PANIMALAR
ENGINEERING COLLEGE

An Autonomous Institution

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

CURRICULUM & SYLLABUS
REGULATION 2023

FOR THE STUDENTS ADMITTED DURING 2023-24

B.E - ELECTRICAL AND ELECTRONICS ENGINEERING

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PANIMALAR ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to Anna University, Chennai)
Bangalore Trunk Road, Varadharajapuram,
Poonamallee, Chennai – 600 123.

Department of Electrical and Electronics Engineering
B.E- Electrical and Electronics Engineering

CURRICULUM AND SYLLABUS

REGULATION-2023

(For the Students admitted during 2023-24)

VISION AND MISSION OF THE DEPARTMENT

VISION

To provide excellence in technical education of electrical and electronics engineering and produce globally competent engineers for the revolution of industry

MISSION

1. To Provide good infrastructure and serene environment to our students and faculty members to meet the requirement of electrical and electronics engineering.
2. To prepare the students through contextual technical education for their career enrichment.
3. To impart knowledge on core engineering fields through projects, workshops and industry interaction.
4. To prepare graduates with ethical, social and environmental awareness to demonstrate professionalism in multidisciplinary environment.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

1. To prepare students to analyze, design and implement basic electrical circuits and power systems using the knowledge of basic science and mathematics.
2. To train students with scientific and engineering knowledge so as to comprehend, analyze, design and create novel products and solutions for real time problems.
3. To prepare students with robust knowledge in core engineering for the betterment of placement, research and higher studies.
4. To inculcate graduates with communication skills, leadership qualities in their profession and adopt to current trends by engaging in lifelong learning.
5. To prepare graduates to demonstrate professionalism with social and ethical values

PROGRAM OUTCOMES (PO)

1. **Engineering knowledge:**

   Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems.

2. **Problem Analysis:**

   Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **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.

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.

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.

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.

7. **Environment and Sustainability**

   Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of need for sustainable development.

8. **Ethics**

   Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and Team Work**

   Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**

    Communicate effectively on complex engineering activities with the engineering community and with society at large. Some of them are, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **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.

12. **Lifelong learning**

    Recognise the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO 1. Apply the basic knowledge of mathematics, science, electrical and electronics engineering to analyze and solve the complex problems in Electrical Machines, Control Systems, Instrumentation, Power Systems and Power Electronic Systems.

PSO 2. Design and develop hardware and software requirements to meet the needs of Electric drives, Automation, Power Systems and Embedded systems based industries.

PSO 3. To take up roles in a team, develop managerial skills, and contributes towards the electrical community globally.

B.E.-Electrical and Electronics Engineering

CHOICE BASED CREDIT SYSTEM (CBCS)

I - VIII SEMESTERS CURRICULUM AND SYLLABI (REGUALTION 2023)

(For the Students admitted during 2023-24)

Semester I							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1.	23MA1101	Matrices and Calculus	BS	3/1/0	4	4	60/40
2.	23ES1101	Problem solving using C Programming	ES	3/0/0	3	3	60/40
3.	23ES1103	Engineering Graphics	ES	2/0/2	4	3	60/40
Theory Cum Practical Courses							
4.	23HS1101	Communicative English and Language Skills	HS	2/0/2	4	3	50/50
5.	23PH1101	Engineering Physics	BS	2/0/2	4	3	50/50
Laboratory Courses							
6.	23ES1111	Problem solving using C Programming Laboratory	ES	0/0/4	4	2	40/60
Mandatory Course							
7.	23TA1101	தமிழர் மரபு/ Heritage of Tamils	HS	1/0/0	1	1	60/40
			TOTAL		**24**	**19**	

Semester II							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1.	23MA1201	Complex Variables and Laplace Transform	BS	3/1/0	4	4	60/40
2.	23ES1201	Python Programming	ES	3/0/0	3	3	60/40
3.	23ES1202	Basic Civil and Mechanical Engineering	ES	3/0/0	3	3	60/40
Theory Cum Practical Courses							
4.	23HS1201	Communicative and Aptitude Skills	HS	2/0/2	4	3	50/50
5.	23EE1201	Electric Circuit Analysis	PC	3/0/2	5	4	50/50
Laboratory Courses							
6.	23EE1211	Engineering Practices Laboratory	ES	0/0/4	4	2	40/60
7.	23ES1211	Python Programming Laboratory	ES	0/0/4	4	2	40/60
8.	23ES1212	Technical Skill Practices I	EEC	0/0/2	2	1	40/60
Mandatory Course							
9.	23TA1201	தமிழரும் தொழில் நுட்பமும்/Tamils and Technology	HS	1/0/0	1	1	60/40
10		Mandatory Course I	MC	2/0/0	2	0	0/100
			TOTAL		**32**	**23**	

Semester III							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1	23MA1303	Transforms and Partial Differential Equations	BS	3/1/0	4	4	60/40
2	23EE1301	Electromagnetic Theory	PC	3/0/0	3	3	60/40
3	23EE1302	Signals and Systems	PC	3/0/0	3	3	60/40
4	23CS1304	Object Oriented Programming using Java	ES	3/0/0	3	3	60/40
Theory Cum Practical Courses							
5	23EE1303	Analog Electronics	PC	3/0/2	5	4	50/50
Laboratory Course							
6	23CS1313	Object Oriented Programming using Java Laboratory	ES	0/0/4	4	2	40/60
7	23ES1312	Coding Practices I	EEC	0/0/2	2	1	40/60
Mandatory Course							
8		Mandatory Course II	MC	2/0/0	2	0	0/100
TOTAL					**26**	**20**	

Semester IV							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1	23MA1403	Numerical Methods	BS	3/1/0	4	4	60/40
2	23EE1401	Measurements and Instrumentation	PC	3/0/0	3	3	60/40
3	23EE1402	Electrical Machines I	PC	3/0/0	3	3	60/40
4	23EE1403	Transmission and Distribution	PC	3/0/0	3	3	60/40
5	23EE1404	Control Systems	PC	3/0/0	3	3	60/40
Theory Cum Practical Courses							
6	23EE1405	Digital Electronics	PC	3/0/2	5	4	50/50
Laboratory Course							
7	23EE1411	Electrical Machines Laboratory I	PC	0/0/4	4	2	40/60
8	23EE1412	Control and Instrumentation Laboratory	PC	0/0/4	4	2	40/60
9	23ES1412	Coding Practices II	EEC	0/0/2	2	1	40/60
TOTAL					**31**	**25**	

Semester V							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1		Power System Analysis	PC	3/0/0	3	3	60/40
2		Electrical Machines II	PC	3/0/0	3	3	60/40
3		Power Electronics	PC	3/0/0	3	3	60/40
4		Professional Elective – I	PE	3/0/0	3	3	60/40
5		Open Elective – I	OE	3/0/0	3	3	60/40
Theory Cum Practical Courses							
6		Microcontroller and Embedded System	PC	3/0/2	5	4	50/50
Laboratory Course							
7		Electrical Machines Laboratory II	PC	0/0/4	4	2	40/60
8		Industrial Automation Laboratory	PC	0/0/4	4	2	40/60
9		Coding Practices III	EEC	0/0/2	2	1	40/60
TOTAL					**30**	**24**	

Semester VI							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1		Electrical Drives	PC	3/0/0	3	3	60/40
2		Power System Operation and Control	PC	3/0/0	3	3	60/40
3		Professional Elective – II	PE	3/0/0	3	3	60/40
4		Professional Elective – III	PE	3/0/0	3	3	60/40
5		Open Elective – II	OE	3/0/0	3	3	60/40
Theory Cum Practical Courses							
6		Artificial Intelligence for Electrical Engineers	PC	3/0/2	5	4	50/50
Laboratory Course							
7		Power Electronics and Drives Laboratory	PC	0/0/4	4	2	40/60
8		Power System Simulation Laboratory	PC	0/0/4	4	2	40/60
9		Coding Practices IV	EEC	0/0/2	2	1	40/60
TOTAL					**30**	**24**	

Semester VII							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1		Protection and Switchgear	PC	3/0/0	3	3	60/40
2		Renewable Energy Systems	PC	3/0/0	3	3	60/40
3		High Voltage Engineering	PC	3/0/0	3	3	60/40
4		Professional Elective - IV	PE	3/0/0	3	3	60/40
5		Professional Elective – V	PE	3/0/0	3	3	60/40
Laboratory Course							
6		Renewable Energy Systems Laboratory	PC	0/0/4	4	2	40/60
7		Mini Project	EEC	0/0/4	4	2	40/60
TOTAL					**23**	**19**	

Semester VIII							
S. No	**COURSE CODE**	**COURSE TITLE**	**Category**	**L/T/P**	**Contact Hours**	**Credit**	**Ext / Int Weightage**
Theory Courses							
1		Professional Elective – VI	PE	3/0/0	3	3	60/40
2		Professional Elective – VII	PE	3/0/0	3	3	60/40
Laboratory Course							
3		Project Work	EEC	0/0/20	20	10	40/60
TOTAL					**22**	**16**	

TOTAL NO. OF CREDITS: 170

CREDIT DISTRIBUTION

S. No.	Subject Area / Semester	Credits Per Semester								Credits Total	Percentage %
		I	II	III	IV	V	VI	VII	VIII		
1.	Humanities and Social Studies (HS)	4	4							8	4.71
2.	Basic Sciences (BS)	7	4	4	4					19	11.18
3.	Engineering Sciences (ES)	8	10	5						23	13.53
4.	Professional Core (PC)		4	10	20	17	14	11		76	44.71
5.	Professional Electives (PE)					3	6	6	6	21	12.35
6.	Open Electives (OE)					3	3			6	3.53
7.	Project Work (PR/EEC)		1	1	1	1	1	2	10	17	10
8.	Non-Credit/ (Mandatory)		0	0						0	
	Total	**19**	**23**	**20**	**25**	**24**	**24**	**19**	**16**	**170**	**100**

SEMESTER – I

23MA1101	MATRICES AND CALCULUS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE:

- To comprehend matrices as mathematical structures used to represent data, equations, and transformations in various engineering applications
- To introduce the concepts of limits, continuity, derivatives and maxima and Minima.
- To familiarize the functions of two variables and finding its extreme points.
- To provide understanding of various techniques of integration.
- To introduce integral ideas in solving areas, volumes and other practical problems.

UNIT I MATRICES 9+3

Eigen values and Eigenvectors of a real matrix - Characteristic equation -Properties of Eigen values and Eigenvectors -Cayley Hamilton theorem -Diagonalization of matrices- Reduction of a quadratic form to canonical form by orthogonal transformation - Nature of quadratic forms.

UNIT II DIFFERENTIAL CALCULUS 9+3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (Sum, Product & Quotient rule, Chain rule, logarithmic and implicit differentiation) - Maxima and Minima of functions of one variable and its applications**.**

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9+3

Partial differentiation - Total derivative - Change of variables –Jacobian's- Taylor's series for functions of two variables - Maxima and minima of functions of two variables - Lagrange's method of undetermined multipliers.

UNIT IV INTEGRAL CALCULUS 9+3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts -Bernoulli's formula- Integration of rational functions by partial fraction - Improper integrals - Applications: Hydrostatic force and pressure, moments and centres of mass.

UNIT V MULTIPLE INTEGRALS 9+3

Double integrals in Cartesian and polar coordinates - Change of order of integration in Cartesian coordinates - Area enclosed by plane curves - Change of variables in double integrals -Triple integrals - Volume of Solids.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Able to apply matrix operations to solve engineering problems efficiently.
CO2 Apply limit definition and rules of differentiation to differentiate functions.
CO3 Understand familiarity in the knowledge of Maxima and Minima, Jacobian,Taylor series and apply the problems involving Science and Engineering.
CO4 Understand the knowledge of Integration by parts, Integration of rational functions by partial fraction.
CO5 Understand the knowledge of Area enclosed by plane curves, Change of variables in double integrals, Triple integrals, Volume of Solids.

TEXT BOOKS

1. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, NewDelhi, 44rdEdition,2018.
2. James Stewart, "Calculus: Early Transcendental", Cengage Learning, 9thEdition, NewDelhi,2015.
3. Bali N., Goyal M. and Walkins C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt. Ltd.,), New Delhi, 7th Edition, 2015.

REFERENCE BOOKS

1. Narayanan, S. and Manicavachagam Pillai, T. K., “Calculus" Volume I and II, S. Viswanathan Publishers Pvt.Ltd.Chennai, 2007.
2. Srimanta Pal and Bhunia,S.C, "Engineering Mathematics" Oxford University Press,2015.
3. B.V. Ramana “Higher Engineering Mathematics”, McGraw Hill Education, India.
4. Erwin Kreyzig, Advanced Engineering Mathematics, John Wiley sons, 10th Edition,2015.
5. Sivaramakrishna Dass, C. Vijayakumari, “Engineering Mathematics”, Pearson Education India, 4th Edition 2019.
6. Sundar Raj. M and Nagarajan. G , “Engineering Mathematics-I”,3rd Edition, Sree Kamalamani Publications, Chennai, 2020.

ONLINE COURSES / RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_ma60/preview
2. https://onlinecourses.nptel.ac.in/noc21_ma58/preview

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3									1
CO2	3	3	3									1
CO3	3	3	3									1
CO4	3	3	3									1
CO5	3	3	3									1

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23ES1101	PROBLEM SOLVING USING C PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To learn the syntax for C programming
- To develop C Programs using basic programming constructs
- To develop C Programs using arrays and strings
- To develop applications in C using functions, pointers
- To develop applications using structures and union

UNIT-I BASICSOFCPROGRAMMING 9

Introduction to programming paradigms – Algorithms – Flowchart - Structure of C program - C programming: Data Types – Storage classes - Constants – Enumeration Constants - Type Conversion Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements, Format specifiers, Assignment statements – Decision making statements - Switch statement – Break – Continue - Goto statement - Looping statements – Pre-processor directives - Compilation process.

UNIT-II ARRAYSANDSTRINGS 9

Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program: Computing Mean, Median and Mode - Two dimensional arrays – Example Program: Matrix Operations (Addition, Multiplication, Determinant and Transpose) – String operations: length, compare, concatenate, copy, Reverse and Palindrome – Selection sort, Insertion sort - linear and binary search.

UNIT-III FUNCTIONSANDPOINTERS 9

Introduction to functions: Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions – Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference.

UNIT-IV STRUCTURES ANDUNION 9

Structure - Nested structures– Pointer and Structures– Array of structures – Example Program using structures and pointers – Self-referentials structures – Dynamic memory allocation – Singly linked list– typedef and Union.

UNIT-V FILEPROCESSING 9

Files – Types of file processing: Sequential access, Random access – Sequential access file - Example Program: Finding average of numbers stored in sequential access file -Random access file - Example Program: Transaction processing using random access files– Command line arguments.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Learn the syntax for C programming
CO2 Develop simple applications in C using basic constructs
CO3 Design and implement applications using arrays and strings
CO4 Develop and implement applications in C using functions and pointers.
CO5 Develop applications in C using structures and union.
CO6 Design applications using sequential and random access file processing.

TEXT BOOKS

1. Reema Thareja, —Programming in C, Oxford University Press, Second Edition,2016.
2. Kernighan, B.W and Ritchie,D.M, —The C Programming language, Second Edition, Pearson Education, 2006.

REFERENCE BOOKS

1. Paul Deitel and Harvey Deitel, — C How to Program, Seventh edition, Pearson Publication, 2015.
2. Juneja, B. L and Anita Seth, —Programming in C, CENGAGE Learning India pvt. Ltd., 2011.
3. Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, 2009.
4. Anita Goel and Ajay Mittal, —Computer Fundamentals and Programming in C, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
5. Byron S. Gottfried, "Schism"s Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.

WEBREFERENCES

1. https://github.com/tscheffl/ThinkC/blob/master/PDF/Think-C.pdf
2. https://freecomputerbooks.com/langCBooks.html

ONLINECOURSES/ RESOURCES

1. https://www.programiz.com/c-programming
2. https://www.tutorialspoint.com/cprogramming/index.htm
3. https://www.javatpoint.com/c-programming-language-tutorial
4. https://www.geeksforgeeks.org/c-programming-language/

5. https://en.wikibooks.org/wiki/C_Programming
6. https://www.cprogramming.com/tutorial/c-tutorial.html?inl=hp

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**1**	**1**	**1**		**1**						
CO2	**2**	**1**	**1**	**1**	**2**	**1**						
CO3	**3**	**2**	**2**	**1**	**3**	**1**						
CO4	**3**	**2**	**2**	**1**	**3**	**1**						
CO5	**2**	**1**	**1**	**1**	**2**	**1**						
CO6	**2**	**1**	**1**	**1**	**2**	**1**						

Internal Assessment				**End Semester Examinations**
Assessment I (100 Marks)		**Assessment II (100 Marks)**		
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Individual Assignment / Case Study / Seminar / Mini Project**	**Written Test**	**Written Examinations**
40	60	40	60	100
40%				**60 %**

23ES1103	ENGINEERING GRAPHICS	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE:

- Drawing Engineering curves
- Drawing orthographic projections of lines and planes
- Drawing orthographic projections of solids
- Drawing section and development of the surfaces of objects
- Drawing isometric views and intersection curves of simple solids
- Drawing free hand sketches of basic geometrical shapes, multiple views of objects and Applications of Engineering Graphics

UNIT 0 CONCEPTS AND CONVENTIONS (Not for Examination) 2

Importance of drawing in engineering applications - Use of drafting instruments - BIS conventions and specifications - Size, layout and folding of drawing sheets - Lettering and dimensioning - Introduction to Scales - Geometric construction - to draw perpendiculars, parallel lines, divide a line and circle, to draw equilateral triangle, square, regular polygons. Introduction to drafting packages like CAD and demonstration of their use in engineering fields.

UNIT I ENGINEERING CURVES AND PROJECTION OF POINTS AND LINES 6+6

Basic construction of cycloid, epicycloid and hypocycloid - Drawing of tangents and normal to the above curves. Construction of involutes of square, pentagon and circle - Drawing of tangents and normal to the above involutes.

Orthographic projection – Introduction to Principal Planes of projections - First angle projection - Projection of points. Projections of straight lines (only in First angle projections) inclined to both the principal planes - Determination of true lengths, true inclinations and traces by rotating line method

UNIT II PROJECTIONS OF PLANES AND PROJECTIONS OF SOLIDS 6+6

Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method and auxiliary plane method.

Projection of simple solids like prisms, pyramids, cylinder, and cone when the axis is inclined to one principle planes by rotating object method.

UNIT III SECTIONS of SOLIDS AND DEVELOPMENT OF SURFACES 6+6

Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section.

Development of lateral surfaces of simple solids and frustum and truncated solids – Prisms, pyramids cylinders and cones.

UNIT IV INTERSECTION OF SOLIDS AND ISOMETRIC PROJECTIONS 6+6

Line of intersection - Determining the line of intersection between surfaces of two interpenetrating two square prisms and Intersection of two cylinders with axes of the solids intersecting each other perpendicularly, using line method.

Principles of isometric projection – isometric scale –Isometric projections and isometric views of simple solids and frustum and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions.

UNIT V FREE-HAND SKETCHING 5+5

Steps in free hand sketching - Orthographic views (front, top and side views) of simple blocks from their Isometric view, Isometric view of simple blocks from their Orthographic views (front, top and side views)

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

CO1 Draw the engineering curves and draw orthographic projections of lines and planes

CO2 Draw orthographic projections of planes and solids

CO3 Draw the sections and development of the surfaces of objects

CO4 Draw isometric projections and intersection of curves of simple solids.

CO5 Draw free hand sketching of basic geometrical shapes, multiple views of objects

TEXT BOOKS

1. Natarajan, K. V., “A text book of Engineering Graphics”, 28th Ed., Dhanalakshmi Publishers, Chennai, 2015.
2. Venugopal, K. and Prabhu Raja, V., “Engineering Graphics”, New Age Publications,2008.

REFERENCE BOOKS

1. Bhatt, N.D., Panchal V M and Pramod R. Ingle, “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2014.
2. Parthasarathy, N. S. and Vela Murali, “Engineering Drawing”, Oxford University Press, 2015
3. Agrawal, B. and Agrawal C.M., “Engineering Drawing”, Tata McGraw, N.Delhi, 2008.

WEB REFERENCES

1. https://nptel.ac.in/courses/105/104/105104148/

ONLINE COURSES / RESOURCES

1. https://nptel.ac.in/courses/112/103/112103019/

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**								**3**	**3**
CO2	**3**	**3**	**3**								**3**	**3**
CO3	**3**	**3**	**3**								**3**	**3**
CO4	**3**	**3**	**3**								**3**	**3**
CO5	**3**	**3**	**3**								**3**	**3**

Internal Assessment				**End Semester Examinations**
Assessment I (100 Marks)		**Assessment II (100 Marks)**		
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Individual Assignment / Case Study / Seminar / Mini Project**	**Written Test**	**Written Examinations**
40	60	40	60	100
40%				**60 %**

23HS1101	COMMUNICATIVE ENGLISH AND LANGUAGE SKILLS	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE:

- To induce the basic reading and writing skills among the first year engineering and technology students.
- To assist the learners to develop their listening skills, which will enable them listening to lectures and comprehend them by asking questions and seeking clarifications
- To succour the learners to develop their speaking skills and speak fluently in real contexts.
- To motivate the learners to develop vocabulary of a general kind by developing their reading skills for meeting the competitive exams like GATE, TOFEL, GRE, IELTS, and other exams conducted by Central and State governments
- To learn to use basic grammatical structures in suitable contexts

UNIT I INFORMAL COMMUNICATION 6

Listening: Listening and filling details, Listening to Speeches by Specialists and Completing Activities such as Answering Questions, Identifying the Main Ideas, Style, etc. **Speaking**: Introducing One-self – Introducing a Friend/ Family. **Reading**: Descriptive Passages (From Newspapers / Magazines). **Writing**: Autobiographical Writing, Developing Hints. **Grammar**: Noun, Pronoun & Adjective. **Vocabulary Development**: One Word Substitution

UNIT II CONVERSATIONAL PRACTICE 6

Listening: Listening to Conversations (Asking for and Giving Directions). **Speaking**: Making Conversation Using (Asking for Directions, Making an Enquiry), Role Plays, and Dialogues. **Reading**: Reading a Print Interview and Answering Comprehension Questions. **Writing**: Writing a Checklist, Dialogue Writing **Grammar**: Tenses and Voices, Regular and Irregular Verbs. **Vocabulary Development**: Prefix &Suffix, Word formation.

UNIT III OFFICIAL COMMUNICATIONS 6

Listening: Listening for specific information. Speaking: Giving Short Talks on a given Topic. **Reading**: Reading Motivational Essays on Famous Engineers and Technologists (Answering Open-Ended and Closed Questions). **Writing**: Writing Permission Letters/Editor, Complaint, and Invitation. Emails and Review Writing-Books, Films. **Grammar**: Adverb, Prepositions & Conjunctions. **Vocabulary Development**: Collocations – Fixed Expressions.

COMMUNICATION AT WORK PLACE **6**

UNIT IV

Listening: Listening to Short Talks (5 Minutes Duration and Fill a Table, Gap-Filling Exercise) Note Taking/Note Making. Speaking: Small Group Discussion, Giving Recommendations. **Reading**: Reading Problem – Solution Articles/Essays Drawn from Various Sources. Writing: Making Recommendations. **Grammar**: Subject-Verb Agreement, Framing Questions. **Vocabulary Development**: Infinitives and Gerunds, Reference Words, Technical Vocabulary.

UNIT V **DEFINITIONS AND PRODUCT DESCRIPTION** **6**

Listening: Listening to a Product Description (Labelling and Gap Filling) Exercises. **Speaking**: Describing a Product and Comparing and Contrasting it with Other Products. **Reading**: Reading Graphical Material for Comparison (Advertisements). **Writing**: Essay Writing. Compare and Contrast Paragraphs, Essay writing. **Grammar**: Phrasal Verbs – Cause and Effect Sentences –Compound Nouns and Definitions. **Vocabulary Development:** Use of Discourse Markers.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1 The students will be able to comprehend conversation and short talks delivered in English.

CO2 Participate effectively in informal conversation; introduce themselves and their friends and express opinions English.

CO3 Read articles of a general kind in magazines and newspaper

CO4 Write short essays of a general kind and personal letters and emails in English.

CO5 To gain understanding of basic grammatical structures and use them in right context.

CO6 To use appropriate words in a professional context.

TEXT BOOKS

1. N P Sudharshana& C Savitha. English for Technical Communication Delhi: CUP, 2019.
2. Board of Editors. English for Engineers and Technologists Volume 1 Orient Black Swan Limited, 2020

REFERENCE BOOKS

1. Board of Editors. Using English-A course book for Undergraduate engineers and Technologists Orient Black Swan Limited, 2017
2. Bailey, Stephen. Academic Writing: A Practical Guide for Students. New York: Rutledge, 2011.

3. Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skills for Business English. Cambridge University Press, Cambridge: Reprint 2011 3. Means,L. Thomas and Elaine Langlois. English & Communication For Colleges. Cengage Learning , USA:2007
4. Redston, Chris &Gillies Cunningham Face2Face (Pre-intermediate Student's Book &Workbook)Cambridge University Press, New Delhi: 2005.

WEB REFERENCES

1. https://learnenglishteens.britishcouncil.org/exams/grammar-and-vocabulary-exams/wordformation
2. https://cdn.s3waas.gov.in/s347d1e990583c9c67424d369f3414728e/uploads/2018/02/20180316 21.pdf
3. http://xn--englishclub-ql3f.com/grammar/parts-of-speech.htm
4. https://www.edudose.com/english/grammar-degree-of-comparison-rules/

ONLINE COURSES / RESOURCES

1. https://basicenglishspeaking.com/wh-questions/
2. https://agendaweb.org/verbs/modals-exercises.html
3. https://cdn.s3waas.gov.in/s347d1e990583c9c67424d369f3414728e/uploads/2018/02/2018031621.pdf
4. https://www.ego4u.com/en/cram-up/grammar/prepositions

LIST OF EXPERIMENTS

1. Listen to lectures- articulate a complete idea as opposed to producing fragmented utterances- Tedtalks, Science Fiction- My Fair Lady
2. Listening – following, responding to explanations, giving directions and instructions in academic and business contexts- IELTS, TOEFL.
3. Listening to transcripts and answer to the questions.
4. Listening for specific information: accuracy and fluency – BEC.
5. Reading: Different Text Type.
6. Reading: Predicting Content using pictures and titles.
7. Reading: Use of Graphic Organizers to review.
8. Reading: Aid Comprehension
9. Reading: Speed Reading Techniques.
10. Reading and Comprehending the passages in the competitive exams like GATE, TOEFL, GRE, IELTS, and other exams conducted by Central and state governments.

TOTAL: 30 PERIODS

REFERENCE BOOKS

1. SureshKumar.E and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Blackswan: Hyderabad,2012
2. Davis, Jason and Rhonda Liss. Effective Academic Writing (level 3) Oxford University Press: Oxford,2006
3. Withrow, Jeans and et al. Inspired to write. Reading and Tasks to develop writing skills. Cambridge University Press: Cambridge,2004

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									**3**	**3**		**2**
CO2									**3**	**3**		**2**
CO3									**2**	**3**		**2**
CO4									**2**	**3**		**2**
CO5									**2**	**3**		**2**
CO6									**3**	**3**		**2**

Assessment (40% weightage) (Theory Component)		**Assessment** (60% weightage) (Laboratory Component)		**End Semester Examination**
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Evaluation of Laboratory Observation, Record**	**Test**	**Written Examination**
40	**60**	**75**	**25**	
100				**100**
50 %				**50 %**

23PH1101	ENGINEERING PHYSICS	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE:

- To impart knowledge in basic concepts of physics relevant to engineering applications
- To introduce advances in technology for engineering applications

UNIT–I PROPERTIES OF MATTERS 6

Elasticity: Stress, strain, Hooke's law and elastic moduli – stress-strain diagram – twisting couple per unit twist for solid cylinder – torsional pendulum (theory) – bending moment of beam – non-uniform and uniform bending (theory)– I-shape girder.

Thermal Physics: Mode of heat transfer: conduction, convection and radiation – thermal expansion of solids – bimetallic strips – thermal conductivity – Forbe's method and Lee's disc method; theory and experiment – thermal insulation – applications

UNIT–II SEMICONDUCTING AND MAGNETIC MATERIALS 6

Semiconducting Materials: Intrinsic Semiconductors – energy band diagram – carrier concentration in intrinsic semiconductors – extrinsic semiconductors (N-type & P-type) – variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration –Zener and avalanche breakdown in p-n junctions – Ohmic contacts – Schottky diode – tunnel diode.

Magnetic Materials: Magnetism in materials – Basic definitions – Classifications of Magnetic Materials- Ferromagnetic Domain theory – M versus H behaviour - Hard and Soft Magnetic materials- Magnetic principle in Computer data storage – Magnetic Hard Disc and Embedded systems**.**

UNIT–III MODERN OPTICS 6

Laser: Population of energy levels, Einstein's A and B coefficients derivation – optical amplification (qualitative) – Semiconductor lasers: homojunction and heterojunction**– Fiber Optics**: components and principle of fiber optics – numerical aperture and acceptance angle derivation – types of optical fibers (material, refractive index, mode) – losses associated with optical fibers– fiber as pressure and displacement sensors.

UNIT–IV QUANTUM PHYSICS AND NANOSCIENCE 6

Quantum Physics: Blackbody radiation – Planck's hypothesis and derivation – wave particle duality of light: concepts of photon – de Broglie hypotheses – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations.

Nanoscience: Introduction – Classification of nanomaterials – preparation (bottom up and top down approaches), mechanical, optical and electrical properties – applications: NEMS and MEMS– carbon nanotubes: types.

UNIT–V ELECTROMAGNETIC WAVES 6

Divergence – curl – integral calculus – Gauss divergence theorem – Stoke's theorem – equation of continuity – displacement current – Maxwell's equations – Gauss's laws – Faraday's law –Ampere-Maxwell law – mechanism of electromagnetic wave propagation – Hertz observation – production and detection of electromagnetic wave – properties of electromagnetic waves.

TOTAL: 30 PERIODS

LIST OF EXPERIEMENTS

1. Determination of Moment of Inertia of the disc and Rigidity Modulus of the material of the wire – Torsional Pendulum
2. Determination of Young's Modulus – Non - Uniform Bending
3. Determination of Thermal Conductivity of the Bad Conductor – Lee's Disc Method
4. Determination of thickness of a thin wire – Air wedge method
5. (i) Determination of wavelength of Laser using Grating and Particle size determination
   (ii) Determination of Numerical Aperture and Acceptance angle of an Optical Fibre
6. Determination of Velocity of ultrasonic waves in a liquid and compressibility of the liquid – Ultrasonic Interferometer.
7. Determination of wavelength of Hg source using Grating by normal incidence method using spectrometer
8. Determine the band gap energy of a semiconductor.

TOTAL: 30 PERIODS

TEXT BOOKS

1. AjoyGhatak, Optics, 5th Ed., Tata McGraw Hill, 2012
2. Arthur Beiser, Shobhit Mahajan and S Rai Choudhury, Concepts of Modern Physics, 6th Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2014
3. B. K. Pandey and S. Chaturvedi, Engineering Physics, 1st edition, Cengage Learning India Pvt Ltd., New Delhi, 2017
4. Karl F. Renk, Basics of laser physics: for students of science and engineering, 2017.

REFERENCE BOOKS

1. Halliday, D., Resnick, R. & Walker, J.—Principles of Physics, Wiley, 2015.
2. Tipler, P.A. &Mosca, G. — Physics for Scientists and Engineers with Modern Physics'. W.H.Freeman, 2007.
3. Ruby Das, C.S. Robinson, Rajesh Kumar, Prashant Kumar Sahu, A Textbook of Engineering Physics Practical, University Science Press, Delhi, II Edition (2016).

COURSE OUTCOMES:

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

CO1 Understand the basics properties of materials, especially elastic and thermal properties of materials.

CO2 Adequate knowledge on the concepts of semiconducting and magnetic materials and their applications in memory storage.

CO3 Acquire the knowledge on the concepts of lasers, fiber optics and their technological applications.

CO4 Knowledge on fundamental concepts of quantum theory, nanoscience its applications

CO5 Knowledge on the basics of electromagnetic waves and its properties.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**1**	**1**	**1**						
CO2	**3**	**3**	**2**	**1**	**2**	**1**						
CO3	**3**	**3**	**2**	**2**	**2**	**1**						**1**
CO4	**3**	**3**	**1**	**1**	**2**	**1**						
CO5	**3**	**3**	**1**	**1**	**2**	**1**						

Assessment (40% weightage) (Theory Component)		**Assessment** (60% weightage) (Laboratory Component)		**End Semester Examination**
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Evaluation of Laboratory Observation, Record**	**Test**	**Written Examination**
40	**60**	**75**	**25**	
100				**100**
50 %				**50 %**

23ES1111	PROBLEM SOLVING USING C PROGRAMMINGLABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE:

- To write, test, and debug simple C programs.
- To implement C programs with conditional and looping statement
- To develop applications in C using strings, pointers, functions.
- To implement C programs with structures and union.
- To develop applications in C using file processing
- To develop an application in real time situation

LISTOFEXPERIMENTS

1. Programs using I/O statements and expressions.
2. Programs using decision-making constructs.
3. Write a program to find whether the given year is leap year or Not? (Hint: not every centurion year is a leap. For example 1700, 1800 and 1900 is not a leap year)
4. Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.
5. Check whether a given number is Armstrong number or not?
6. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions
   a) if it is a perfect cube
   b) if it is a multiple of 4 and divisible by 6
   c) if it is a prime number
   d) Sort the numbers based on the weight in the increasing order as shown below
   <10,its weight>,<36,its weight><89,its weight>
7. Populate an array with height of persons and find how many persons are above the average height.
8. Given a string —a$bcd./fg find its reverse without changing the position of special characters. (Example input:a@gh%;j and output:j@hg%;a)
9. Convert the given decimal number into binary, octal and hexadecimal numbers using user defined functions
10. From a given paragraph perform the following using built-in functions:
    a) Find the total number of words.
    b) Capitalize the first word of each sentence.
    c) Replace a given word with another word.
11. a) Sort the list of numbers using Selection sort and insertion sort
    b) Sort the list of numbers using pass by reference.
12. Search an element from an unsorted array using linear search
    Search an element in an array using Binary search recursion call.

13. Generate salary slip of employees using structures and pointers.

14. a) Programs using Pointers
    b) Pointer demonstration the use of & and *
    c) Access Elements of an Array Using Pointer
    d) Perform the string operations like Length of the String, Concatenation of string and compare the string using Pointer
    e) Count number of words, digits, vowels using pointers
    f) Add two matrices using Multidimensional Arrays with pointers
    g) Multiply two matrices using pointers
    h) Multiply two numbers using Function Pointers

15. Compute internal marks of students for five different subjects using structures and functions.
16. Program to demonstrate the difference between unions and structures
17. Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.
18. Count the number of account holders whose balance is less than the minimum balance using sequential access file.
19. **MINIPROJECT**
    Create a—Railway reservation system with the following modules
    a) Booking
    b) Availability checking
    c) Cancellation
    d) Prepare chart

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Write, test, and debug simple C programs.
CO2 Implement C programs with conditionals and loops.
CO3 Develop C programs for simple applications making use arrays and strings.
CO4 Develop C programs involving functions, recursion, pointers, and structures and union.
CO5 Design applications using sequential and random access file processing.
CO6 Perform task as an individual and / or team member to manage the task in time

WEB REFERENCES

1. https://www.programiz.com/c-programming/examples
2. https://beginnersbook.com/2015/02/simple-c-programs/
3. https://www.programmingsimplified.com/c-program-examples
4. https://www.tutorialgateway.org/c-programming-examples/
5. https://www.javatpoint.com/c-programs
6. https://www.tutorialspoint.com/learn_c_by_examples/simple_programs_in_c.htm

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2								
CO2	3	2	2	1	3							
CO3	3	3	3	2	3							
CO4	3	2	2	1	3							
CO5	3	3	3	2	3							
CO6	3	2	2	1	3							

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%

23TA1101	HERITAGE OF TAMIL	L	T	P	C
		1	0	0	1

UNIT – I LANGUAGE AND LITERATURE 3

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

UNIT – II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3

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

UNIT – III FOLK AND MARTIAL ARTS 3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT –IV THINAI CONCEPT OF TAMILS 3

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

UNIT –V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE 3

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

TOTAL: 15 PERIODS

TEXT-CUM REFERENCE BOOKS:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கக.கக. பிள்ளை
   (தவை : தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் ியடு
   கழகம்).
2. கணினித் தமிழ் - முளனவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - ளவளக நதிக்களரயில் சங்ககால நகர நாகரிகம்
   (ததால்லியல் துளை தவைியீ)
4. தபாருளந - ஆற்ைங்களர நாகரிகம். (ததாலல்லியல் துளை)
5. Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published 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: InternationalInstitute of Tamil Studies
7. Historical 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) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book

23TA1101	தமிழர் மரபு	L	T	P	C
		1	0	0	1

UNIT – I **மமொழி மற்றும் இலக்கியம்** **3**

இந்திய தமமொழிக் குடமும்பங்கள் - திரமொவிட தமமொழிகள் - தமிழ் ஒர மொத தசம்தமமொழி - தமிழ் தசவ்வமிலகக்கியங்கள் - சங்க இலகக்கியத்தின் சமய சமொர்பறம்மை தனம்ளம - சங்க இலகக்கியத்தில் பகிர்தல் அமைம் - திருக்கமைமைில் கமலமண்ளமக் கருத்துகக்கள் - தமிழ் கமொப்பியங்களம், தமிழகத்தில் சமண தபமொத்த சமயங்கமைின் தொகக்கம் - பகக்தி இலகக்கியம், ஆழம்வமொர்கள் மற்றமும் நமயன்மமொர்களம் - சிற்மைிலகக்கியங்கள் - தமிழில் நவன இலகக்கியத்தின் வமைர்ச்சி - தமிழ் இலகக்கிய வமைர்ச்சியில் பமொரதியமொர் மற்றமும் பமொரதிதமொசன் ஆகிகயமொரினம் பங்கமைிப்ப.

UNIT – II **மரபு - பமொறமை ஓவியங்கள் மமொதல் நவனீ ஓவியங்கள் வறர - சிற்பக் கறல** **3**

நடுகல் முதல் நவன சிற்பங்கள் வளர - ஐம்தபமொன் சிளலகள் - பழஙம்குடியினர் மறம்றுமம் அவர்களம் தயமொரிக்கும் ளகவளினப் தபமொருட்கள், தபமொம்ளமகள் - கதர் தசயம்யும் களல - சுடுமண் சிறப்பங்கள் - நமொட்டமப்புமைத் ததய்வங்கள் - குமரிமுளனயில் திருவள்ளுவர் சிளல - இளசக்கருவிகள் - மிருதங்கம், பளமை, வளண, யமொழ், நமொதஸம்வரம் - தமிழர்கைின் சமூக தபொரமைமொதமொர வமொழ்வமில் ககமவமில்கமைின் பங்கு.

UNIT – III **நமொட்டுப்புமைக் கறலகள் மற்றமும் வர வமிறையமொட்டமகள்** **3**

ததருக்கமத்து, கரகமொடம்டம், வமில்லமப்பமொடம்டு, கணியமொன் கமொதம்து, ஒயமிலமொட்டம், கதொலம்பமொளவகக் கமொதம்து, சிலமம்பமொடம்டம், வைரி, பமலியமொட்டம், தமிழர்கமைின் வமிளமையமொட்டுகளம்.

UNIT –IV **தமிழர்கைின் திறைக் ககொட்பொடுகள்** **3**

தமிழகத்தின் தமொவரங்களமமம், வமிலங்குகளமும் - ததமொல்கபம்பியம் மற்றமும் சங்க இலகக்கியத்தில் அகம் மற்றமும் பமமைக் ககமொடம்பமொடுகள் - தமிழர்களம் கபமொற்மைிய அைகக்ககமொட்பமொட - சங்ககமொலதத்தில் தமிழகத்தில் எழமத்தமைிவமமம், கலம்வியமும் - சங்ககமொல நகரங்களமும் துளமை முகங்களமும் - சங்ககமொலத்தில் ஏறற்மமதி மற்றமும் ைிகக்மமதி - கடல் கடநத நமொடுகமைிலம் ககமழர்கைின் தவறம்மைி.

UNIT –V **இந்திய கதசிய இயக்கம் மற்றும் இந்திய பண்பொட்டிற்குத் தமிழர்கைன் பங்கைப்பு** **3**

இந்திய வடிுதளலப் கபொரிலம் தமிழர்கைின் பங்க - இந்தியவின் பிைபப்குதிகைில் தமிழப்ப் பண்பாட்டினம் ெதாகக்கம் - சுயமரியாைத இயகக்ம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்தவட்டுகள், ளகதயழ்ெத்துபப்டிகள் - தமிழப்ப் ப்த்தகங்கைினம் அச்ப் வரலாற்.

TOTAL: 15 PERIODS

TEXT-CUM REFERENCE BOOKS:

1. தமிழக வரலாறு - மக்களுமம் பண்பாடும் - கக.கக. பிளள்ளை (தவை : தமிழ்நாடு பாடநூல் மறற்ும் கல்வியியல் பணிகள் ியடு
   கழகம்).
2. கணினித் தமிழ் – முளனவர். இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - ளவளக நதிக்களரயில் சங்ககால நகர நாகரிகம் (ததாலல்லியல் த்ளை தவைியட்)
4. தபாருளந - ஆற்ைங்களர நாகரிகமம். (ததாலல்லியல் த்ளை)
5. Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published 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: InternationalInstitute of Tamil Studies
7. Historical 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) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

SEMESTER – II

23MA1201	COMPLEX VARIABLES AND LAPLACE TRANSFORM	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE:

- To solve the linear differential equations with constant coefficients.
- To understand the concepts of vectors as it gives the insight into how to trace along the different types of curves.
- To understand the standard technique of a complex variable theory in particular of analytics functions and its mapping property.
- Complex variable techniques have been used in a wide area of engineering.
- Apply the basic ideas of Laplace Transform to solve the problems in engineering and technology.

UNIT I ORDINARY DIFFERENTIAL EQUATIONS 9+3

Higher order linear differential equations with constant coefficients -Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous first order linear differential equations with constant coefficients.

UNIT II VECTOR CALCULUS 9+3

Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration: Green's theorem in a plane - Gauss divergence and Stokes' theorem (excluding proofs) – Simple applications involving cubes, rectangular parallelepiped, sphere and cylinder**.**

UNIT III ANALYTIC FUNCTIONS 9+3

Functions of a complex variable–Analytic functions –Cauchy-Riemann equations – Necessaryandsufficientconditions–Harmonicandorthogonalpropertiesofanalytic function – Harmonic conjugate – Construction of analytic functions by Milne Thomson method– Conformal mapping: w =z+c,cz,1/z and bilinear transformation.

UNIT IV COMPLEX INTEGRATION 9+3

Line integrals- Cauchy's integral theorem-Cauchy's integral formula - Singularities – Residues– Cauchy's residue theorem - Taylor's and Laurent's series expansions – Application of residue theorem for evaluation of real definite integrals – Use of circular contour and semi- circular contour (excluding poles on the real axis).

UNIT V **LAPLACE TRANSFORM** **9+3**

Laplace transform: Sufficient conditions for existence – Transform of elementary functions – Basic properties–Transforms of derivatives and integrals of functions-Derivatives and integrals of transforms - Transforms of unit function, unit step function and unit impulse functions – Transforms of periodic functions– Initial and final value theorems. Inverse Laplace transforms: Convolution theorem–Solution of linear ODE of second order with constant coefficients using the techniques of Laplace transformation.

TOTAL :60 PERIODS

COURSE OUTCOMES:

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

CO1 Apply various techniques in solving differential equations.

CO2 Identify the gradient, divergence and curl of a vector point function and related identities. Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.

CO3 Understand the concepts of analytic functions, harmonic functions and conformal mapping.

CO4 Determine the types of singularities, residues and contour integration.

CO5 Able to solve differential equations using Laplace transform.

TEXT BOOKS

1. Grewal B.S.,- "Higher Engineering Mathematics", Khanna Publishers, NewDelhi, 44th Edition,2018.
2. B.V. Ramana, "Higher Engineering Mathematics", McGraw Hill Education, India.
3. Bali N., Goyal M. and Walkins C., "Advanced Engineering Mathematics", Firewall.

REFERENCE BOOKS

1. Kreyszig Erwin, "Advanced Engineering Mathematics", John wiley and Sons,10th Edition, New Delhi.
2. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
3. O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt. Ltd, New Delhi, 2007.
4. Sastry, S.S, "Engineering Mathematics", Vol.I& II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.
5. Wyile, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt Ltd, 6thEdition, New Delhi, 2012.

ONLINE COURSES / RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_ma69
2. https://onlinecourses.nptel.ac.in/noc21_ma57

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3									1
CO2	3	3	3									1
CO3	3	3	3									1
CO4	3	3	3									1
CO5	3	3	3									1

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23ES1201	PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

To impart Knowledge on the following topics:

- Basic programming constructs and control structures in python
- Python data structures – Lists, Tuples and Dictionary
- Python functions and use Strings
- Input/output with files in Python.
- Python packages and GUI concepts

UNIT I INTRODUCTION TO PYTHON PROGRAMMING ANDCONTROL STRUCTURES 9

Introduction to Python, Demo of Interactive and script mode, Tokens in Python – Variables, Keywords, Comments, Literals, Data types, Indentation, Operators and its precedence, Expressions, Input and Print functions, Type Casting. Illustrative problems: find minimum in a list, guess an integer number in a range, Towers of Hanoi.

Control Structures: Selective statements – if, if-else, nested if, if – elif ladder statements; Iterative statements - while, for, range functions, nested loops, else in loops, break, continue and pass statements. Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT II FUNCTIONS AND STRINGS 9

Functions: Types, parameters, arguments: positional arguments, keyword arguments, parameters with default values, functions with arbitrary arguments, Scope of variables: Local and global scope, Recursion and Lambda functions. Illustrative programs: power of a number, sorting, Fibonacci series using lambda.

Strings: Formatting, Comparison, Slicing, Splitting, Stripping, Negative indices, String functions, Regular expression: Matching the patterns, Search and replace. Illustrative programs: check whether the string is symmetrical, reverse a string, length of a string.

UNIT III COLLECTIONS 9

List: Create, Access, Slicing, Negative Indices, List Methods, and comprehensions

Tuples: Create, Indexing and Slicing, Operations on tuples.

Dictionary: Create, add, and replace values, operations on dictionaries.

Sets: Create and operations on set.

Illustrative programs: Interchange first and last element in a list, maximum and minimum N elements in a tuple, sort dictionary by key or value, size of a set.

UNIT IV FILES AND EXCEPTION HANDLING 9

Files: Open, Read, Write, Append and Close. Tell and seek methods. Illustrative programs: word count, copy file.

Command line arguments, Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, Exception Chaining, User-defined Exceptions, Defining Clean-Up actions.

Illustrative programs: prompt the user to input an integer and raises a Value Error exception if the input is not a valid integer, open a file and handles a File Not Found Error exception if the file does not exist, prompt the user to input two numbers and raises a Type Error exception if the inputs are not numerical, executes an operation on a list and handles an Index Error exception if the index is out of range.

UNIT V PACKAGES & GUI 9

Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc. Illustrative programs: create a pandas series using numpy, make a pandas data frame with 2D list.

GUI Programming: Tkinter introduction, Tkinter and Python Programming, Tk Widgets, Tkinter examples. Python programming with IDE. Illustrative programs: create a GUI marksheet, calendar, file explorer using Tkinter.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1 Develop and execute simple Python programs using conditionals and loops for solving problems.

CO2 Express proficiency in the handling of strings and functions

CO3 Represent compound data using Python lists, tuples, dictionaries, set setc

CO4 Read and write data from/to files and handle exceptions in Python programs

CO5 Implement python packages in data analysis and design GUI

CO6 Examine various problem solving concepts in python to develop real time applications.

TEXT BOOKS

1. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021.
2. ReemaThareja, “Problem Solving and Programming with Python’’, 2nd edition, Oxford University Press, New Delhi, 2019.
3. Alan D. Moore, Python GUI Programming with Tkinter, Design and Build Functional and User-friendly GUI Applications, Packt Publishing, 2021.

REFERENCE BOOKS

1. Martin C. Brown, “Python: The Complete Reference”, 4th Edition, Mc-Graw Hill, 2018
2. Eric Matthes, “Python Crash Course, A Hands - on Project Based Introduction to Programming”, 2nd Edition, No Starch Press, 2019.
3. Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd Edition, O’Reilly Publishers, 2016.

ONLINE COURSES / RESOURCES

1. https://docs.python.org/3/tutorial/
2. https://www.w3schools.com/python/
3. https://www.tutorialspoint.com/python/index.htm
4. https://www.javatpoint.com/python-tutorial

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	1	2							1
CO2	2	3	3	1	2							1
CO3	2	3	3	1	2							1
CO4	2	3	3	1	2							1
CO5	2	3	3	1	2							1
CO6	2	3	3	1	2							1

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23ES1202	BASIC CIVIL AND MECHANICAL ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To provide basic knowledge about civil and mechanical concepts

UNIT I SCOPE OF MECHANICAL AND CIVIL ENGINEERING 9

Overview of Civil Engineering – Civil Engineering contributions to the welfare of Society – Specialized sub disciplines in Civil Engineering – Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering

Overview of Mechanical Engineering – Mechanical Engineering contributions to the welfare of Society –Specialized sub disciplines in Mechanical Engineering – Production, Automobile, and Energy Engineering – Interdisciplinary concepts in Civil and Mechanical Engineering.

UNIT II SURVEYING AND CIVIL ENGINEERING MATERIALS 9

Surveying: Objects – classification – principles – measurements of distances – angles – leveling –determination of areas– contours – examples.

Civil Engineering Materials: Bricks – stones – sand – cement – concrete – steel – timber – modern materials.

UNIT III BUILDING COMPONENTS AND STRUCTURES 9

Foundations: Types of foundations – Bearing capacity and settlement – Requirement of good foundations.

Civil Engineering Structures: Brick masonry – stonemasonry – beams – columns – lintels – roofing– flooring – plastering – floor area, carpet area and floor space index.

Types of Bridges and Dams – water supply – sources and quality of water – Rain water harvesting – introduction to high way and rail way.

UNIT IV INTERNAL COMBUSTION ENGINES AND POWER PLANTS 9

Classification of Power Plants- Working principle of steam, Gas, Diesel, Hydro -electric and Nuclear Power plants, Working principle of Boilers-Turbines, Reciprocating Pumps (single acting and double acting) and Centrifugal Pumps,

Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines - Introduction to Electric Vehicles and Hybrid Vehicles, Concept of hybrid engines. Industrial safety practices and protective Devices.

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 9

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system–Layout of typical domestic refrigerator–Window and Split type room Air conditioner. Properties of air - water mixture, concepts of psychometric and its process.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1	Understanding overview of Mechanical and Civil Engineering
CO2	Understanding surveying and materials of constructions
CO3	Ability to explain the usage of construction material and proper selection of construction materials
CO4	Understanding the basic concept of IC engines and power plant
CO5	Understanding the fundamental of refrigeration and air-conditioning

TEXT BOOKS

1. Shanmugam Gand Palanichamy MS, "Basic Civil and Mechanical Engineering",TataMcGraw Hill PublishingCo.,NewDelhi,1996.
2. Palanikumar, K. Basic Mechanical Engineering, ARS Publications, 2010.

REFERENCE BOOKS

1. Seetharaman S.,"Basic Civil Engineering",AnuradhaAgencies,2005.
2. ShanthaKumar SRJ., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, 2000.
3. Venugopal K. and Prahu Raja V., "Basic Mechanical Engineering", Anuradha PublishersKumbakonam,2000.

WEB REFERENCES

1. Basic Civil and Mechanical Engineering - https://www.brainkart.com

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**		**3**									
CO2	**3**					**3**						
CO3	**3**		**3**									
CO4	**3**					**3**	**3**					
CO5	**3**		**3**				**3**					

Internal Assessment				**End Semester Examinations**
Assessment I (100 Marks)		**Assessment II (100 Marks)**		
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Individual Assignment / Case Study / Seminar / Mini Project**	**Written Test**	**Written Examinations**
40	60	40	60	100
40%				**60 %**

23HS1201	COMMUNICATIVE AND APTITUDE SKILLS	L	T	P	C
		2	0	2	3

COURSE OBJECTIVE:

- To develop linguistic and strategic competence in workplace context and to enhance language proficiency and thereby the employability of budding engineers and technologists.
- To improve the relevant language skills necessary for professional communication.
- To help learners to develop their listening skills, which will, enable them to listen to lectures and comprehend them by asking questions; seeking clarification and developing their speaking skills and to speak fluently in real contexts.
- To improve the verbal ability skill and communicative skill of the students.
- To enhance the analytical and problem solving skills of the students.
- To prepare them for various public and private sector exams & placement drives.

UNIT I INTERPERSONAL COMMUNICATION 6

Listening: Listening to Telephone Etiquettes and Conversations. **Speaking**: Role Play Exercises Based on Workplace Contexts, Introducing Oneself - PEP Talks. **Reading**: Reading the Interview of an Achiever and Completing Exercises (Skimming, Scanning and Predicting). **Writing**: Writing a Short Biography of an Achiever Based on Given Hints, **Grammar**: Comparative Adjective, Numerical Expressions and Sentence pattern. **Vocabulary Development**: Idioms and Phrases.

UNIT II TECHNICAL COMMUNICATION 6

Listening: Listening to Talks/Lectures Both General and Technical and Summarizing the Main Points. **Speaking**: Participating in Debates, TED Talks. **Reading**: Reading Technical Essays/ Articles and Answering Comprehension Questions. **Writing**: Summary Writing, Minutes of the meeting. **Grammar**: Prepositional Phrases and Relative Clauses. **Vocabulary Development:** Abbreviations and Acronyms.

UNIT III PROCESS DESCRIPTION 6

Listening: Listening to a Process Description and Drawing a Flowchart. **Speaking**: Participating in Group Discussions, Giving Instructions, Presentation. **Reading**: Reading Instruction Manuals **Writing**: Process Descriptions – Writing Instructions **Grammar**: Use of Imperatives, Tenses, Impersonal Passive Voice and Phrasal verbs **Vocabulary Development**: Misspelt words. Homophones and Homonyms.

UNIT IV **REPORT WRITING** **6**

Listening: Listening to a Presentation and Completing Gap-Filling Exercises. **Speaking**: Making Formal Presentations, **Reading**: Reading and Interpreting Charts/Tables and diagrams. **Writing**: Interpreting Charts/Tables and Diagrams, Writing a Report. **Grammar**: Reported Speech; Interrogatives- Question Tags and Articles – omission of articles **Vocabulary Development**: Technical Jargon.

UNIT V **INTERVIEW SKILLS** **6**

Listening: Listening to a Job Interview and Completing Gap-Filling Exercises **Speaking**: Mock Interview, Telephone Interviews &Etiquette, and Group Discussion. **Reading: Reading** a Job Interview, SOP, Company Profile and Completing Comprehension Exercises **Writing**: Job Applications and Resume. **Grammar**: Conditional Clauses, Modal verbs **Vocabulary Development:** Technical Vocabulary, Purpose Statement.

Aptitude Skills:

Ratio and Proportion – Ratio, Proportion, Simple equations, Problems on Ages.

Percentages - Percentages increase/decrease, Simple and Compound interest.

Number system - Factors, Multiples - HCF and LCM.

Permutation - Combination and Probability

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1	Recognise the need for life skills; apply them to different situations, the basic communication practices in different types of communication.
CO2	Gain confidence to communicate effectively in various situations to acquire employability skills.
CO3	Develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others.
CO4	Communicate effectively & appropriately in real life situation and enhance student's problem solving skill.
CO5	Prepare for various public and private sector exams & placement drives.
CO6	Enhance students' problem solving skills.

TEXT BOOKS

1. Board of Editors. English for Engineers and Technologists Volume 2 Orient Black Swan Limited, 2020.
2. Richards, C. Jack. Interchange, New Delhi: CUP, 2017.
3. Aggarwal R.S. Quantitative Aptitude for Competitive Examinations 3rd (Ed.) New Delhi: S.Chand Publishing, 2017.

REFERENCE BOOKS

1. Kumar, Suresh. E. Engineering English, Orient Blackswan: Hyderabad, 2015
2. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014.
3. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007.
4. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007.
5. Sharma Arun.(2016). Quantitative Aptitude, 7th (Ed.). Noida: McGraw Hill Education Pvt. Ltd.

WEB REFERENCES

1. https://learnenglishteens.britishcouncil.org/exams/grammar-and-vocabularyexams/word-formation.
2. https://cdn.s3waas.gov.in/s347d1e990583c9c67424d369f3414728e/uploads/2018.
3. http://xn--englishclub-ql3f.com/grammar/parts-of-speech.html.
4. https://www.edudose.com/english/grammar-degree-of-comparison-rules
5. https://www.math-only-math.com/practice-test-on-ratio-and-proportion.html
6. https://www.hitbullseye.com/Simple-Interest-and-Compound-Interest.php

ONLINE COURSES / RESOURCES

1. https://basicenglishspeaking.com/wh-questions/
2. https://agendaweb.org/verbs/modals-exercises.html
3. https://cdn.s3waas.gov.in/s347d1e990583c9c67424d369f3414728e/uploads/2018/02/2018031621.pdf
4. https://www.ego4u.com/en/cram-up/grammar/prepositions
5. https://www.classcentral.com/course/quantitative-methods-4340
6. https://www.classcentral.com/subject/qualitative-research

LIST OF EXPERIMENTS

1. Speaking- sharing personal information- self introduction
2. Speaking- Group Discussion, Small talk or Peb Talk
3. Speaking- Presentation- Formal and Informal
4. Speaking- Mock Interview
5. Speaking- FAQ's on Job Interview
6. Speaking – JAM
7. Speaking- Debate and Story Narration
8. Writing: Error Detection- Spotting and reasoning the errors from the passages in competitive exams.
9. Writing: Letter of recommendation
10. Writing: Elements of a good essay
11. Writing: Types of essays. Descriptive – Narrative-Issue based.

TOTAL: 30 PERIODS

REFERENCE BOOKS

1. Kumar, Suresh. E. Engineering English, Orient Blackswan: Hyderabad, 2015
2. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014.
3. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007.
4. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007.
5. Sharma Arun.(2016). Quantitative Aptitude, 7th (Ed.). Noida: McGraw Hill Education Pvt. Ltd.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									**3**	**3**		**2**
CO2									**3**	**3**		**2**
CO3									**2**	**3**		**2**
CO4									**2**	**3**		**2**
CO5									**2**	**3**		**2**
CO6									**3**	**1**		**3**

Assessment (40% weightage) (Theory Component)		**Assessment** (60% weightage) (Laboratory Component)		**End Semester Examination**
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Evaluation of Laboratory Observation, Record**	**Test**	**Written Examination**
40	**60**	**75**	**25**	
100				**100**
50 %				**50 %**

23EE1201	ELECTRIC CIRCUIT ANALYSIS	L	T	P	C
		3	0	2	4

COURSE OBJECTIVE:

- To introduce electric circuits and its analysis
- To impart knowledge on solving circuit equations using network theorems
- To introduce the phenomenon of resonance in coupled circuits
- To educate on obtaining the transient response of circuits
- To introduce Phasor diagrams and analysis of three phase circuits.

UNIT - I BASIC CIRCUITS ANALYSIS 9

Resistive elements - Ohms Law Resistors in series and parallel circuits – Kirchoff's laws –-- Mesh current and node voltage - methods of analysis.

UNIT - II NETWORK REDUCTION AND THEOREMS FOR DC AND AC CIRCUITS 9

Network reduction: voltage and current division, source transformation – star delta Conversion-Thevenin's and Norton's Theorems – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT - III TRANSIENT RESPONSE ANALYSIS 9

L and C elements -Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. sinusoidal input.

UNIT - IV THREE PHASE CIRCUITS 9

A.C. circuits – Average and RMS value - Phasor Diagram – Power, Power Factor and Energy- Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & unbalanced – phasor diagram of voltages and currents – power measurement in three phase circuits.

UNIT - V RESONANCE AND COUPLED CIRCUITS 9

Series and parallel resonance – their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

TOTAL: 45 PERIODS

LIST OF EXPERIMENTS

1. Experimental verification of Kirchhoff's current and voltage law
2. Simulation and Experimental verification of Theremin's , Norton's and Maximum Power Transfer theorem
3. Simulation and Experimental verification of Superposition theorem
4. Experimental determination of time constant of series RL, RC circuits
5. Experimental determination of frequency response of RLC circuits
6. Design and Simulation of series and parallel resonant circuits
7. Simulation of three phases balanced and unbalanced star & delta connected networks

SOFTWARE REQUIRED: MATLAB

TOTAL: 30 PERIODS

TEXT BOOKS

1. William H. HaytJr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", McGraw Hill publishers, edition, New Delhi, 2013.
2. Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, 2013. 36
3. Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", Cengage Learning India, 2013
4. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", McGraw Hill, 2015

REFERENCE BOOKS

1. Chakrabarti A, "Circuits Theory (Analysis and synthesis), DhanpathRai& Sons, New Delhi, 1999.
2. Jegatheesan, R., "Analysis of Electric Circuits," McGraw Hill, 2015.
3. Joseph A. Edminister, MahmoodNahri, "Electric circuits", Schaum"s series, McGrawHill, New Delhi, 2010.
4. M E Van Valkenburg, "Network Analysis",Prentice-Hall of India Pvt Ltd, New Delhi, 2015.
5. Mahadevan, K., Chitra, C., "Electric Circuits Analysis," Prentice-Hall of India Pvt Ltd., New Delhi, 2015.
6. Richard C. Dorf and James A. Svoboda, "Introduction to Electric Circuits", 7th Edition, John Wiley & Sons, Inc. 2015.

WEB REFERENCES

1. https://www.circuitlab.com/
2. https://www.allaboutcircuits.com/

ONLINE COURSES / RESOURCES

1. https://nptel.ac.in/courses/108/104/108104139/

2. https://nptel.ac.in/courses/108105053

COURSE OUTCOMES:

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

CO1 Explain circuit's behavior using circuit laws.

CO2 Apply mesh analysis/ nodal analysis / network theorems to determine behavior of the given DC and AC circuit

CO3 Compute the transient response of first order and second order systems to step and sinusoidal input

CO4 Compute power, line/ phase voltage and currents of the given three phase circuit

CO5 Explain the frequency response of series and parallel RLC

CO6 Explain the behaviour of magnetically coupled circuits.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2		2	1				3
CO2	3	3	3	3	2		2	1				3
CO3	3	3	3	3	2		2	1				3
CO4	3	3	3	3	2		2	1				3
CO5	3	3	3	3	2		2	1				3
CO6	3	3	3	3	2		2	1				3

Assessment (40% weightage) (Theory Component)		**Assessment** (60% weightage) (Laboratory Component)		**End Semester Examination**
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Evaluation of Laboratory Observation, Record**	**Test**	**Written Examination**
40	**60**	**75**	**25**	
100				**100**
50 %				**50 %**

23EE1211	ENGINEERING PRACTICES LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE:

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering

GROUP – A CIVIL AND ELECTRICAL ENGINEERING 30 Periods

CIVIL ENGINEERING PRACTICES

PLUMBING WORK:

a.Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.

b.Preparing plumbing line sketches.

c.Laying pipe connection to the suction side and delivery side of a pump

d.Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

a.Introduction to Tools and Equipments

b.Simple Planning and sawing practice

c.Making Half Lap, Dovetail, Mortise and Tenon joints

WOOD WORK STUDY:

a.Studying joints in door panels and wooden furniture

b.Studying common industrial trusses using models.

ELECTRICAL ENGINEERING PRACTICES:

a. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
b. Fluorescent lamp wiring.
c. Stair case wiring
d. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
e. Measurement of energy using single phase energy meter.
f. Soldering practice – Components Devices and Circuits – Using general purpose PCB.

GROUP – B MECHANICAL AND ELECTRONICS ENGINEERING 30 Periods

MECHANICAL ENGINEERING PRACTICES:

SHEET METAL WORK:

a. Demonstrating basic sheet metal operations

BASIC MACHINING WORK:

b. Introduction to Lathe, Drilling machine, Tools and Equipments
c. Simple Turning and facing
d. Step turning
e. Simple Drilling and Tapping of flat plate using drilling machine

WELDING WORK:

a. Introduction to Arc welding and Gas welding Tools and Equipments

b. Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

ASSEMBLY WORK:

a. Assembling a centrifugal pump.
b. Assembling an air conditioner.

ELECTRONICS ENGINEERING PRACTICES:

a. Study of Electronic components and equipments – Resistor colour coding
b. Measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
c. Design of Half wave and Full wave Rectifier.
d. 2D & 3D Electrical wiring Model using suitable Software.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.

CO2 Introduction to Lathe machine, Tools and Equipments with machining experiments

CO3 Carry out basic home electrical works and measure the electrical quantities.

CO4 Analyse the basic electronic circuits and to solder simple components on PCB and test simple electronic circuits.

CO5 Design and Construct 2D and 3D Electrical wiring model using suitable software.

TEXT BOOKS

1. Jeyapoovan T., Saravana pandian M. & Pranitha S., “Engineering Practices Lab Manual”, Vikas Publishing House Pvt.Ltd, (2006)
2. Kannaiah P. & Narayana K.L., “Manual on Workshop Practice”, Scitech Publications, (1999).
3. Jeyachandran K., Natarajan S. & Balasubramanian S., “A Primer on Engineering Practices Laboratory”, Anuradha Publications, (2007).

REFERENCE BOOKS

1. K.C. John, "Mechanical workshop practice", Second edition, PHI learning Pvt Ltd, New Delhi
2. Bawa H.S., “Workshop Practice”, Tata McGraw – Hill Publishing Company Limited, (2007)

WEB REFERENCES

1. https://nptel.ac.in/courses/112/107/112107090/
2. https://nptel.ac.in/courses/112/107/112107084/

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3									3
CO2	3	3	3									3
CO3	3	2			1	1	1					2
CO4	3	2			1	1	1					2
CO5	3	2			1	1	1					2

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%

23ES1211	PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE:

To impart Knowledge on the following topics:

- Write, test, and debug simple Python programs
- Implement Python programs with conditions and loops
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.
- Implement string functions and file operations
- Understand python packages and GUI development.

LIST OF EXPERIMENTS

1. Basic Python Programs
2. Write programs to demonstrate different number data types in python
3. Develop python programs to demonstrate various conditional statements
4. Implement user defined functions using python
5. Develop python scripts to demonstrate built-in functions
6. Develop python programs to perform various string operations like slicing, indexing & formatting
7. Develop python programs to perform operations on List & Tuple
8. Demonstrate the concept of Dictionary with python programs
9. Develop python programs to perform operations on Sets.
10. Develop python codes to perform matrix addition, subtraction and transpose of the given matrix
11. Develop python codes to demonstrate the concept of function composition and anonymous functions.
12. Demonstrate python codes to print try, except and finally block statements
13. Implement python programs to perform file operations
14. Write a python code to raise and handle various built in exceptions.
15. Implement python programs using packages numpy and pandas
16. UI development using tkinter

Mini Project :Suggested Topics(but not limited to)

- Dice roll simulator
- Guess the number game
- Random password generator

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Develop and execute simple Python programs

CO2 Implement programs in Python using conditionals and loops for solving problems.

CO3 Deploy functions to decompose a Python program.

CO4 Develop programs using string operations.

CO5 Utilize Python packages in data analysis

CO6 Create GUI for python applications

WEB REFERENCES

1. https://www.programiz.com/python-programming/examples
2. https://www.geeksforgeeks.org/python-programming-examples/
3. https://beginnersbook.com/2018/02/python-programs/
4. https://www.javatpoint.com/python-programs
5. https://www.w3schools.com/python/python_examples.asp
6. https://www.sanfoundry.com/python-problems-solutions/

CO- PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**3**	**3**	**1**	**2**							**1**
CO2	**2**	**3**	**3**	**1**	**2**							**1**
CO3	**2**	**3**	**3**	**1**	**2**							**1**
CO4	**2**	**3**	**3**	**1**	**2**							**1**
CO5	**2**	**3**	**3**	**1**	**2**							**1**
CO6	**2**	**3**	**3**	**1**	**2**							**1**

Internal Assessment		**End Semester Examination**
Evaluation of Laboratory Observation, Record	**Test**	**Practical**
75	**25**	**100**
60 %		**40%**

23ES1212	TECHNICAL SKILL PRACTICES I	L	T	P	C
		0	0	2	1

COURSE OBJECTIVE:

To impart Knowledge on the following topics:

- Essential problem solving skills through general problem solving concepts.
- Basic knowledge on programming essentials using C as implementation tool.
- Introduce various programming methods using C.

LIST OF EXPERIMENTS

1. Data Types, Variables, Operators
2. Expressions, Precedence, Operators
3. Conditional Statements, Switch Statements
4. Looping, Nested Loops
5. Problems on Bit Manipulation
6. Patterns
7. Number Problems
8. Array Basics, Static vs Dynamic Array, Two-Dimensional Matrix
9. Structure, Union, Storage Classes
10. Function, Parameters passing.
11. Recursion
12. Strings
13. Pointers
14. Command Line Arguments, Pre-processors
15. File Handling & Exception Handling.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1 Propose solutions for a given problem.

CO2 Infer the fundamental programming elements in C language and learn to apply basic control structures in C.

CO3 Demonstrate the applications of structures and unions.

CO4 Visualize the capabilities of modular programming approach in C.

CO5 Understand the basic principles of pointers and their association during implementations.

CO6 Apply various input, output and error handling functions in C.

TEXT BOOKS

1. Reema Thareja, ``Programming in C"", 2nd edition, OXFORD University Press, New Delhi, 2019.
2. Paul Deitel and Harvey Deitel, “C How to Program”, Seventh edition, Pearson Publication, 2016.

REFERENCE BOOKS

1. Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education, 2014.
2. Herbert Schildt, “C: The Complete Reference”, Fourth Edition, McGraw Hill, 2000.

ONLINE COURSES / RESOURCES

1. https://www.javatpoint.com/c-programming-language-tutorial
2. https://www.tutorialspoint.com/cprogramming/

CO – PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3							3
CO2	3	3	3	3	3							3
CO3	3	3	3	3	3							3
CO4	3	3	3	3	3							3
CO5	3	3	3	3	3							3
CO6	3	3	3	3	3							3

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%

23TA1201	TAMILS AND TECHNOLOGY	L	T	P	C
		1	0	0	1

UNIT–I WEAVINGAND CERAMIC TECHNOLOGY 3

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

UNIT–II DESIGNANDCONSTRUCTION TECHNOLOGY 3

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

UNIT–III MANUFACTURING TECHNOLOGY 3

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

UNIT–IV AGRICULTUREAND IRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry -Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries –Pearl-Conchediving-AncientKnowledgeofOcean-KnowledgeSpecificSociety.

UNIT–V SCIENTIFICTAMIL & TAMIL COMPUTING 3

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

Total : 15 PERIODS

23TA1201	தமிழரும் மதொழில் நுட்பமும்	L	T	P	C
		1	0	0	1

UNIT–I மநசவு மற்றும் பாறனத் மதொழில் நுட்பம் 3

சங்க காலத்தில் தநசவுத் ததாழில் – பாளனத் ததாழிலம் நுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் – பாணம்டங்கமைில் கீைலம் காைியல்களம்.

UNIT–II வடிவறமப்பு மற்றும் கட்டிடத் மதொழில் நுட்பம் 3

சங்ககாலத்தில் வடிவளமப்பு மற்றும் கட்டுமானங்கள் & சங்க காலதம்தில் வட்டுப் தபாருட்கமைில் வடிவளமப்பு – சங்க காலதம்தில் கட்டுமானப் தபாருட்களுமம் நடுகலம்லும் – சிலப்பதிகாரதம்தில் கமளட அளமப்பு பற்மைிய விவரங்கள் – மாமல்லபுரசம் சிற்பங்களுமம், ககாவில்களுமம் – கசாழர் காலத்துப் தபருங்ககாயில்கள் மற்றும் பிமை வழிபாட்டுத் தலங்கள் – நாயகம்கர் காலக் ககாயில்கள் – மாதிரி கட்டளமப்புகளம் பற்மைி அமைிதலம், மதுளர மீனாட்சி அமம்மன் ஆலயம்
மற்றும் தி்ருமளலநாயகம்கர் மஹால் – தசடம்டிநாடு வடுகள் – பிரிட்டிஷ் காலதம்தில் தசனம்ளனயில் இந்கதா-சாரசனிகம் கட்டிடக்களல.

UNIT–III உற்பத்திமதொழில்நுட்பம் 3

கப்பல் கடம்டும் களல - உகலாகவியல் – இருமம்புத் ததாழிற்சாளல – இருமம்ளப உருகம்க்குதலம், எஃகு – வரலாற்றுச் சான்றுகமைாக தசமம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாம்க்கும் ததாழிற்சாளலகள் – கல் மணிகளம், கணண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்கு மணிகள் – எலும்புத் துண்டுகள் – ததாலம்லியல் சானம்றுகள் – சிலப்பதிகாரதம்தில் மணிகமைின் வளககளம்.

UNIT–IV கவமைாண்றமமற்றும்நீர்பாசனத்மதாழில்நுட்பம் 3

அளண, ஏரி, காைங்கள், மதகு – காசாழர் காலக் காமிழித்தூமம்பின் முக்கியதம்துவம் – காலம்நளட பராமரிப்பு – காலம்நளடகளுகம்காக வடிவளமக்கப்படம்ட காணறுகள் – கவமைாண்ளம மற்றும் கவமைாண்ளமச் சார்ந்த தசயல்பாடுகள் – கடல்சார் அமைிவு - மீனம்வமம்
– முத்து மற்றும் முத்துக்குமைித்தல் – தபருங்கடல் குமைித்த பண்ளடய அமைிவு – அமைிவு சார்சமூகம்.

UNIT–V **ைவியல்தமிழ்மற்றும்கினித்தமிழ்** **3**

ைவியல் தமிழின் வைர்ச்சி – கணினித் தமிழ் – தமிழ் நூல்களை மின்பதிப்பு தசய்தல் – தமிழ் தமனத்தபொருட்கள் உரொவக்கம் – தமிழ் இளணயக் கல்விக்கழகம் – தமிழ் மின்நூலகம் – இளணயத்தில் தமிழ்அகரொதிகள் – தசொற்குளவத் திட்டம்.

Total : 15 PERIODS

TEXT-CUM REFERENCE BOOKS:

1. தமிழக வரலாறு – மக்களுமம் பண்பொடும் - கக.கக. பிள்ளை (தவை : தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் ியடு
கழகம்).
2. கணினித் தமிழ் – முளனவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – ளவளக நதிக்களரயில் சங்ககால நகர நொகரிகம்
(ததால்லியல் தளை தவையட)
4. தபருளந – ஆற்ைங்களர நொகரிகம். (ததலல்லியல் தளை)
5. Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.Thirunavukkarasu) (Published 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 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 & TamilNadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to TamilNadu (Dr.K.K.Pillay) (Published by:The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & TamilNadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by :RMRL)–Reference Book

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

SEMESTER – III

23MA1303	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE:

- To understand the concepts of solving partial differential equation.
- To understand the concepts of Fourier series analysis.
- To apply the concept of Fourier series techniques in wave and heat flow problems.
- To introduce the basic concepts of Fourier transform techniques.
- To introduce the Z-transform techniques for discrete time systems.

UNIT - I PARTIAL DIFFERENTIAL EQUATIONS 9+3

Formation of partial differential equations - Solutions to standard types of first order partial differential equations - Lagranges linear equation - Second and higher order with constant coefficients of homogeneous linear partial differential equations.

UNIT - II FOURIER SERIES 9+3

Dirichlet's conditions – General Fourier series - Odd and even functions - Change of interval-Half range sine series–Half range cosine series–RMS values-Parseval's identity–Harmonic analysis

UNIT - III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9+3

Fourier Series Solutions of one dimensional wave equation –One dimensional equation of heat conduction– Steady state solution of two dimensional equation of heat conduction Cartesian coordinates.

UNIT - IV FOURIERTRANSFORMS 9+3

Statement of Fourier integral theorem – Fourier transforms pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem– Parseval's identity.

UNIT - V Z-TRANSFORMS AND DIFFERENCE EQUATIONS 9+3

Z-transforms - Elementary properties –Initial and final value theorems- Inverse Z-transform (Using partial fraction method and Residue method)-Convolution theorem– Formation of difference equation-Solution of difference equations using Z –transform.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

CO1 Understand the concepts of partial differential equations and their solutions.

CO2 Utilise the principles of Fourier series in real life situation

CO3 Develop one dimensional equation using Fourier series techniques.

CO4 Develop two dimensional equations using Fourier series techniques.

CO5 Understand the mathematical principles on Fourier transforms.

CO6 Apply the basic knowledge to solve difference equations using Z-transforms.

TEXT BOOKS

1. Grewal B.S., “Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014
2. Narayanan S.,Manicavachagam Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II &III, S. Viswanathan Publishers Pvt. Ltd, Chennai, 1998.
3. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
4. Nagarajan G. and Sundar Raj M., "Transforms and Partial Differential Equations", Sreekamalamani Publications 6th edition, Chennai, 2021.

REFERENCE BOOKS

1. Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 9th Edition, Laxmi Publications Pvt. Ltd, 2014.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, JohnWiley, India, 2016.
3. Ramana.B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2018.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**1**	**-**	**-**							**1**
CO2	**3**	**3**	**1**	**1**	**1**							**1**
CO3	**3**	**3**	**1**	**1**	**1**							**1**
CO4	**3**	**3**	**1**	**1**	**1**							**1**
CO5	**3**	**3**	**1**	**1**	**1**							**1**
CO6	**3**	**3**	**1**	**1**	**1**							**1**

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Individual Assignment / Case Study / Seminar / Mini Project**	**Written Test**	**Written Examinations**
40	60	40	60	100
40%				**60 %**

23EE1301	ELECTROMAGNETIC THEORY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To acquire a basic understanding of various coordinate systems, vector algebra and calculus.
- To impart knowledge of the basic laws of electrostatics and its applications.
- To impart knowledge on dielectrics and electrostatic boundary conditions.
- To impart knowledge on magnetic materials and understand the laws of magneto statics.
- To analyse the time varying electric and magnetic fields and to understand Maxwell's equations.

UNIT - I VECTOR ANALYSIS 9

Vector fields - Different co-ordinate systems – Rectangular, Cylindrical, Spherical co-ordinate systems – Gradient, Divergence and Curl – Divergence Theorem – Stoke's Theorem**.**

UNIT - II ELECTROSTATICS- I 9

Sources and effects of electromagnetic fields – Coulomb's Law – Electric field intensity – Field due to point and continuous charges –Gauss's law and applications – Electric potential.

UNIT - III ELECTROSTATICS- II 9

Electric field in free space, conductors, dielectric - Dielectric polarization - Dielectric strength - Electric field in multiple dielectrics – Boundary conditions– Poisson's and Laplace's equations – Capacitance, Energy density.

UNIT - IV MAGNETOSTATICS 9

Magnetic field intensity – Biot-Savart Law - Ampere's Law and applications - Magnetic field due to straight conductors, circular loop, infinite sheet carrying current – Magnetic flux density (B) –Magnetization –Boundary conditions – Scalar and vector potential –Inductance – Energy density**.**

UNIT - V ELECTROMAGNETIC WAVES 9

Magnetic force – Lorentz Law of force –Torque –Faraday's laws, induced emf – Transformer and motional EMF – Maxwell's equations (differential and integral forms) – Displacement current – Poynting vector -Derivation of generalized Wave Equations from Maxwell's equations.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1 Apply vector calculus to static electric field.

CO2 Apply the basic concepts about electrostatic fields for the calculation of Electric field intensity, Electrical potential.

CO3 Explain Electric field in free space, conductors, dielectric and multiple dielectrics and apply the basic concepts in Capacitance calculations.

CO4 Determine the magnetic flux density, scalar potential, vector potential and energy density.

CO5 Derive Electromagnetic wave equation and apply the Poynting expression.

CO6 Apply the Maxwell equations to solve problems in electromagnetic field theory.

TEXT BOOKS

1. Mathew N. O. Sadiku, 'Principles of Electromagnetics', 6th Edition, Oxford University Press Inc. Asian edition, 2015.
2. Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, Fifth Edition, 2017.
3. Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Fifth Edition (Schaum's Outline Series), McGraw Hill, 2019.
4. K A Gangadhar, 'Electromagnetic Field Theory', Khanna Publishers; Sixteenth Publication :2023

REFERENCE BOOKS

1. V.V.Sarwate, 'Electromagnetic fields and waves', Second Edition, New age Publishers, 2018
2. S.P.Ghosh, LipikaDatta, 'Electromagnetic Education(India) Private Limited, 2017.
3. William H. Hayt, John A. Buck, Jaleel M. Akhtar, 'Engineering Electromagnetics', McGraw Hill Special 9th edition, Published: February 18, 2020.

WEB REFERENCES: (Only accessible Links)

1. https://www.electrical4u.com/electromagnetic-theory/
2. https://clerkmaxwellfoundation.org/html/electromagnetic_theory.html

ONLINE COURSES / RESOURCES

1. https://nptel.ac.in/courses/108/104/108104087/

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1								
CO2	3	2		2			1	1				
CO3	3	2	1	2			1					
CO4	3	2		2			1	1				
CO5	3	2	1	2								1
CO6	3	2		2								1

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23EE1302	SIGNALS AND SYSTEMS	L	T	P	C
		2	1	0	3

COURSE OBJECTIVE:

- To introduce the fundamentals and classifications of signals and systems.
- To get familiarized to system representation and stability study with Laplace transform.
- To analyze the continuous time signals, Fourier series and to learn to apply frequency analysis.
- To impart knowledge on discrete time signals and discretised systems.
- To understand importance of sampling theorem and its implications.

UNIT - I INTRODUCTION TO SIGNALS AND SYSTEMS 9

Continuous time signals - Discrete time signals – Representation of signals – Step, Ramp, Pulse, Impulse, Sinusoidal, Exponential signals, Operations on the signals – Classification of continuous and discrete time signals – Continuous time and discrete time systems – Classification of systems –Properties of systems.

UNIT - II BEHAVIOR OF CONTINUOUS AND DISCRETE-TIME LTI SYSTEMS 9

Impulse response and step response, convolution, input-output behavior with aperiodic convergent inputs, cascade interconnections. LTI continuous time systems- Differential equations –Characterization of causality and stability of LTI systems- Laplace Transforms – properties-ROC, Transfer function and Impulse response –Block diagram representation and reduction – Convolution Integral – State variable techniques –State equations.

UNIT - III FOURIER TRANSFORMS 9

Fourier series representation of periodic signals, Waveform Symmetries, Calculation of Fourier Coefficients. Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response- The Discrete- Time Fourier Transform (DTFT) -properties- the Discrete Fourier Transform (DFT) –properties- Linear and Circular Convolution-Application of FFT in Harmonic calculation.

UNIT - IV Z-TRANSFORMS 9

The z-Transform for discrete time signals and systems, system functions- Laplace Transforms to z-transformation-poles and zeros of systems and sequences, z-domain analysis- Properties – Z Transformation: Properties – Different methods of finding Inverse Z-Transformation.

UNIT - V **SAMPLING AND RECONSTRUCTION** **9**

The Sampling Theorem and its implications. Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold. Aliasing and its effects- applications – filtering, feedback control systems.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1 Distinguish between different types of signals and Systems.
CO2 Analyze the behaviour of continuous and discrete-time LTI systems.
CO3 Classify systems based on their properties and determine the response in frequency domain.
CO4 Analyze system properties based on impulse response and Fourier analysis.
CO5 Apply the Z- transform for analysis of continuous-time and discrete-time signals.
CO6 Understand the process of sampling and its implications during signal reconstruction.

TEXT BOOKS

1. V. Oppenheim, A. S. Willsky and S. H. Nawab, “Signals and systems”, Prentice Hall India, 1997.
2. P. Lathi, “Linear Systems and Signals”, Oxford University Press, 2009.
3. Ingle and Proakis Digital signal Processing using MATLAB-A problem solving Companion”,4th Edition, Cengage Learning,2018.

REFERENCES

1. Simon Haykins and Barry Van Veen, “Signals and Systems”, John Wiley and Sons, 2007.
2. H. P. Hsu, “Signals and systems”, Schaum’s series, McGraw Hill Education, 2010.
3. M. J. Robert “Signals and Systems-Analysis using Transform Methods and MATLAB”, McGraw Hill Education,2004.
4. M. J. Robert “Fundamentals of Digital signal Processing using MATLAB”, Cengage Learning, 2005.

ONLINE COURSES / RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_ee28/preview

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**2**	**3**							
CO2	**3**	**3**	**3**	**2**	**3**							
CO3	**3**	**3**	**3**	**2**	**3**							
CO4	**3**	**3**	**3**	**2**	**3**							
CO5	**3**	**3**	**3**	**2**	**3**							
CO6	**3**	**3**	**3**	**2**	**3**							

Internal Assessment				**End Semester Examinations**
Assessment I (100 Marks)		**Assessment II (100 Marks)**		
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Individual Assignment / Case Study / Seminar / Mini Project**	**Written Test**	**Written Examinations**
40	60	40	60	100
40%				**60 %**

23CS1304	OBJECT ORIENTED PROGRAMMING USING JAVA	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

To impart Knowledge on the following topics:

- Basic concepts of OOP
- Syntax, semantics classes, objects, invoking methods, etc.
- Principles of inheritance and interfaces.
- Exception handling and I/O mechanism
- Threading and Generic Programming

UNIT- I INTRODUCTION TO OOP 9

Object oriented programming concepts – objects - classes - methods and messages - abstraction and encapsulation - inheritance - abstract classes - polymorphism - OOP in Java – Characteristics of Java – The Java Environment - Java Source File - Structure – Compilation- Fundamental Programming Structures in Java.

UNIT- II JAVA FUNDAMENTALS 9

Defining classes in Java – constructors, methods -access specifiers - static members - Comments, Data Types, Variables, Operators, Strings, Control Flow, Arrays, Java Scope, Packages- Javadoc comments.

UNIT- III INHERITANCE AND INTERFACES 9

Inheritance – Super classes - sub classes – Protected members – constructors in sub classes - the Object class – abstract classes and methods - final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces – Packages.

UNIT- IV EXCEPTION HANDLING AND MULTITHREADING 9

Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups.

UNIT- V I/O AND GENERIC PROGRAMMING 9

Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Recall the OOP principles.
CO2 Understand the Fundamental Concepts of Java.
CO3 Develop Java Programs using the concepts of inheritance and interfaces.
CO4 Examine exception handling and multithreading in Java.
CO5 Compare and contrast between I/O and generic programming.
CO6 Design applications using Java which mimics the real word scenarios.

TEXTBOOKS

1. Herbert Schildt, “Java The Complete Reference”, 12th Edition, McGraw Hill Education, 2021.
2. Prem Kumar ,”Getting Inside Java” (Beginner’s Guide), 2021.
3. Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition, Pearson, 2015.

REFERENCE BOOKS

1. Cay S. Horstmann, Gary Cornell, “Core Java Volume – I Fundamentals”, 9th Edition, Prentice Hall, 2013.
2. Steven Holzner, “Java 2 Black book”, Dreamtech press, 2011.
3. Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition, Pearson Education, 2000.

WEB REFERENCES

1. https://www.javatpoint.com/java
2. https://www.tutorialspoint.com/java/index.htm
3. https://www.geeksforgeeks.org/java/

ONLINECOURSES/RESOURCES

1.https://www.udemy.com/topic/java/

2.https://www.coursera.org/courses?query=java

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	**2**	**2**		**3**							**1**
CO2	**1**	**2**	**2**		**3**							**1**
CO3	**1**	**2**	**2**		**3**							**1**
CO4	**1**	**2**	**2**		**3**							**1**
CO5	**1**	**2**	**2**		**3**							**1**
CO6	**1**	**2**	**2**		**3**							**1**

Internal Assessment				**End Semester Examinations**
Assessment I (100 Marks)		**Assessment II (100 Marks)**		
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Individual Assignment / Case Study / Seminar / Mini Project**	**Written Test**	**Written Examinations**
40	60	40	60	100
40%				**60 %**

23EE1303	ANALOG ELECTRONICS	L	T	P	C
		3	0	2	4

COURSE OBJECTIVE:

- To impart knowledge on the operation and applications of electronics devices.
- To learn the design of power amplifiers, feedback amplifier and oscillators.
- To understand the characteristics of op-amp.
- To gain knowledge on design, construction and application circuits using op-amp.
- To understand Functional blocks and applications of special ICs like 555 timer and voltage regulator ICs.

UNIT - I ELECTRONIC DEVICES AND THEIR CHARACTERISTICS 9

BJT - Biasing circuits, FET: JFET and MOSFET, Characteristics of CS, CG and CD amplifier configurations, Biasing circuits - IGBT- Differential amplifier - Common mode and Difference mode analysis, UJT - Relaxation Oscillator.

UNIT - II POWER AMPLIFIER AND OSCILLATOR CIRCUITS 9

Classification of Power amplifiers:- Class A, B, AB and C Power amplifiers- Push-Pull amplifier, Complementary symmetry Push-Pull amplifiers - Design of power output, efficiency and cross-over distortion – Condition for oscillations, RC phase shift, Wien bridge, Crystal oscillators.

UNIT - III OP-AMP AND CHARACTERISTICS 9

Op-amp characteristics - DC characteristics, AC characteristics. Basic applications of Op-amp – Comparators, Inverting and Non-inverting Amplifiers, Summer, Differentiator and Integrator, Instrumentation amplifier.

UNIT - IV APPLICATION OF OPAMPS 9

Waveform generators, Clipper, Clamper, S/H circuit - D/A converter (weighted resistor and R-2R ladder types), A/D converters (flash type, dual slope type and successive approximation type) using op-amp.

UNIT - V SPECIAL IC 9

Functional blocks, characteristics and applications – 555 Timer (Astable and Monostable Multivibrator), IC voltage regulators – Fixed voltage regulators LM78XX, LM79XX, its application as Linear power supply – Variable voltage regulator 723, ICL8038 function generator IC.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1	Acquire knowledge in Semiconductor devices like BJT, FET, MOSFET and UJT.
CO2	Design the amplifiers with various biasing circuits for FET and BJT and analyse the differential amplifier.
CO3	Interpret the different types of Power Amplifiers and Oscillators.
CO4	Summarize the characteristics of Op-Amp and analyse the various applications of Op-Amp.
CO5	Develop and correlate the various Non-linear applications of Op-amp and study the A/D converters and D/A converters.
CO6	Implementing the semiconductor devices and Op-amp ICs for doing projects and extrapolate the IC technologies on voltage regulators.

TEXT BOOKS

1. David A. Bell, "Electronic Devices and Circuits", 5th edition, Oxford University Press, 2017.
2. D. Roy Choudhury, S.B. Jain, "Linear Integrated Circuits", 6th edition, New Age Publishers, 2023.

REFERENCE BOOKS

1. Sedra and Smith, “Microelectronic circuits”, 7th edition, Oxford University Press, 2017.
2. Thomas L. Floyd, “Electronic Devices” 11th edition, Pearson Asia, 2017
3. Robert L. Boylestad, “Electronic Devices and Circuit theory”, 11th edition 2016.
4. Ramakant A. Gayakwad, "Op-amps and Linear Integrated Circuits", 4th edition, Pearson Education, 2021.

WEB REFERENCES

1. https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/resources/lecture-20/

ONLINE COURSES / RESOURCES

1. https://nptel.ac.in/courses/108/102/108102095/
2. https://www.classcentral.com/provider/swayam
3. https://nptel.ac.in/courses/117103063/

ANALOG ELECTRONICS LABORATORY 30 Hours

LIST OF EXPERIMENTS

1. Digital Simulation and Experimental Verification of Characteristics of a NPN Transistor under common emitter, common collector and common base configurations.
2. Characteristics of JFET and UJT.
3. Design and plot the frequency response characteristics of a Common Emitter amplifier.
4. Design and testing of RC phase shift and LC oscillators.
5. Design the differential amplifier using FET
6. Simulation of Op-Amp application circuits using PSPICE.
7. Variable voltage regulator using IC LM317.

REFERENCES

1. David A. Bell, “Laboratory manual for Electronic devices and circuits”, 4th edition, PHI, 2007.
2. S Salivahanan, N Suresh Kumar, “Electronic Devices and Circuits”, 5th edition, McGraw Hill, 2022.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2			1				1
CO2	3	3	3	2	2			1				1
CO3	3	3	2	2	2			1				1
CO4	3	3	2	2	2			1				1
CO5	3	3	2	2	2			1				1
CO6	3	3	2	2	2			1				1

Assessment (40% weightage) (Theory Component)		**Assessment** (60% weightage) (Laboratory Component)		**End Semester Examination**
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Evaluation of Laboratory Observation, Record**	**Test**	**Written Examination**
40	**60**	**75**	**25**	
100				**100**
50 %				**50 %**

23CS1313	OBJECT ORIENTED PROGRAMMING USING JAVA LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE:

- To learn and work on programs for fundamentals of Object Oriented Programming using Java.
- To analyze and design the concepts of class, operator overloading and functions by implementation.
- To develop the program using STL and to design class in Java.
- To develop and design the packages, interfaces and inheritance.
- To learn and develop application based on exception, Java I/O and Multithreaded.

LIST OF EXPERIMENTS

1. Demonstrate concept of variable, methods, control/conditional and looping statements using Java programs.
2. Demonstrate with java programs by creating own user defined classes and objects. Each class contains data and data members and methods to facilitate the user how to kept data encapsulated manner for the protection from the unauthorized access.
3. Write a java programs to create your own methods with or without return values, invoke a method with or without parameters, overload methods using the same names.
4. Design a java program to demonstrate the concept of package (user defined packages).
5. Write a java program to demonstrate the concept of abstract class and abstract method.
6. Demonstrate the concept of various string methods with suitable java program.
7. Write a java program to demonstrate the concept of single, multilevel inheritance and another program to illustrate how multiple inheritances is supported in java.
8. Write a java program demonstrates the use of static member and static function in a class.
9. Write a Java program to implement user defined exception handling
10. Write a Java program to implement various file handling mechanisms.
11. Develop a mini project for any application using Java concepts.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Recall object oriented features and Java concepts.

CO2 Understand the key aspects of java Standard API libraries.

CO3 Experiment with the concepts of class, operator overloading and function.

CO4 Distinguish the various types of Inheritance in Java.

CO5 Assess exception handling and file handling mechanisms in Java.

CO6 Design and develop applications using Java for real time scenarios.

WEB REFERENCES

1. https://www.javatpoint.com/java
2. https://www.tutorialspoint.com/java/index.htm
3. https://www.geeksforgeeks.org/java/

ONLINECOURSES/RESOURCES

1. https://www.udemy.com/topic/java/
2. https://www.coursera.org/courses?query=java

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2		2							3
CO2	3	2	2		2							3
CO3	3	2	2		2							3
CO4	3	2	2		2							3
CO5	3	2	2		2							3
CO6	3	2	2		2							3

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%

23ES1312	CODING PRACTICES I	L	T	P	C
		0	0	2	1

COURSE OBJECTIVE:

- To impart essential problem-solving skills through general problem-solving concepts.
- To provide basic knowledge on programming essentials using Python as implementation Tool.
- To introduce various Collection Data types and Exception handling using Python

LIST OF EXPERIMENTS

1. Data Types, Variables, Operators
2. Expressions, Precedence of Operators
3. Conditional Statements
4. Built-in Functions including Range, len, input, map and split
5. Looping, For and While
6. User Defined Functions
7. List
8. Tuple
9. Dictionary
10. Recursion and Lambda Functions
11. String Handling
12. Regular Expressions
13. Packages
14. Exception Handling.
15. GUI using TKinter

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1 Identify solutions for a given problem.

CO2 Summarize the fundamental programming elements in Python language and learn to apply basic control structures in Python.

CO3 Articulate the applications of Collection data types in Python.

CO4 Visualize the capabilities of String and Regular expressions.

CO5 Defend the basic principles of Exception Handling.

CO6 Design and Develop GUIs

TEXT BOOKS

1. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021.
2. Reema Thareja, “Problem Solving and Programming with Python”, 2nd edition, Oxford University Press, New Delhi, 2019.
3. Alan D. Moore, Python GUI Programming with Tkinter, Design and Build Functional and User-friendly GUI Applications, Packt Publishing, 2021.

REFERENCE BOOKS

1. Martin C. Brown, “Python: The Complete Reference”, 4th Edition, Mc-Graw Hill, 2018
2. Eric Matthes, “Python Crash Course, A Hands - on Project Based Introduction to Programming”, 2nd Edition, No Starch Press, 2019.

ONLINE COURSES / RESOURCES

1. https://docs.python.org/3/tutorial/
2. https://www.w3schools.com/python/
3. https://www.tutorialspoint.com/python/index.htm
4. https://www.javatpoint.com/python-tutorial
5. https://nptel.ac.in/courses/

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%

SEMESTER – IV

23MA1403	NUMERICAL METHODS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE:

- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation.
- To acquaint the student with understanding of numerical techniques of differentiation and integration.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.
- To understand the knowledge of various techniques and methods of solving various types of partial differential equations.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Solution of algebraic and transcendental equations: Fixed point theorem (without proof)– Newton Raphson method - Solution of linear system of equations : Gauss elimination method – Gauss Jordan method - Iterative methods : Gauss Jacobi and Gauss Seidel – Eigen values of a matrix by Power method.

UNIT II INTERPOLATION AND APPROXIMATION 9+3

Interpolation with unequal intervals: Lagrange's interpolation – Newton's divided difference interpolation – Interpolation with equal intervals: Newton's forward and backward difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9+3

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule – Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9+3

Single step methods : Taylor's series method - Euler's method - Modified Euler's method – Improved Euler's method- Fourth order Runge - Kutta method for solving first order equations - Multi step method : Milne's predictor corrector method for solving first order equations.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIALEQUATIONS 9+3

Finite difference methods for solving second order boundary value problems-Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson)methods – One dimensional wave equation by explicit method.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Understand the basic concepts and techniques of solving algebraic and transcendental equations.

CO2 Analyse the numerical techniques of interpolation and approximations in various intervals.

CO3 Apply the numerical techniques of differentiation for engineering problems.

CO4 Recognize the numerical techniques of integration for engineering problems.

CO5 Evaluate the numerical techniques of differentiation and integration for solving initial value problems.

CO6 Remember the partial and ordinary differential equations with initial and boundary conditions by using certain techniques.

TEXT BOOKS

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2.Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

REFERENCE BOOKS

1. Mathews, J.H. "Numerical Methods for Mathematics, Science and Engineering", 2nd Edition, Prentice Hall, 1992.
2. Sastry, S.S, "Introductory Methods of Numerical Analysis", PHI Learning Pvt. Ltd, 5th Edition, 2015.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2									1
CO2	3	3	2	1								1
CO3	3	3	2									1
CO4	3	3	2		1							1
CO5	3	3	2	1	1							1
CO6	3	3	2	1	1							1

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Individual Assignment / Case Study / Seminar / Mini Project**	**Written Test**	**Written Examinations**
40	60	40	60	100
40%				**60 %**

23EE1401	MEASUREMENTS AND INSTRUMENTATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To educate the fundamental concepts of measuring instruments.
- To understand the operation of various analog instruments.
- To understand the operation of various digital instruments
- To infer the importance of various bridge circuits used with measuring instruments.
- To learn the principle and working of various transducers

UNIT - I INTRODUCTION 9

Units and dimensions, Functional elements of an instrument, Static and dynamic characteristics, Errors in measurement, Statistical evaluation of measurement data, Standards and calibration**.**

UNIT - II ANALOG INSTRUMENTS 9

Moving coil instruments: Permanent magnet moving coil instruments, Moving iron: attraction and repulsion type instruments- Torque equations and errors, Single and Three phase watt meters and Energy meters.

UNIT - III DIGITAL INSTRUMENTS 9

Introduction, Digital Multi-meter: Block diagram, principle of operation, Digital Voltmeter: Block diagram, principle of operation, Types-Integrating type voltmeter, Digital Phase meter, Power quality analyzer

UNIT - IV MEASUREMENT OF ELECTRICAL AND NON ELECTRICAL QUANTITIES 9

Measurement of Resistance: Kelvin double bridge, Wheatstone bridge, Measurement of inductance and capacitance: Maxwell and Schering bridge, Earth Resistance Tester, Measurement of Temperature: Thermocouples, Radiation and Optical pyrometer**.**

UNIT - V TRANSDUCERS 9

Selection of transducer, Classification of transducers: Resistive, capacitive & inductive transducers, Piezoelectric & Hall Effect Transducers.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Understand the fundamental concepts of measurements and instruments.

CO2 Analyze the static and dynamic behaviour of a measurement system and compare with standard system.

CO3 Categorize the working principle of various Analog instruments.

CO4 Illustrate the characteristics and performance parameters of Digital instruments.

CO5 Explain the suitable bridge for the measurement of unknown resistance, Inductance and Capacitance

CO6 Analyze the various types of transducers to measure the physical quantities.

TEXT BOOKS

1. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements& Instrumentation', Dhanpat Rai and Co, New Delhi, Edition 2011.

2. R. K. Rajput, "Electrical and Electronics Measurements and Instrumentation", Chand Pub, 2016.

3. E. O. Doebelin and D. N. Manik, " Measurement Systems – Application and Design", TataMcGraw-Hill, New Delhi, 2007.

REFERENCE BOOKS

1. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010.

2. David Bell, 'Electronic Instrumentation & Measurements', Oxford University Press,2013.

3. Alan. S. Morris, Principles of Measurements and Instrumentation, 2nd Edition, Prentice Hallof India, 2003.

4. J.J. Carr, 'Elements of Electronic Instrumentation and Measurement', Pearson Education India, New Delhi, 2011.

ONLINE COURSES / RESOURCES

https://archive.nptel.ac.in/courses/108105153/

https://archive.nptel.ac.in/courses/108105064/

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	3
CO2	3	3	3	2	-	-	-	-	-	-	-	3
CO3	3	3	2	2	-	-	-	-	-	-	-	3
CO4	3	3	2	-	-	-	-	-	-	-	-	3
CO5	3	3	2	2	-	-	-	-	-	-	-	3
CO6	3	3	2	-	-	-	-	-	-	-	-	3

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23EE1402	ELECTRICAL MACHINES I	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To impart knowledge on principles of electromechanical energy conversion in singly and doubly excited systems.
- To understand the construction, working principle of DC machines and analyze their performance.
- To understand the operation and performance of special machines.
- To familiarize with the construction details of different types of transformers, working principle, appropriate tests and their performance.

UNIT - I PRINCIPLES OF ENERGY CONVERSION 9

Faraday's law of electromagnetic induction -singly and doubly excited magnetic field systems, EMF and torque production in rotating machines.

UNIT - II DC GENERATOR 9

Construction and components of DC Machine – Principle of operation - Lap and wave windings-EMF equations – armature reaction –methods of excitation- commutation – interpoles, compensating winding –characteristics of DC generators and application.

UNIT - III DC MOTOR 9

Principle and operations - types of DC Motors – Speed Torque Characteristics of DC Motors- starting and speed control of DC motors –Plugging, dynamic and regenerative braking, Testing and efficiency –Swinburne’s test and Hopkinson’s test - Permanent Magnet Brushless DC (PMBLDC)motors- Stepper motor, Applications.

UNIT - IV TRANSFORMER 9

Construction - Principle of operation - Types - Equivalent circuit -Phasor Diagram-Voltage regulation -losses and efficiency-All Day Efficiency - Auto transformer: construction and Working -Comparison with two winding Transformers- Application.

UNIT - V TRANSFORMER TESTING 9

Testing of transformers -Polarity, open circuit, short circuit and Sumpner's test - Three phase transformers construction-Types of connections and their comparative features-Parallel operation.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Examine the electro-mechanical energy conversion process in rotating electrical machines.

CO2 Understand the construction, working principle of DC machines and analyse the performance of DC Generator.

CO3 Interpret the characteristics of various types of DC Motor.

CO4 Analyze the performance of special electrical machines.

CO5 Interpret the constructional details of different types of transformers, working principle and their performance.

CO6 Compute various performance parameters of single and three phase transformers by conducting suitable tests.

TEXT BOOKS

1. Nagrath, I.J. and Kothari.D.P, Electric Machines', McGraw-Hill Education, 5th Edition,2017.
2. Fitzgerald. A.E., Charles Kingsely Jr, Stephen D.Umans, 'Electric Machinery', 6th edition, McGraw Hill Books Company, 2017.
3. Theraja.B.L., Theraja.A.K. "A Text Book of Electrical Technology", Volume II AC & DC Machines", S.Chand& Company LTD.,23rd Edition,2005.
4. P. S. Bimbhra, "Electric Machinery", Khanna Publishers, 2nd Edition, 2021.

REFERENCE BOOKS

1. Stephen J. Chapman, 'Electric Machinery Fundamentals'4th edition, McGraw Hill Education Pvt. Ltd, 2010.
2. B.R. Gupta, 'Fundamental of Electric Machines' New age International Publishers,3rdEdition, Reprint 2015.
3. S.K. Bhattacharya, 'Electrical Machines' McGraw - Hill Education, New Delhi, 3rd Edition,2009
4. Vincent Del Toro, 'Basic Electric Machines' Pearson India Education, 2016.

WEB REFERENCES

1. https://www.electrical4u.com/electric-machines/

ONLINE COURSES / RESOURCES

1. https://archive.nptel.ac.in/courses/108105017/
2. https://archive.nptel.ac.in/courses/108105155/
3. https://www.classcentral.com/course/swayam-electrical-machines-iitd-14030

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**1**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**1**
CO2	**3**	**3**	**1**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**1**
CO3	**3**	**3**	**1**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**1**
CO4	**3**	**3**	**1**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**1**
CO5	**3**	**3**	**1**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**1**
CO6	**3**	**3**	**1**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**1**

Internal Assessment				**End Semester Examinations**
Assessment I (100 Marks)		**Assessment II (100 Marks)**		
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Individual Assignment / Case Study / Seminar / Mini Project**	**Written Test**	**Written Examinations**
40	60	40	60	100
40%				**60 %**

23EE1403	TRANSMISSION AND DISTRIBUTION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To study the structure of electric power system and to develop expressions for the computation of transmission line parameters
- To obtain the equivalent circuits for the transmission lines based on distance and to determine voltage regulation and efficiency.
- To understand the mechanical design of transmission lines and to analyze the voltage distribution in insulator strings to improve the efficiency.
- To study the types, construction of Cables and methods to improve the efficiency.
- To understand the different types of distribution system and substations with its layout.

UNIT - I INTRODUCTION TO POWER SYSTEM 9

Structure of electric power system - operating voltages of generation, transmission and distribution – advantage of higher operating voltage for AC transmission - Right of Way, Substation layout, Mechanical designs of transmission line: Sag and tension calculations- effect of ice and wind on sag.

UNIT - II TRANSMISSION LINE PARAMETERS 9

Resistance, inductance and capacitance calculations: single and three phase transmission lines - double circuits - solid, stranded and bundled conductors - symmetrical and unsymmetrical spacing – transposition of lines - concepts of GMR and GMD - skin and proximity effects.

UNIT - III MODELLING AND PERFORMANCE OF TRANSMISSION LINES 9

Transmission line classification - short line, medium line (T and π Model) and long line – equivalent circuits –Sending end voltage, current, voltage regulation and transmission efficiency- ABCD constants - real and reactive power flow in lines – surge impedance and surge-impedance loading - Ferranti effect -. Corona discharge characteristics – critical voltage and corona loss.

UNIT - IV INSULATORS AND UG CABLES 9

Insulators: Types - Characteristics and classification – voltage distribution in insulator string - improvement of string efficiency, Underground cables: constructional features of LT and HT cables – insulation resistance, capacitance, and dielectric stress – grading of UG cables.

UNIT - V DISTRIBUTION SYSTEMS 9

Feeders, distributors and service mains, DC 2-wire distributor – radial and ring main distribution, AC distribution – single phase (with concentrated loads) and three phase 3-wire and 4-wire distribution with balanced and unbalanced loads.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Understand the importance and the functioning of Power system.

CO2 Calculate the sag and tension of transmission lines.

CO3 Estimate the line parameters for transmission lines.

CO4 Model and Predict the performance parameters of transmission lines.

CO5 Analyze the voltage distribution in insulator strings and grading of cables in transmission lines.

CO6 Study the different types of distribution system.

TEXT BOOKS

1. D.P.Kothari, I.J. Nagarath, 'Power System Engineering', McGraw-Hill Publishing Company limited, New Delhi, Third Edition, 2019.
2. C.L.Wadhwa, 'Electrical Power Systems', New Academic Science Ltd, 2009.
3. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011.

REFERENCE BOOKS

1. B.R.Gupta, 'Power System Analysis and Design' S. Chand, New Delhi, Fifth Edition, 2008.
2. V.K.Mehta, Rohit Mehta, 'Principles of power system (LPSPE)', S. Chand & Company Ltd, New Delhi, 2022.
3. G.Ramamurthy, "Handbook of Electrical power Distribution," Universities Press, Second Edition, 2013.

ONLINE COURSES / RESOURCES

1. https://nptel.ac.in/courses/108105104

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		**1**								**2**
CO2	3	3	**3**	**3**								**3**
CO3	3	3	**3**	**3**								**2**
CO4	3	3	**2**	**2**								**2**
CO5	3	3	**2**	**2**								**3**
CO6	3	3										**3**

Internal Assessment				End Semester Examinations
Assessment I (100 Marks)		Assessment II (100 Marks)		
Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Individual Assignment / Case Study / Seminar / Mini Project	Written Test	Written Examinations
40	60	40	60	100
40%				60 %

23EE1404	CONTROL SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To understand the use of transfer function models for analysis physical systems and introduce the control system components.
- To provide adequate knowledge in the time response of systems and steady state error analysis.
- To accord basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.
- To introduce stability analysis and design of compensators.
- To introduce state variable representation of physical systems.

UNIT - I SYSTEMS AND REPRESENTATION 9

Basic elements in control systems: – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs.

UNIT - II TIME RESPONSE 9

Time response: – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error – Root locus construction- Effects of P, PI, PID modes of feedback control –Time response analysis.

UNIT - III FREQUENCY RESPONSE 9

Frequency response: – Bode plot – Polar plot – Determination of closed loop response from open loop response - Correlation between frequency domain and time domain specifications.

UNIT - IV STABILITY AND COMPENSATOR DESIGN 9

Characteristics equation – Routh Hurwitz criterion – Nyquist stability criterion- Performance criteria – Effect of Lag, lead and lag-lead compensation on frequency response-Design of Lag, lead and lag lead.

UNIT - V STATE VARIABLE ANALYSIS 9

Concept of state variables – State models for linear and time invariant Systems – Solution of state and output equation in controllable canonical form – Concepts of controllability and observability.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Understand the basics of system to a find transfer function using BDR and SFG.

CO2 Interpret the conversion of mechanical model to Electrical Model and vice versa

CO3 Realize the concept of system response in time domain and also steady state error.

CO4 Understand the concept of system response in frequency domain with graphical approach such as bode & Polar.

CO5 Analyze the system stability using Routh criterion, Nyquist criterion and also perceive ideas regarding lead, lag, lead-lag compensators

CO6 Understand the concept of state space modelling

TEXT BOOKS

1. Nagarath, I.J. and Gopal, M., “Control Systems Engineering”, New Age International Publishers, 2017.
2. Benjamin C. Kuo, “Automatic Control Systems”, Wiley, 2014.

REFERENCE BOOKS

1. Katsuhiko Ogata, “Modern Control Engineering”, Pearson, 2015.
2. Richard C.Dorf and Bishop, R.H., “Modern Control Systems”, Pearson Education,2009.
3. John J.D., Azzo Constantine, H. and HoupisSttuart, N Sheldon, “Linear Control System Analysis and Design with MATLAB”, CRC Taylor& Francis Reprint 2009.
4. RamesC.Panda and T. Thyagarajan, “An Introduction to Process Modelling Identification and Control of Engineers”, Narosa Publishing House, 2017.
5. M.Gopal, “Control System: Principle and design”, McGraw Hill Education, 2012.

WEB REFERENCES

1. https://www.geeksforgeeks.org/control-system/

ONLINE COURSES / RESOURCES

1. https://onlinecourses.nptel.ac.in/noc20_ee90/preview
2. https://archive.nptel.ac.in/courses/108106098/
3. https://www.classcentral.com/course/swayam-automatic-control-9850

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**3**	**3**			**3**				**3**
CO2	**3**	**3**	**3**	**3**				**3**				**3**
CO3	**3**	**3**	**3**	**3**	**2**							**3**
CO4	**3**	**3**	**3**	**3**	**3**							**3**
CO5	**3**	**3**	**3**	**2**	**3**							**2**
CO6	**3**	**3**	**3**	**3**	**3**							**3**

Internal Assessment				**End Semester Examinations**
Assessment I (100 Marks)		**Assessment II (100 Marks)**		
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Individual Assignment / Case Study / Seminar / Mini Project**	**Written Test**	**Written Examinations**
40	60	40	60	100
40%				**60 %**

23EE1405	DIGITAL ELECTRONICS	L	T	P	C
		3	0	2	4

COURSE OBJECTIVE:

- To perform the numeric conversions and design of simple logic circuits.
- To understand the concepts of combinational circuits.
- To design various synchronous and asynchronous circuits.
- To familiarize with programmable logic devices.
- To understand the fundamental concepts of VHDL programming.

UNIT I NUMBER SYSTEM AND BOOLEAN ALGEBRA 9

Review of number systems, binary codes, error detection and correction codes (Parity and Hamming code) - Digital Logic Families - RTL, DTL, TTL, ECL and MOS families - operation, characteristics of digital logic family.

UNIT II COMBINATIONAL CIRCUITS 9

Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps - simplification and implementation of combinational logic – multiplexers and de multiplexers - code converters, adders, subtractors, Encoders and Decoders.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 9

Sequential logic- SR, JK, D and T flip flops - level triggering and edge triggering - counters - asynchronous and synchronous type - Modulo counters - Shift registers - design of synchronous sequential circuits – Moore and Mealy models- Counters, state diagram; state reduction; state assignment.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS AND PROGRAMMABILITY LOGIC DEVICES 9

Asynchronous sequential logic circuits- hazards &errors in digital circuits; analysis of asynchronous sequential logic circuits-Fundamental mode. Introduction to Programmability Logic Devices. PROM – PLA –PAL, CPLD-FPGA.

UNIT V INTRODUCTION TO VHDL 9

Digital design process flow - Entities and Architecture - Behavioural, Dataflow, and structural modelling - Simple coding for combinational logic circuit and Sequential circuit (example: Adder, Counter, Flipflops, Multiplexer and De-multiplexer.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1 Apply Boolean algebra and simplify the logical expressions using Boolean functions.
CO2 Design and realize the combinational circuits using logic gates.
CO3 Analyze the synchronous Sequential logic circuits using flip flops and counters.
CO4 Analyze and Design Asynchronous sequential logic circuits.
CO5 Examine the operation of various Programmable Logic Devices.
CO6 Develop simple programs in VHDL.

TEXT BOOKS

1. Thomas L Floyd, 'Digital fundamentals', Pearson Education Limited, 11th Edition, 2018
2. Morris Mano.M, 'Introduction to the verilog HDL,VHDL and system', Prentice Hall of India, 6st Edition, 2018.

REFERENCE BOOKS

1. S K Mandal, "Digital Electronics Principles & Application", McGraw Hill Edu, 2017.
2. D.P.Kothari,J.S.Dhillon, „Digital circuits and Design", Pearson Education, 2015.

WEB REFERENCES

1. https://de-iitr.vlabs.ac.in/exp/4bit-synchronous-asynchronous-counter/theory.html
2. https://de-iitr.vlabs.ac.in/exp/4bit-synchronous-asynchronous-counter

ONLINE COURSES / RESOURCES

1. https://archive.nptel.ac.in/courses/108105113/
2. https://archive.nptel.ac.in/courses/117106114/
3. https://archive.nptel.ac.in/courses/108106177/

DIGITAL ELECTRONICS LABORATORY **30 Hours**

LIST OF EXPERIMENTS

1. Verification of Boolean laws using basic logic gates
2. Design and implementation of Adder and Subtractor circuits.
3. Design and implementation of Parity generator and parity
4. Design and implementation Excess-3 to BCD and Binary to Gray code converter and vice-versa.
5. Design and implementation of Encoders and Decoders.
6. Design and implementation of 3-bit modulo counters as synchronous types using FF IC"s and specific counter IC.
7. Design and implementation of simplified Boolean expressions using multiplexer and de multiplexer.
8. Design and implementation of Magnitude Comparators

SOFTWARE REQUIRED

REFERENCE:

1. https://de-iitr.vlabs.ac.in/exp/half-full-subtractor/
2. https://de-iitr.vlabs.ac.in/exp/4bit-synchronous-asynchronous-counter/

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2					1				**2**
CO2	3	2	2	1				1				**2**
CO3	3	3	3	1				1				**2**
CO4	3	2	2	1								**2**
CO5	3	2		1								**2**
CO6	3	2	2	**1**	**3**							**2**

Assessment (40% weightage) (Theory Component)		**Assessment** (60% weightage) (Laboratory Component)		**End Semester Examination**
Individual Assignment / Case Study / Seminar / Mini Project	**Written Test**	**Evaluation of Laboratory Observation, Record**	**Test**	**Written Examination**
40	**60**	**75**	**25**	
100				**100**
50 %				**50 %**

23EE1411	ELECTRICAL MACHINES LABORATORY I	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE:

- To determine the characteristics of DC machines by using simulation and experimental method.
- To enable the students to be familiar with the speed control of DC Motors.
- To know the performance characteristics of transformers based on various tests under no load, loading conditions, open circuit and short circuit conditions.
- To study the various connections in three phase transformers.

LISTOFEXPERIMENTS

1. Open circuit and load characteristics of DC shunt generator- critical resistance and critical speed.
2. Load characteristics of DC compound generator with differential and cumulative connections.
3. Load test on DC shunt motor.
4. Load test on DC compound motor.
5. Load test on DC series motor.
6. Swinburne's test and speed control of DC shunt motor.
7. Hopkinson's test on DC motor – generator set.
8. Load test on single-phase transformer and three phase transformers.
9. Open circuit and short circuit tests on single phase transformer.
10. Sumpner's test on single phase transformers.
11. Separation of no-load losses in single phase transformer.
12. Study of starters and 3-phase transformers connections.
13. Simulation on motoring and Braking operation of DC motor
14. Mini Project on application of PMBLDC and Stepper Motor.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Analyze the no load and load characteristics of DC Shunt and Compound generator.
CO2 Illustrate the mechanical and electrical characteristics of Shunt, Series and Compound motor.
CO3 Develop the equivalent circuit of Single phase Transformer and calculate the parameters of equivalent circuit.
CO4 Demonstrate the indirect method of testing of DC machine to determine its efficiency.
CO5 Analyze the different types of three phase transformer Connections.
CO6 Analyze the characteristics of DC motor using Simulation software.

TEXT BOOKS

1. D.P. Kothari and B.S. Umre, "Laboratory Manual for Electrical Machines", 2ed, Wiley, 2020.

WEB REFERENCES

1. https://ems-iitr.vlabs.ac.in/

2. https://ems-iitr.vlabs.ac.in/List%20of%20experiments.html

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	-	-	-	3	3	-	-
CO2	3	3	3	-	-	-	-	-	3	3	-	-
CO3	3	3	3	3	-	-	-	-	3	3	-	-
CO4	3	3	3	3	-	-	-	-	3	3	-	-
CO5	3	3	3	-	-	-	-	-	3	3	-	-
CO6	3	3	3	3	3	-	-	-	3	3	-	-

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%

23EE1412	CONTROL AND INSTRUMENTATION LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE :

- To determine the transfer function of electrical systems.
- To infer knowledge about different types of bridges and transducers.
- To simulate the time response and frequency response of Second order linear system.
- To develop knowledge about signal conditioning systems.

LISTOFEXPERIMENTS

1. Digital Simulation of Second-order Systems for obtaining the time response of a system under various damping conditions.
2. Stability Analysis of Linear Systems using Bode, Root locus &Nyquist plots method using simulation software.
3. Determination of Transfer Function of Separately Excited DC Generator.
4. Determination of Transfer Function of Armature Controlled DC Motor.
5. DC Position Control Systems.
6. AC Position Control Systems.
7. Synchro-Transmitter- Receiver and Characteristics.
8. Design of P, PI, and PID Controllers.
9. Bridge Networks –AC and DC Bridges.
10. Dynamics of Sensors/Transducers
    (a) Temperature
    (b) pressure
    (c) Displacement
    (d) Optical
    (e) Strain
    (f) Flow
11. Signal Conditioning
    (a) Instrumentation Amplifier
    (b) Analog – Digital and Digital –Analog converters (ADC and DACs)
12. Measurements of Three Phase Power.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Demonstrate the types of controllers and stability analysis of linear system

CO2 Determine the Transfer Function of electro mechanical system and energy measuring devices.

CO3 Infer the response of Position Control and Characteristics of Synchro Transmitter and receiver

CO4 Compare the energy storage elements using AC & DC bridges and signal conditioning circuit.

CO5 Analyze the dynamics of Sensors / Transducers.

CO6 Interpret the basics of signal conditioning circuits

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	3	-	-	-	-	-	-	
CO2	3	3	3	3	-	-	-	3	-	-	-	3
CO3	3	3	3	3	3	-	-	2	-	-	-	2
CO4	3	3	3	3	3	-	-	-	-	-	-	3
CO5	3	3	3	-	-	-	-	3	-	-	-	3
CO6	3	3	3	3	-	-	-	3	-	-	-	3

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%

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COURSE OBJECTIVE:

To impart Knowledge on the following topics:

- Understanding Java Fundamentals.
- Develop proficiency in flow control statements and Understand the usage of arrays and var-arg types
- Exploring Object-Oriented Programming Concepts through Java Programming
- Develop programs on Exception handling through Java Programming
- Understand the usage of wrapper classes and Utilizing Standard Java Libraries

LISTOF EXPERIMENTS

1. Java Tokens- Comments, Identifiers, Keywords, Separators, Data types
2. Scoping and Parameter passing (by value & by reference)
3. Flow Control Statements
4. Arrays and Var-arg types
5. Enums
6. Operators & their Precedence & Associativity
7. Conversions: Narrowing & Widening Conversions
8. Assignments and Initializations
9. Access Modifiers for Class & Class Members
10. Non Access Modifiers for Class & Class Members
11. Packages with Static imports
12. Creating Classes and Instances
13. Method and Types of methods
14. Inheritance
15. Polymorphism (Method Overloading & Overriding) Abstract classes and Interfaces
16. Constructors and Initialization
17. Reference Variable Casting
18. Static data and methods
19. Traditional Error Handling Techniques
20. Importance of Exception Handling
21. Exception Handling Framework
22. Stack-based Execution
23. Checked and Unchecked Exceptions
24. User defined Exceptions
25. Cautions When Using Exceptions
26. Java Thread Model
27. Thread Class & Runnable Interface
28. Types of Threads - User, Demon

29. Creating Your Own Threads
30. Threads States and Life cycle
31. Thread Methods: yield(), sleep(), current Thread() etc
32. Scheduling and Thread Priorities
33. Concurrency Control and Synchronization
34. Deadlocks
35. Inter-thread communication
36. Wrapper Classes
37. Autoboxing / Unboxing
38. Math Class
39. String and String Buffer Classes
40. Date and Calendar

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1 Understand the fundamental programming elements of Java and learn to apply basic control structures in Java.

CO2 Apply scoping rules and demonstrate an understanding of parameter passing in Java

CO3 Analyze and create effective flow control statements in Java

CO4 Evaluate the usage of arrays, var-args, and enums in Java, based on program requirements and design considerations.

CO5 Develop Java programs to implement object-oriented design principles.

CO6 Apply exception handling techniques in Java, including the creation of user-defined exceptions

TEXTBOOKS

1. Herbert Schildt, “Java The complete reference”, 12th Edition, McGraw Hill Education, 2022.
2. Cay S. Horstmann, Gary Cornell, “Core Java Volume – I Fundamentals”, 11th Edition, Prentice Hall, 2020.

REFERENCES BOOKS

1. Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition Pearson, 2015
2. Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition, Pearson Education, 2000.

WEB REFERENCES

1. https://www.javatpoint.com/java-tutorial
2. https://www.tutorialspoint.com/java/index.htm

Internal Assessment		End Semester Examination
Evaluation of Laboratory Observation, Record	Test	Practical
75	25	100
60 %		40%