

<b>PO/PSO  CO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>
CS23221.1	3	2	2	1	-	1	-	2	2	2	-	2	-	-	-
CS23221.2	3	2	2	1	-	1	-	2	2	2	-	2	-	-	-
CS23221.3	3	2	2	1	-	1	-	2	2	2	-	2	-	-	-
CS23221.4	3	2	2	1	-	1	-	2	2	2	-	2	-	-	-
CS23221.5	3	2	2	1	-	1	-	2	2	2	-	2	-	-	-
<b>Average</b>	3	2	2	1	-	1	-	2	2	2	-	2	-	-	-

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low)    2: Moderate (Medium) 3: Substantial (High) No correlation: “-

Course Code	Course Title	Category	L	T	P	C
MC23112	ENVIRONMENTAL SCIENCE AND ENGINEERING	MC	3	0	0	0

**Objectives:**

·	To develop the understanding of environmental and associated issues
·	To develop an attitude of concern for the environment
·	To promote enthusiasm in participating environmental protection initiatives
·	To develop skills to solve environmental degradation issues

<b>UNIT-I</b>	<b>AIR AND NOISE POLLUTION</b>	<b>9</b>
Definition –sources of air pollution –chemical and photochemical reactions in the atmosphere - formation of smog, PAN, acid rain, ozone depletion, particulate pollutants-Air quality standards-Air quality indices - control of particulate air pollutants-gravitational settling chambers, cyclone separators, wet collectors, fabric filters (Bag-house filter), electrostatic precipitators (ESP)-catalytic converters. Noise pollution-Sources; Health Effects-Standards- Measurement and control methods		
<b>UNIT-II</b>	<b>WATER POLLUTION AND ITS MANAGEMENT</b>	<b>9</b>
Definition-causes-effects of water pollution-point and nonpoint sources of wastewater-marine pollution-thermal pollution-control of water pollution by physical, chemical and biological methods–wastewater treatment-primary, secondary and tertiary treatment-sources and characteristics of industrial effluents- zero liquid discharge		
<b>UNIT-III</b>	<b>SOLID WASTE AND HAZARDOUS WASTE MANAGEMENT</b>	<b>9</b>
Solid waste – types- municipal solid waste management: Sources, characteristics, collection, and transportation- sanitary landfill, recycling, composting, incineration, energy recovery options from waste - Hazardous waste – Types, characteristics, and health impact - Hazardous waste management: neutralization, oxidation reduction, precipitation, solidification, stabilization, incineration and final disposal. E-waste-definition-sources-effects on human health and environment- E-waste management- recovery of metals-Role of E-waste management within the initiatives of the Govt. of India- Swachh Bharat Mission.		
<b>UNIT-IV</b>	<b>SUSTAINABLE DEVELOPMENT</b>	<b>9</b>
Sustainable development- concept-dimensions-sustainable development goals-value education- gender equality-food security- poverty-hunger-famine-Twelve principles of green chemistry- green technology- definition, importance, Cleaner development mechanism- carbon credits, carbon trading, carbon sequestration, eco labeling-International conventions and protocols-Disaster management.		
<b>UNIT-V</b>	<b>ENVIRONMENTAL MANAGEMENT AND LEGISLATION</b>	<b>9</b>
Environmental Management systems - ISO 14000 series- Environmental audit-Environmental Impact Assessment- life cycle assessment- human health risk assessment - Environmental Laws and Policy- Objectives - Polluter pays principle, Precautionary principle - The Environment (Protection) Act 1986 - Role of Information technology in environment and human health.		
<b>Total Contact Hours</b>		<b>45</b>

**Course Outcomes:**

On completion of the course, the students will be able to

•	Associate air and noise quality standards with environment and human health.
•	Illustrate the significance of water and devise control measures for water pollution.
•	Analyze solid wastes and hazardous wastes.
•	Outline the goals of sustainable development in an integrated perspective.
•	Comprehend the significance of environmental laws.

**Text Book(s):**

1	Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016
2	Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers ,2018.
3	Johri R., E-waste: implications, regulations, and management in India and current global best practices, TERI Press, New Delhi

**Reference Books(s) :**

1	R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media. 38. Edition 2010.
2	Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3	Fowler B, Electronic Waste – 1st Edition (Toxicology and Public Health Issues), 2017Elsevier

<b>Web links for virtual lab (if any)</b>
<ul style="list-style-type: none"> <li>• <a href="https://onlinecourses.nptel.ac.in/noc19_ge22/">https://onlinecourses.nptel.ac.in/noc19_ge22/</a></li> </ul>
<ul style="list-style-type: none"> <li>• <a href="https://news.mit.edu/2013/ewaste-mit">https://news.mit.edu/2013/ewaste-mit</a></li> </ul>

**CO - PO – PSO matrices of course**

PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
<b>CO</b>															
MC23112. 1	-	-	-	1	-	-	-	-	-	3	-	-	-	2	-
MC23112. 2	-	-	-	1	-	-	-	-	-	3	-	-	2	-	-
MC23112. 3	-	1	-	1	-	-	-	-	-	3	-	-	2	-	-
MC23112. 4	-	-	-	2	-	-	-	-	1	3	-	-	3	-	1
MC23112. 5	-	-	-	1	-	-	-	-	1	3	-	-	1	-	-
<b>Average</b>	-	1.0	-	1.2	-	-	-	-	1	3	-	-	2.0	2	1.0

Correlation levels 1, 2 or 3 are as defined below:

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High) No correlation : “-“