

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING								
SEMESTER - I								
Sl. No.	Course Category	Course Code	Course Title	L	T	P	Total Contact Periods	Credits
THEORY COURSES								
1	HS	U23EN101	Technical English - I	3	0	0	3	3
2	BS	U23MA101	Engineering Mathematics	3	1	0	4	4
3	BS	U23PH101	Engineering Physics	3	0	0	3	3
4	ES	U23EG101	Engineering Graphics	2	4	0	6	4
5	ES	U23CP101	Programming in C	3	0	2	5	4
6	ES	U23BE103	Basic Civil and Mechanical Engineering	3	0	0	3	3
7	HS	U23TA101	தமிழர் மரபு /Heritage of Tamils	1	0	0	1	1
PRACTICAL COURSES								
8	ES	U23EP101	Engineering Practices Laboratory	0	0	3	3	1.5
9	HS	U23EN102	Professional Communication Laboratory	0	0	3	3	1.5
10	SIP	U23IP101	Student Induction Programme	0	0	0	2 Weeks	0
TOTAL CREDITS								25
SEMESTER - II								
Sl. No.	Course Category	Course Code	Course Title	L	T	P	Total Contact Periods	Credits
THEORY COURSES								
1	HS	U23EN201	Technical English - II	3	0	0	3	3
2	BS	U23MA201	Vector Calculus and Complex Functions	3	1	0	4	4
3	BS	U23PH201	Physics for Electrical and Electronics Engineers	3	0	0	3	3
4	BS	U23CY101	Engineering Chemistry	3	0	0	3	3
5	ES	U23PY201	Problem Solving and Python Programming	3	0	2	5	4
6	PC	U23EE201	Electric Circuit Analysis	3	1	0	4	4
7	HS	U23TA201	தமிழரும் தொழில் நுட்பமும் / Tamils and Technology	1	0	0	1	1
PRACTICAL COURSES								
8	BS	U23PC101	Physics and Chemistry Laboratory	0	0	3	3	1.5
9	PC	U23EE202	Electric Circuits Laboratory	0	0	3	3	1.5
TOTAL CREDITS								25

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SEMESTER - III								
Sl. No.	Course Category	Course Code	Course Title	L	T	P	Total Contact Periods	Credits
THEORY COURSES								
1	BS	U23MA301	Transforms and Partial Differential Equations	3	1	0	4	4
2	PC	U23EE301	Electromagnetic Fields	3	1	0	4	4
3	PC	U23EE302	Electron Devices and Circuits	3	0	2	5	4
4	PC	U23EE303	Electrical Machines - I	3	0	0	3	3
5	PC	U23EE304	Measurements and Instrumentation	3	0	0	3	3
6	PC	U23EE305	Digital Logic Circuits	3	0	2	5	4
PRACTICAL COURSES								
7	PC	U23EE306	Electrical Machines - I Laboratory	0	0	3	3	1.5
EMPLOYABILITY ENHANCEMENT COURSES								
8	EEC	U23EEC301	Employability Skills - I	0	0	2	2	1
TOTAL CREDITS								24.5
SEMESTER - IV								
Sl. No.	Course Category	Course Code	Course Title	L	T	P	Total Contact Periods	Credits
THEORY COURSES								
1	BS	U23MA401	Numerical Methods	3	1	0	4	4
2	PC	U23EE401	Transmission and Distribution	3	1	0	4	4
3	PC	U23EE402	Electrical Machines -II	3	0	0	3	3
4	PC	U23EE403	Linear Integrated Circuits	3	0	2	5	4
5	PC	U23EE404	Microprocessors and Microcontrollers	3	0	2	5	4
6	ES	U23CS306	Object Oriented Programming with Data Structures	3	0	2	5	4
7	MNC	U23MX01	Personal Values	2	0	0	2	0
PRACTICAL COURSES								
8	PC	U23EE405	Electrical Machines - II Laboratory	0	0	3	3	1.5
EMPLOYABILITY ENHANCEMENT COURSES								
9	EEC	U23EEC401	Employability Skills - II	0	0	2	2	1
TOTAL CREDITS								25.5

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U23EN101	TECHNICAL ENGLISH - I	L	T	P	C
	(Common to all branches)	3	0	0	3

Prerequisites: Fundamentals of Analytical Skills in English

COURSE OBJECTIVES:

- To enhance reading comprehension skills for technical articles to grasp and interpret complex concepts.
- To prepare students' for effective communication and writing in technical and professional contexts.
- To develop the ability to write persuasive job applications and structured resumes effectively.

UNIT I INTRODUCTION 9

Reading – Requirement for Reading – reading short technical texts from journals and newspapers; **Writing** – Compare and Contrast Essay; Email Writing; **Grammar** – Parts of Speech, Mixed Tenses, Prepositional phrases; **Vocabulary Development** – Contextual meaning of words.

UNIT II READING AND LANGUAGE DEVELOPMENT 9

Reading – Reading Advertisements, User Manuals, Brochures; **Writing** - Process Writing, Interpreting charts & graphs; **Grammar** – Active and Passive Voice transformations, Infinitive and Gerunds; **Vocabulary Development** – Vocabulary used in formal & informal letters / emails and reports.

UNIT III TECHNICAL WRITING AND GRAMMAR 9

Reading – Reading Longer texts both general and technical, practice in speed reading; **Writing** – Writing responses to complaints, Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay; **Grammar** – Error correction; If Clauses, Compound Words, Punctuation; **Vocabulary Development** – Sentence Completion.

UNIT IV REPORT WRITING 9

Reading – Reading for detailed comprehension: Skimming and Scanning; **Writing**- Recommendations, Writing Reports – Accident Report, Survey Report, Minutes of a meeting; **Grammar** – Reported Speech, Modals; **Vocabulary Development** – Technical Vocabulary.

UNIT V GROUP DISCUSSION AND JOB APPLICATIONS 9

Reading – Reading and understanding Technical Articles; **Writing** – Writing Job Application – Resume Preparation (via email and hard copy); **Grammar** – Numerical Adjectives, Relative Clauses, Idioms and Phrases; **Vocabulary Development** – Verbal Analogies.

TOTAL: 45 PERIODS

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TEXT BOOKS:

- 1 Veena Selvam, "English for Science and Technology", Cambridge University Press, 2021.
- 2 N P Sudharshana,m, C Saveetha, "English for Technical Communication", Cambridge University Press, New Delhi, 2016.

REFERENCES:

- 1 E Suresh Kumar, "Engineering English", Orient Black swan, Hyderabad, 2015.
- 2 Meenakshi Raman, Sangeetha Sharma, "Technical Communication Principles and Practice", Oxford University Press, New Delhi, 2014.
- 3 Marion Grussendorf, "English for Presentations", Oxford University Press, 2007.

ONLINE RESOURCES:

- 1 <https://iimskills.com/course/technical-writing-course/>
- 2 <https://www.udemy.com/course/easy-english-grammar-course>
- 3 <https://www.coursera.org/learn/introduction-to-research-for-essay-writing>

COURSE OUTCOMES:

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

- CO1** Write essays and emails.
CO2 Describe any process, interpretation of charts and graphs both general and technically.
CO3 Write letters and responses to complaints.
CO4 Write Recommendations, minutes and reports of events.
CO5 Write Job application with Resume.

CO - PO - PSO 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

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- 2 B S Grewal, "Higher Engineering Mathematics", 45th Edition, Khanna Publishers, 2018.

REFERENCES:

- 1 R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", 6th Edition, Narosa Publications, 2021.
- 2 Ravish R Singh, Mukul Bhatt, "Advanced Engineering Mathematics", 2nd Edition, Tata McGraw Hill, 2020.
- 3 H C Taneja, "Advanced Engineering Mathematics", Dreamtech Press, 2019.
- 4 T K V Iyengar, M V A A N Prasad, B Krishna Gandhi, "Engineering Mathematics", Special Edition, S. Chand & Company Ltd., 2023.

ONLINE RESOURCES :

- 1 <http://nptel.ac.in/courses/111105035/10>
- 2 <http://nptel.ac.in/courses/111105035/5>
- 3 <http://nptel.ac.in/courses/111105035/17>

COURSEOUTCOMES:

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

- CO1** Apply Cayley-Hamilton theorem and orthogonal transformation for different process of matrices.
- CO2** Analyze the differentiation rules to find the extreme values of functions.
- CO3** Apply the concepts of partial derivatives and total derivatives in Taylor's series, Jacobians and maxima and minima of functions.
- CO4** Evaluate definite and improper integrals using techniques of integration
- CO5** Evaluate area and volume using double and triple integrals.

CO – PO – PSO MAPPING:

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

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U23PH101	ENGINEERING PHYSICS	L	T	P	C
	(Common to all branches)	3	0	0	3

Prerequisites: Fundamentals of Mechanics and Optics

COURSE OBJECTIVES:

- To enable the students effectively understand concepts of mechanics and elastic properties of materials.
- To gain knowledge about thermal physics, ultrasonics, lasers, optical fibres with applications.
- To introduce the basics of quantum mechanics, crystal structures and imperfections.

UNIT I MECHANICS AND ELASTICITY 9

Center of mass (CM) – Rotational kinematics – Moment of Inertia (M.I.) – Theorems of M.I.: parallel and perpendicular axes theorems – M.I. of continuous bodies – Conservation of angular momentum – Elasticity – Hooke's law – Stress-Strain diagram – Poisson's ratio – Factors affecting elasticity – Bending moment – Depression of a cantilever – Young's modulus by uniform bending – I-shaped girders.

UNIT II THERMAL PHYSICS AND ULTRASONICS 9

Modes of heat transfer – Thermal conductivity – Newton's law of cooling – Lee's disc method – Radial heat flow – Rubber tube method – Characteristics and Production of ultrasonics by magnetostriction and piezoelectric methods – Acoustic grating – Non-destructive testing – Medical applications: Sonogram.

UNIT III LASERS AND FIBRE OPTICS 9

Laser: characteristics and properties – Einstein's coefficients derivation – Population inversion – Types of lasers: Nd-YAG laser, CO₂ laser, semiconductor laser – Applications of lasers – Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle – Classification of optical fibres (material, refractive index, mode) – Optical-fibre communication system (Block diagram only).

UNIT IV QUANTUM MECHANICS 9

Black body radiation – Photons and light waves – Electrons and matter waves – Compton effect: Theory and experimental verification – The Schrodinger equation: Time dependent and time independent forms – Physical significance of wave function – Particle in an infinite potential well: 1D – Electron microscopes: Scanning Electron Microscope and Transmission Electron Microscope.

UNIT V CRYSTAL PHYSICS 9

Lattice – Bravais lattice – Lattice planes – Miller indices – d-spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP crystal structures – Crystal imperfections: point, line and surface defects.

TOTAL: 45 PERIODS

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TEXT BOOKS:

- 1 D. Kleppner, R Kolenkow, "An Introduction to Mechanics", Tata McGraw Hill, 2017.
- 2 Arthur Beiser, Shobhit Mahajan, S Rai Choudhury, "Concepts of Modern Physics", Tata McGraw Hill, 2017.

REFERENCES:

- 1 R. Wolfson, "Essential University Physics", Volume 1 & 2, 4th Edition, Pearson Education, 2020.
- 2 K Thyagarajan, A Ghatak, "Lasers: Fundamentals and Applications", 2nd Edition, Laxmi Publication, 2019.
- 3 P K Palanisamy, "Materials Science", Scitech Publication India Pvt. Ltd., 2015.

ONLINE RESOURCES:

- 1 <https://www.coursera.org/courses?query=physics>
- 2 <https://archive.nptel.ac.in/courses/115/102/115102124/>
- 3 https://onlinecourses.nptel.ac.in/noc24_ph17/preview

COURSE OUTCOMES:

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

- CO1** Comprehend the basics of mechanics and elastic properties of materials.
CO2 Explain the thermal physics concepts, production and applications of ultrasonic waves.
CO3 Apply the basic concepts of lasers and optical fibre in various fields.
CO4 Describe the basics of quantum mechanical phenomenon and electron microscopes.
CO5 Explain the fundamentals of crystal structures and imperfections.

CO - PO - PSO MAPPING:

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

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U23EG101

ENGINEERING GRAPHICS
(Common to all branches)

L T P C
2 0 4 4

Prerequisites: Nil

COURSE OBJECTIVES:

- To prepare the students for drawing freehand sketch of simple objects and engineering curves.
- To prepare the students for drawing orthographic projection of solids, section of solids and development of lateral surfaces of various solids.
- To prepare the students for drawing pictorial projections like isometric and perspective projection of simple solids.

UNIT I

PLANE CURVES

6+12

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

UNIT II

PROJECTION OF POINTS, LINES AND PLANE SURFACES

6+12

Orthographic projection- principles – Principal planes – First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes – Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III

PROJECTION OF SOLIDS AND FREE HAND SKETCHING

6+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three-Dimensional objects – Layout of views – Freehand sketching of multiple views from pictorial views of objects.

UNIT IV

SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES

6+12

Sectioning of simple solids in vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids (without Cut out) — Prisms, pyramids cylinders and cones.

UNIT V

ISOMETRIC AND PERSPECTIVE PROJECTIONS

6+12

Principles of isometric projection — isometric scale - isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

TOTAL: 90 PERIODS

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TEXT BOOKS:

- 1 Bhatt N D, Panchal V M, "Engineering Drawing", Charotar Publishing House, 54th Edition, 2023.
- 2 Natrajan K V, "A Text Book of Engineering Graphics", 36th Edition, Dhanalakshmi Publishers, 2023.

REFERENCES:

- 1 Gopalakrishna K R, "Engineering Drawing" (Vol. I&II Combined), Subhas Publications, 27th Edition, 2017.
- 2 Venugopal K. and Prabhu Raja V, "Engineering Graphics", New Age International Private Limited, 2008.
- 3 Parthasarathy N S, Vela Murali, "Engineering Graphics", Oxford University Press, 2015.
- 4 Basant Agarwal and Agarwal C. M, "Engineering Drawing", Tata McGraw Hill, 2nd Edition, 2019.

ONLINE RESOURCES:

- 1 <https://archive.nptel.ac.in/courses/112/102/112102304/>
- 2 <https://nptel.ac.in/courses/112103019>
- 3 https://onlinecourses.nptel.ac.in/noc24_ar02/preview

COURSE OUTCOMES:

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

- CO1** Draw the various curves used in engineering practices.
- CO2** Draw the projections of straight lines which are inclined to both the planes.
- CO3** Draw the projections of solids inclined to one plane and parallel to other plane.
- CO4** Draw the projections of sectioned solids and draw the development of lateral surfaces of a solid.
- CO5** Draw the isometric projections and perspective projections of simple solids.

CO - PO - PSO MAPPING:

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

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U23CP101

PROGRAMMING IN C
(Common to all Branches)

L T P C
3 0 2 4

Prerequisites: Mathematical Fundamentals

COURSE OBJECTIVES:

- To understand the basic construct of C Language and develop C programming of these construct.
- To develop C program using arrays, strings and modular applications using functions.
- To develop applications in C using pointers, structures and union.

UNIT I BASICS OF C PROGRAMMING 9

Introduction to programming paradigms – Applications of C Language - Structure of C program – C programming: Data Types – Constants – Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions – Input/ Output statements, Assignment statements. Illustrative Programs: Use of Variables in expression and their evaluation, Temperature Conversion (Fahrenheit to Celsius) Problem.

UNIT II DECISION MAKING AND LOOPING 9

Simple if Statements, The if.else statements, Nesting of if...else statements, else...if Ladder, switch Statements, goto Statements, while, do...while, for Statements , Illustrative Problems: EB Bill Computations, Determination of Average Cost and the range of the values , and Square root of a Series , Student Grade System.

UNIT III ARRAYS AND STRINGS 9

Introduction to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays – String operations: length, compare, concatenate, copy – Selection sort, linear and binary search. Illustrative Programs: palindrome Checking using arrays and String, Concatenation of strings.

UNIT IV FUNCTIONS AND POINTERS 9

Modular programming - Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion, Binary Search using recursive functions – Pointers – Pointer operators, Parameter passing: Pass by value, Pass by reference. Illustrative Program: Fibonacci Series, Towers of Hanoi.

UNIT V STRUCTURES AND UNION 9

Structure - Nested structures – Array of structures – Self-referential structures – Dynamic memory allocation - Singly linked list – typedef – Union - Storage classes and Visibility. Illustrative Program: To Print name and address of Employee, Generate Student Mark List.

45 PERIODS

PRACTICAL EXERCISES:

1. I/O statements, operators, expressions.
2. Decision-making constructs: if-else, goto, switch-case, break-continue.
3. Loops: for, while, do-while
4. Arrays: 1D and 2D, multi-dimensional arrays, traversal.
5. Strings: operations.

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6. Functions and Pointers: Passing parameters by (value, reference), passing arrays to function, Recursion using pointers.
7. Structures and Unions: Nested Structures, Arrays of Structures and Unions

30 PERIODS
TOTAL: 75 PERIODS

TEXT BOOKS:

- 1 Reema Thareja, "Programming in C", Oxford University Press, 2nd Edition, 2018.
- 2 Brian W Kernighan, Dennis M Ritchie, "The C Programming language", 3rd Edition, Prentice Hall of India, 2019.

REFERENCES:

- 1 Paul Deitel, Harvey Deitel, "C How to Program with an Introduction to C++", 8th Edition, Pearson Education, 2018.
- 2 Yashwant Kanetkar, "Let us C", 17th Edition, BPB Publications, 2020.
- 3 Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", 2nd Edition, Oxford University Press, 2013.
- 4 Anita Goel, Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2016.

ONLINE RESOURCES:

- 1 https://onlinecourses.nptel.ac.in/noc22_cs40/preview
- 2 https://onlinecourses.swayam2.ac.in/cec24_cs05/preview
- 3 https://onlinecourses.swayam2.ac.in/nou24_cs06/preview

COURSE OUTCOMES:

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

- CO1** Describe knowledge on C Programming constructs.
CO2 Apply the simple applications in C using decision making and looping.
CO3 Design the various applications using arrays and strings.
CO4 Write and implement modular applications in C using functions and Pointers.
CO5 Apply the User defined concept in C using Structures and Unions.

CO - PO - PSO MAPPING:

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

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U23BE103 BASIC CIVIL AND MECHANICAL ENGINEERING L T P C
Prerequisites: Nil 3 0 0 3

COURSE OBJECTIVES:

- To impart basic Civil and Mechanical Engineering knowledge.
- To familiarize materials and measurements in Civil Engineering and the fundamental components of civil engineering structures
- To enable the students to distinguish the components and working principle of power plant units, IC engines, and pumps, Refrigerators and Air Conditioner.

UNIT I INTRODUCTION TO CIVIL AND MECHANICAL ENGINEERING 9

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.

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

UNIT II SURVEYING AND BUILDING MATERIALS 9

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

Building 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 - Types of Bridges and Dams - introduction to highway, railway, airport, docks and harbor.

UNIT IV INTERNAL COMBUSTION ENGINES AND POWER PLANTS 9

Classification of Power Plants - 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 – 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.

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.

TOTAL: 45PERIODS

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TEXT BOOKS:

- 1 Shanmugam G, Palanichamy M S, "Basic Civil and Mechanical Engineering", 1st Edition, Tata McGraw Hill, 2018.
- 2 Mamlouk M S, Zaniewski J P, "Materials for Civil and Construction Engineering, 4th Edition, Pearson Education, 2021.

REFERENCES:

- 1 T P Kanetkar, "Surveying and Levelling", Vols. I and II, United Book Corporation, 2014.
- 2 Ramamrutham S, "Basic Civil Engineering", 4th Edition, Dhanpat Rai Publishing Company Ltd., 2018.
- 3 Arora C P, "Refrigeration and Air Conditioning", 4th Edition, Tata McGraw Hill, 2021.

ONLINE RESOURCES:

- 1 <https://www.digimat.in/npTEL/courses/video/105104101/L01.html>
- 2 <https://www.coursera.org/courses?query=civil%20engineering>
- 3 <https://www.classcentral.com/subject/mechanical-engineering>

COURSE OUTCOMES:

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

- CO1** Summarise the specialized sub-disciplines in civil and mechanical engineering and their contribution to the welfare of society.
- CO2** Explain the basics of surveying and the civil engineering materials used in construction.
- CO3** Summarise the components of the building and the infrastructure facilities.
- CO4** Describe the working principles and components used in power plant cycle, petrol and diesel engines, boilers and pumps.
- CO5** Explain the refrigeration and Air-conditioning system.

CO - PO - PSO MAPPING:

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

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தமிழர் மரபு
(Common to all Branches)

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நோக்கம்:

- பாரம்பரியக் கலாச்சாரத்தின் நுண்ணறிவையும் மற்றும் கட்டிடக்கலையின் அற்புதங்களில் நடைபெறும் பொறியியல் நுட்பங்களை எடுத்துரைப்பதாகும்.
- தமிழ்மொழி, பண்பாடு, கலைகள், மரபுகளின் வரலாற்றைப் பற்றி எடுத்துரைப்பதன் நோக்கமாகும்.
- அந்தணர்க்கும் அரசர்க்கும் கல்வியையும், வணிகர்களுக்கு வியாபாரத்தையும், வேளாண் மக்களுக்கு உழவுத்தொழிலையும் தமிழர் மரபின் எடுத்துரைப்பதாகும்.

அலகு - 1 மொழி மற்றும் இலக்கியம் 3
இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு - 2 மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை 3

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளூர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாத்தஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு - 3 நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் 3

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

அலகு - 4 தமிழர்களின் திணைக்கோட்பாடுகள் 3

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

அலகு - 5 இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு 3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறபகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுய மரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிக்கள் - தமிழ்ப் புத்தகங்களின் அச்ச வரலாறு.

TOTAL: 15 PERIODS

TEXT BOOKS:

- முனைவர் ஆ. பூபாலன் "தமிழர் மரபு", வி.ஆர்.பி. வெளியீடு புதிய பாடத்திட்டம் 2023 - 24 அண்ணா பல்கலைக்கழகம்.

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2. முனைவர் ஆ. ஹேமமாலினி “தமிழர் மரபு”, வி.ஆர்.பி. வெளியீடு புதிய பாடத்திட்டம் 2023 – 24 அண்ணா பல்கலைக்கழகம்.

REFERENCES:

1. முனைவர் கே.கே. பிள்ளை “தமிழக வரலாறு, மக்களும், பண்பாடும்,” வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 1972.
2. முனைவர் இல. சுந்தரம், “பொருதை, ஆற்றங்கரை நாகரிகம்,” வெளியீடு: தொல்லியல் துறை மற்றும் தமிழ்நாடு அரசுத் துறை, 2022.
3. Dr. S. V. சுப்பிரமணியன், னுச.மு.ஐ. திருநாவுக்கரசு “தமிழர்களின் வரலாற்று பாரம்பரியம்”, சர்வதேச தமிழ் ஆய்வு நிறுவனம், 2022.

ONLINE RESOURCES:

1. <https://unacademy.com/lesson/introduction-and-administrative-system-of-cultural-heritage-of-tamil-in-tamil/ATMT6TK4>
2. <https://unacademy.com/lesson/society-and-sangam-literature-in-tamil/C5QL4L0Q>
3. <https://unacademy.com/lesson/classical-tamil-literature-epigraphy-and-hero-stones-in-tamil/817FIREX>

COURSE OUTCOMES:

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

- CO1 மொழிகள், இலக்கியங்கள் மற்றும் காப்பியங்கள் பற்றி தொகுக்க இயலும்.
Summarize about languages, literatures and scripts.
- CO2 நடுகற்கள், நவீன சிற்பங்கள், ஐம்பொன் சிலைகள், மற்றும் இசைக் கருவிகள் பற்றி விளக்க இயலும்.
Explain middle stone, modern sculptures, panchaloga idols and musical instruments.
- CO3 நாட்டுப்புறத் தெய்வங்கள், கலைகள் மற்றும் வீர விளையாட்டுகள் பற்றி விளக்க இயலும்.
Explain about the folk gods, arts and heroic sports.
- CO4 தமிழர்களின் திணைக்கோட்பாடுகள் பற்றி தொகுக்க இயலும்.
Summarize the political theories of tamils.
- CO5 இந்திய தேசிய இயக்கம், மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு பற்றி தொகுக்க இயலும்.
Summarize Indian national movement contribution of Tamils to Indian culture.

CO – PO – PSO MAPPING:

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

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U23EP101

ENGINEERING PRACTICES LABORATORY
(Common to all branches)

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Prerequisites: Nil

COURSE OBJECTIVES:

- Drawing pipeline plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in common household woodwork.
- Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping In parts; Assembling simple mechanical assembly of common household equipment's; Making a tray out of metal sheet using sheet metal work.
- Wiring various electrical joints in common household electrical wire work. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP - A (CIVIL & MECHANICAL)

PART I CIVIL ENGINEERING PRACTICES

I. PLUMBING WORK:

1. Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
2. Preparing plumbing line sketches.
3. Laying pipe connection to the delivery side of a pump.
4. Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

II. WOOD WORK:

1. Sawing,
2. Planing
3. Making joints like T-Joint Mortise joint, Tenon joint, and Dovetail joint.
4. Studying joints in door panels and wooden furniture.
5. Studying common industrial trusses using models.

PART II MECHANICAL ENGINEERING PRACTICES

I. WELDING WORK:

- a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
- b) Practicing gas welding.

II. BASIC MACHINING WORK:

- a) (Simple) Turning.
- b) (Simple) Drilling.
- c) (Simple) Tapping.

III. ASSEMBLY WORK:

- a) Assembling a centrifugal pump.
- b) Assembling a household mixer.
- c) Assembling an air conditioner.

IV. SHEET METAL WORK:

- a) Making of a square tray.

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V. FOUNDRY WORK:

- a) Demonstrating basic foundry operations.

GROUP B (ELECTRICAL AND ELECTRONICS)

PART III ELECTRICAL ENGINEERING PRACTICES

- a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket.
- b) Staircase wiring.
- c) Fluorescent Lamp wiring with introduction to CFL and LED types.
- d) Energy meter wiring and related calculations/ calibration.
- e) Study of Iron Box wiring and assembly.
- f) Study of Fan Regulator (Resistor type and Electronic type using Diac/ Triac/ quadrac).
- g) Study of emergency lamp wiring/Water heater.

PART IV ELECTRONICS ENGINEERING PRACTICES

I. SOLDERING WORK:

- a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

- a) Assembling and testing electronic components on a small PCB.

II. ELECTRONIC EQUIPMENT STUDY:

- a) Study an element of smart phone.
- b) Assembly and dismantle of LED TV.
- c) Assembly and dismantle of computer/ laptop.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- CO1** Apply the basic concept of Plumbing and carpentry in various Residential buildings.
CO2 Apply the concept of arc welding in welding of steel plate.
CO3 Analyze the basics of machining operations and sheet metal works.
CO4 Apply the various electrical joints in common household electrical wire work.
CO5 Apply the basic concept of assemble and testing of simple electronic components on PCB.

CO - PO - PSO MAPPING:

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

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U23EN102

PROFESSIONAL COMMUNICATION LABORATORY
(Common to all branches)

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Prerequisites: Basic Communication Skills

COURSE OBJECTIVES:

- To enhance their employability and career prospects by equipping them with soft skills.
- To emphasize the importance of interview etiquette and prepare for job interviews.
- To cultivate a general awareness of current affairs to engage in a professional world.

UNIT I

Introduction to basic Communication Skills of learning – Listening – Empathetic Listening- Key role in Organizational communication; Speaking – role plays – asking about routine actions and expressing opinions. 9

UNIT II

Introduction to Soft Skills – Hard skills & soft skills - employability and career Skills – Grooming as a professional with values – Time Management – General awareness of Current Affairs. 9

UNIT III

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice – presenting the visuals effectively – 5 minute presentations. 9

UNIT IV

Introduction to Group Discussion – Participating in group discussions – understanding group dynamics – brainstorming the topic – questioning and clarifying – GD strategies- activities to improve GD skills. 9

UNIT V

Interview etiquette – dress code – body language – attending job interviews – telephone/Skype interview -one to one interview & panel interview – FAQs related to job interviews. 9

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- CO1** Apply communication proficiency by mastering empathetic listening and speaking skills.
- CO2** Apply soft skills fostering comprehensive competence.
- CO3** Apply effective techniques to deliver presentations in all aspects.
- CO4** Apply effective strategies for active participation in Group Discussion.
- CO5** Apply interview etiquette to navigate various interview formats for Job Interviews.

CO – PO – PSO MAPPING:

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

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U23EN201

TECHNICAL ENGLISH - II
(Common to all branches)

L T P C
3 0 0 3

Prerequisites: Basics of Communication discourse

COURSE OBJECTIVES:

- To develop a high level of proficiency in the English language, encompassing LSRW skills to engage effectively.
- To equip students with a strong foundation in English grammar and vocabulary to understand technical texts.
- To foster critical thinking skills including the ability to evaluate texts critically.

UNIT I GENERAL READING AND FREE WRITING 9

Listening –Short texts (Listening to Audio & Video) Types of Listening – formal and informal conversations – Telephone conversation; Listening to voicemail & messages; **Speaking** – Basics in speaking – speaking on given topics & situations – recording speeches and strategies to improve; **Reading** – Critical Reading – finding key information in a given text – shifting facts from opinions; **Writing** – free writing on any given topic – autobiographical writing, developing hints, Note – Making; **Grammar** – Tenses; **Vocabulary Development** – Word Formation.

UNIT II LISTENING AND SUMMATION 9

Listening – Listening to podcasts / anecdotes / event narration, documentaries and interviews with celebrities; **Speaking** – Narrating personal experiences / events / Reporting and summarizing documentaries / podcasts / interviews; **Reading** – Reading biographies, travelogues, newspaper reports, Excerpts from literature and travel & technical blogs. **Writing** –Short Report on an event (field trip etc.) **Grammar** – Question types: Wh / Yes or No; **Vocabulary Development** – One word substitution.

UNIT III SPEAKING AND ANALYSIS SKILLS 9

Listening – Dialogues & Conversations, focused audio track – **Speaking** – Role Play – Asking about routine actions and Expressing Opinions – Group Interaction – Speaking in formal situations (teachers, officials, foreigners); **Reading** – Reading longer texts & Making a Critical Analysis of the given text; **Writing** – Types of Paragraphs and Essays – Rearrangement of Jumbled sentences; **Grammar** - Cause & Effect Expressions; **Vocabulary Development** – Synonyms & Antonyms.

UNIT IV READING AND LANGUAGE PROGRESSION 9

Listening – Listening to Dialogues or conversations and completing exercises based on them; **Speaking** – Speaking about one – speaking about one’s friend; **Reading** – Comprehension, Reading Different Types of Texts – magazines; **Writing** – Letter Writing - formal or informal letters – E Mails – Conventions of personal email; **Grammar** – Discourse Markers (connectives & sequence words); **Vocabulary development** – Homonyms and Homophones.

UNIT V COMPREHENSIVE WRITING 9

Listening –Listening to Speeches / Presentations, Listening to broadcast and telecast from

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Radio and TV; **Speaking** – Participating in Conversations – short group conversations – Making presentations on given topics; **Reading** –Email communication – Reading the attachment files having a poem / joke / proverb; **Writing** – Creative writing, Poster making, dialogue writing; **Grammar** – Degrees of Comparison, Fixed / Semi-Fixed Expressions; **Vocabulary Development** Abbreviations & Acronyms (as used in technical contexts).

TOTAL: 45 PERIODS

TEXT BOOKS:

- 1 Venkatraman G, "Effective Technical Communication" 1st Edition, Pearson Education, 2022.
- 2 Lakshminarayanan K R, "English for Communication", Scitech Publications, 2022.

REFERENCES:

- 1 Raman, Meenakshi, Sharma, Sangeetha, "Technical Communication Principles and Practice", Oxford University Press, New Delhi, 2015.
- 2 Sharma Sangeetha, Mishra Binod, "Communication Skills for Engineers and Scientists", 2nd Edition, Prentice Hall of India, 2023.
- 3 Ruchi Agarwal, "Academic Writing for Students: A Practical Guide", Eliva Press, 2024.

ONLINE RESOURCES:

- 1 https://onlinecourses.nptel.ac.in/noc22_hs05/preview
- 2 <https://www.coursera.org/specializations/creative-writing>
- 3 <https://www.coursera.org/courses-writing>

COURSE OUTCOMES:

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

- CO1** Apply the concepts of writing in an effective way.
CO2 Write concise reports in a professional context.
CO3 Write different kinds of Paragraphs and Essays.
CO4 Write Email and formal / informal letters without grammatical errors.
CO5 Analyze collaborative work through writing process.

CO – PO – PSO 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

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U23MA201	VECTOR CALCULUS AND COMPLEX FUNCTIONS	L	T	P	C
	(Common to all branches)	3	1	0	4

Prerequisites: Engineering Mathematics

COURSE OBJECTIVES:

- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems
- To make the students to understand the vector calculus such as divergence, curl needed, for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas.

UNIT I **DIFFERENTIAL EQUATIONS** **12**

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Linear differential equation with variable coefficients – Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients – Undetermined coefficients.

UNIT II **BASICS OF VECTOR CALCULUS** **12**

Gradient and directional derivative – Divergence and curl – Vector identities – Irrotational and solenoidal vector fields – Work done by a force – Conservative force field.

UNIT III **APPLICATIONS OF VECTOR CALCULUS** **12**

Line integral over a plane curve – Surface integral – Area of a curved surface – Volume integral – Green’s, Gauss divergence and Stoke’s theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT IV **ANALYTIC FUNCTIONS** **12**

Analytic functions – Necessary and sufficient conditions for analyticity in cartesian and polar coordinates – Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping – Mapping by functions $(z + a, az, z^2, 1/z)$ – Bilinear transformation

UNIT V **COMPLEX INTEGRATION** **12**

Line integral – Cauchy’s integral theorem – Cauchy’s integral formula – Taylor’s and Laurent’s series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semi – circular contour (without poles on real axis).

TOTAL: 60 PERIODS

TEXT BOOKS:

- 1 B S Grewal, “Higher Engineering Mathematics”, Khanna Publishers, 45th Edition, 2020.
- 2 E. Kreyszig, “Advanced Engineering Mathematics”, John Wiley & Sons, 10th Edition, 2020.

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REFERENCES:

- 1 H K Dass, "Advanced Engineering Mathematics", S. Chand & Company Ltd., 20th Edition, 2019.
- 2 Ravish R Singh, Mukul Bhatt, "Advanced Engineering Mathematics", 2nd Edition, Tata McGraw Hill, 2020.
- 3 H C Taneja, "Advanced Engineering Mathematics", Dreamtech Press, 2019.
- 4 T K V Iyengar, M V A A N Prasad, B Krishna Gandhi, "Engineering Mathematics", Special Edition, S. Chand & Company Ltd., 2023.

ONLINE RESOURCES:

- 1 <https://nptel.ac.in/courses/111105134>
- 2 <https://nptel.ac.in/courses/111107111>
- 3 <https://nptel.ac.in/courses/111103070>

COURSE OUTCOMES:

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

- CO1** Solve higher order differential equations of different types for engineering applications.
- CO2** Explain the concepts of vector calculus.
- CO3** Evaluate line, surface and volume integrals in various vector fields using Greens, Stokes and Gauss theorems.
- CO4** Analyze the properties and mappings for constructing analytic functions.
- CO5** Evaluate the complex and contour integral using Cauchy's theorem.

CO - PO - PSO MAPPING:

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

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U23PH201 PHYSICS FOR ELECTRICAL AND ELECTRONICS ENGINEERS L T P C
Prerequisites: Engineering Physics 3 0 0 3

COURSE OBJECTIVES:

- To enable the students effectively understand the characteristics, and properties of the conductor, semiconductor.
- To instil knowledge on physics of magnetic and superconducting materials.
- To inculcate an idea of significance of optoelectronic devices, new engineering materials and their applications.

UNIT I ELECTRICAL PROPERTIES OF MATERIALS 9

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – success and failures of Classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals- energy bands in solids.

UNIT II SEMICONDUCTOR PHYSICS 9

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – compound semiconductors-direct and indirect band gap – n-type and p-type semiconductor: derivation of carrier concentration – variation of Fermi level with temperature and impurity concentration-Hall effect –Determination of Hall coefficient, applications- experimental verification of Hall effect – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS 9

Origin of magnetic moment -- magnetic properties of Dia, Para, Ferro, anti-Ferro and ferrite materials – Domain theory – Hysteresis – soft and hard magnetic materials – Superconductivity: properties – Type I and Type II superconductors – BCS theory of Superconductivity (Qualitative) – High temperature superconductors – Applications of superconductors: SQUID, cryotron, magnetic levitation.

UNIT IV OPTICAL PROPERTIES OF MATERIALS 9

Classification of optical materials – carrier generation and recombination processes – Absorption emission and scattering of light in metals, insulators and semiconductors (concepts) – opto electronic devices: photo detectors, solar cell, LED, organic LED, Laser diodes – Optical data storage techniques.

UNIT V NEW ENGINEERING MATERIALS 9

Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application – Metallic glasses: properties, preparation and applications – Nanomaterials: quantum Structures: Q-dot, wire, well- single electron phenomenon: coulomb blockade effect – Single electron transistor – Carbon Nano tubes (CNT): properties and applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

- 1 S O Kasap, "Principles of Electronic Materials and Devices ", Tata McGraw Hill, 2020.

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- 2 Donald A Neamen, "Semiconductor Physics and Devices Basic Principles", Jain Book Agency, 2024.

REFERENCES:

- 1 D W Snoke, "Solid-state Physics: Essential Concepts", 2nd Edition, Cambridge University Press, 2020.
- 2 Kelly S Potter, Joseph Simmons, "Optical Materials", 2nd Edition, Elsevier, 2021.
- 3 Visakh P M, Artem Semkin, R Balakrishnan, S Lazovic, "Nanotechnology in Electronics: Materials, Properties, Devices", John Wiley & Sons, 2022.

ONLINE RESOURCES:

- 1 https://onlinecourses.nptel.ac.in/noc24_ph05/preview
- 2 https://onlinecourses.nptel.ac.in/noc24_ph02/preview
- 3 https://onlinecourses.nptel.ac.in/noc21_ph14/preview

COURSE OUTCOMES:

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

- CO1** Explain the electrical properties of materials based on classical, quantum free electron theories.
- CO2** Describe the fundamentals of semiconductor Physics.
- CO3** Summarize various types of magnetic and superconducting materials and its applications.
- CO4** Apply the optical properties of materials in functioning of optoelectronic devices.
- CO5** Explain the various new engineering materials, nano electronic devices and its applications.

CO - PO - PSO MAPPING:

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	2	2	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	-	-	1
CO3	2	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	1	1	-	-	-	-	1
CO5	2	2	-	-	-	1	1	-	-	-	-	1

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U23CY101

ENGINEERING CHEMISTRY
(Common to all branches)

L T P C
3 0 0 3

Prerequisites: Fundamentals of Basic Chemistry

COURSE OBJECTIVES:

- To make the students conversant with water treatment techniques and the electrochemical reactions.
- To facilitate the understanding of fuel classification, preparation, combustion and environmental impact.
- To acquire a deep understanding of renewable energy sources and nano materials, their properties and applications.

UNIT I WATER AND ITS TREATMENT 9

Water: Sources and impurities, hardness, alkalinity. Boiler troubles: Scale and sludge. Treatment of boiler feed water: Internal treatment (sodium aluminate and calgon conditioning) and External treatment Ion exchange demineralization process, Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination), Desalination of brackish water: Reverse Osmosis.

UNIT II ELECTRO CHEMISTRY AND DEVICE CORROSION 9

Electrochemistry: Introduction, Electrochemical cells – electrolytic cell – reversible and irreversible cells. Electrode potential – Oxidation and reduction Potentials – emf, Nernst equation and applications. Reference electrodes – Calomel electrode – Electro chemical series – its applications.

Device Corrosion: Introduction- chemistry of IC and PCB – causes of corrosion on IC, PC- miniaturization and complex material utilization- forms of corrosion – anodic and cathodic corrosion-Prevention of corrosion.

UNIT III FUELS AND COMBUSTION 9

Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method), Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking – octane number, diesel oil – cetane number; Power alcohol and biodiesel.

Combustion of Fuels: Introduction: Calorific value – higher and lower calorific values, Theoretical calculation of calorific value; Flue gas analysis – ORSAT Method. CO₂ emission and carbon foot print.

UNIT IV ENERGY SOURCES AND STORAGE DEVICES 9

Solar energy conversion: Principle, working and applications of solar cells; recent developments in solar cell materials. Wind energy; Geothermal energy. Hydrogen as fuel: Sources of hydrogen – Hydrogen production methods – electrolysis, limitations and applications.

Storage Devices: Batteries – Types of batteries, Primary battery – dry cell, Secondary battery – lead acid battery and lithium – ion battery; Electric vehicles working principles.

UNIT V NANO CHEMISTRY 9

Basics: Distinction between molecules, nanomaterials and bulk materials; Types of nanomaterials: Definition, properties and uses of nano particles and nanotube. Preparation

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of nano materials: laser ablation, chemical vapours deposition, electrochemical deposition and electro spinning. An application of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

TOTAL: 45 PERIODS

TEXT BOOKS:

- 1 Jain P C, Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 2021.
- 2 Chatla Naga Babu, G Kanthimathi, "Text Book of Engineering Chemistry", 1st Edition, AG Publishing House, 2023.

REFERENCES:

- 1 Reza K Haghi, Fransico Torrens, "Engineering Technology and Industrial Chemistry with Applications", Apple Academic Press, 2021.
- 2 Anna Klinkova, "Nano Chemistry", 1st Edition, Springer, 2023.
- 3 Stroud N, "Fundamentals of Engineering Chemistry", American Academic Publishers, 2023.

ONLINE RESOURCES:

- 1 https://onlinecourses.nptel.ac.in/noc22_ch27/preview
- 2 <https://nptel.ac.in/courses/105107207>
- 3 https://onlinecourses.nptel.ac.in/noc19_mm21/preview

COURSEOUTCOMES:

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

- C01** Describe the type of factors present in boilers and the method used to treat hard water.
- C02** Apply the principles of electrochemistry to corrosion process and the applications of protective coatings to overcome the corrosion.
- C03** Summarize the various solid, liquid and gaseous fuels manufacturing methods and basic reactions involved in combustion reaction.
- C04** Describe the types of batteries their reactions and the significance of storage renewable energy resource.
- C05** Apply the basic concepts of nanomaterials and its application in various sectors.

CO - PO - PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	2	2	1	-	-	1	1	-	-	-	-	1
C02	3	2	1	-	-	1	1	-	-	-	-	1
C03	2	2	1	-	-	1	1	1	-	-	-	1
C04	2	2	1	-	-	1	1	-	-	-	-	1
C05	3	2	1	-	-	1	-	-	-	-	-	1

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U23PY201	PROBLEM SOLVING AND PYTHON PROGRAMMING	L	T	P	C
	(Common to all Branches)	3	0	2	4

Prerequisites: Programming in C

COURSE OBJECTIVES:

- To understand the basics of algorithmic problem solving using Python conditionals and loops
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data and to input/output with files in Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING 9

Fundamentals of Computing – Identification of Computational Problems - Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion), Towers of Hanoi, insert a card in a list of sorted cards.

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode, debugging; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points,

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, Strings: string slices, immutability, string functions and methods, Lists as arrays, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing; Illustrative programs: histogram, Retail bill preparation, sorting.

UNIT V FILES, MODULES, PACKAGES 9

Files and exceptions: text files, reading and writing files, format operator; errors and exceptions, handling exceptions, modules, packages; Illustrative programs: GCD, setting offset in a file, wordcount, copyfile, voter's age, validation, marks range validation.

45 PERIODS

PRACTICAL EXERCISES:

- 1 Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing)
- 2 Python programming using simple statements and expressions (exchange the values of two variables, compute Simple Interest).
- 3 Scientific problems using Conditionals and Iterative loops. (Prime factor of an Integer, Bin to Decimal, Octal and Hexa).
- 4 Implementing programs using Functions. (Factorial, largest number in alist).
- 5 Implementing programs using Strings. (Reverse, palindrome, character count, replacing characters).
- 6 Implementing operations of lists, tuples, and dictionaries.

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- 7a Implementing operations of file handling. (Copy from one file to another, word count).
 7b Implementing real-time/technical applications using Exception handling. (Divide by zero error, voter's age validity, student mark range validation).

30 PERIODS
TOTAL: 75 PERIODS

TEXT BOOKS:

- 1 Allen B Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
- 2 Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES:

- 1 Paul Deitel, Harvey Deitel, "Python for Programmers", 1st Edition, Pearson Education, 2021.
- 2 G Venkatesh, Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
- 3 John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modelling and Understanding Data", 3rd Edition, MIT Press, 2021
- 4 Eric Matthes, "Python Crash Course, A Hands-on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
- 5 Martin C Brown, "Python: The Complete Reference", 4th Edition, Tata McGraw Hill, 2018.

ONLINE RESOURCES

- 1 <http://www.digimat.in/nptel/courses/video/106106212/L01.html>
- 2 https://onlinecourses.swayam2.ac.in/cec24_cs03/preview
- 3 https://onlinecourses.swayam2.ac.in/cec24_cs01/preview

COURSE OUTCOMES:

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

- CO1** Solve simple computational problems using notations.
CO2 Write python programs using statements and Expressions.
CO3 Apply control flow and functional concepts in a user define problems.
CO4 Apply python data structures - list, tuples and dictionaries for compound data.
CO5 Describe file handling and exceptional handling in python for solving problems.

CO - PO - PSO MAPPING

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	3	2	1	2	-	-	-	1	1	1	-	1
CO2	3	3	3	3	1	-	-	1	1	1	-	1
CO3	3	2	1	2	1	-	-	1	1	1	-	1
CO4	3	2	1	2	1	-	-	1	1	1	-	1
CO5	2	2	1	1	1	-	-	1	1	1	-	1

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U23EE201

ELECTRIC CIRCUIT ANALYSIS

L T P C

Prerequisites: Engineering Physics

3 1 0 4

COURSE OBJECTIVES:

- To introduce network topology and key concepts to analyze electrical circuits using basic laws and Theorems.
- To educate on obtaining the transient response of circuits with DC & Sinusoidal excitations.
- To introduce the concepts of resonance, coupled circuits and three phase circuits.

UNIT I NETWORK TOPOLOGY & DC CIRCUIT ANALYSIS 12

Introduction to Network topology, Trees, Resistive elements - Ohm's Law - Network reduction: Resistors in series and parallel circuits, voltage and current division, source transformation, star delta conversion - Kirchoff's laws - Mesh current and node voltage - methods of analysis with dependent and independent sources.

UNIT II NETWORK THEOREMS FOR DC AND AC CIRCUITS 12

Superposition Theorem, Thevenin's and Norton's Theorem - Maximum power transfer theorem - Reciprocity Theorem - Millman's theorem - DC & AC Circuit Analysis using network theorems.

UNIT III TRANSIENT RESPONSE ANALYSIS 12

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 RESONANCE & COUPLED CIRCUITS 12

Series and parallel resonance - frequency response - Quality factor and Bandwidth - Self and mutual inductance- Dot rule - Coefficient of coupling - Single tuned circuits - Double tuned circuits.

UNIT V THREE PHASE CIRCUITS 12

A.C. circuits - Average and RMS value - Phasor Diagram - Power, Power Factor - 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.

TOTAL: 60 PERIODS

TEXT BOOKS:

- 1 William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", Tata McGraw Hill, 6th Edition, New Delhi, 2024.
- 2 J David Irwin, R Martin Nelms, "Engineering Circuit Analysis", 12th Edition, John Wiley & Sons, 2022.

REFERENCES:

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- 1 Chakrabarti A, "Circuits Theory (Analysis and Synthesis)", Dhanpat Rai & Sons, 2020.
- 2 Joseph A. Edminister, Mahmood Nahvi, "Electric circuits: Schaum's Series", 1st Edition Tata McGraw Hill, 2019.
- 3 Richard C Dorf, James A Svoboda, "Introduction to Electric Circuits", 7th Edition, John Wiley & Sons, 2018.
- 4 Sudhakar A, Shyam Mohan S P, "Circuits and Networks Analysis and Synthesis", Tata McGraw Hill, 2017.

ONLINE RESOURCES:

- 1 <https://nptel.ac.in/courses/108108112>.
- 2 <https://archive.nptel.ac.in/courses/108/104/108104139>
- 3 <https://archive.nptel.ac.in/courses/108/105/108105159>

COURSE OUTCOMES:

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

- CO1** Analyze DC circuits using basic circuit laws.
CO2 Apply network theorems to determine the behaviour of the given DC and AC circuit
CO3 Analyze transient response of RL, RC & RLC circuits to step and sinusoidal input
CO4 Describe the behaviour of resonance & magnetically coupled circuits.
CO5 Analyze the power, line/ phase voltage and currents of three phase circuits.

CO - PO - PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	-	-	-	-	-	3	2
CO2	2	2	1	1	-	-	-	-	-	-	-	-	3	2
CO3	2	2	1	1	-	-	-	-	-	-	-	-	3	2
CO4	2	2	1	1	-	-	-	1	-	-	-	1	3	2
CO5	2	2	1	1	-	-	-	1	-	-	-	1	3	2

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U23TA201

தமிழரும் தொழில்நுட்பமும்
(Common to all Branches)

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நோக்கம்:

- அறிவியல் மற்றும் பொறியியல் சார்ந்த அறிவுத்திறனைப் பெருக்குவதன் மூலம் உலக அளவில் அவர்களின் தரத்தை உயர்த்துவதன் நோக்கமாகும்.
- தமிழர் தொழில்நுட்பம் ஏனைய நாகரிகங்களுக்கு இணையான வளர்ச்சியைக் கொண்டதே இதன் நோக்கமாகும்.
- வேளாண்மை, கட்டிடக்கலை, இசைக்கருவிகள், கப்பற்கலை, போர்க்கலை என பல துறைகளில் தமிழர் தொழில்நுட்பத்தை சிறந்து விளங்குவதே நோக்கமாகும்.

அலகு - 1 நெசவு மற்றும் பாணைத் தொழில்நுட்பம் 3
சங்க காலத்தில் நெசவுத் தொழில் - பாணைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறில் குறியீடுகள்.

அலகு - 2 வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் 3
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை வடிவமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர்காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோவில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

அலகு - 3 உற்பத்தித் தொழில்நுட்பம் 3
கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு - 4 வேளாண்மை மற்றும் நீர்பாசனத் தொழில்நுட்பம் 3
அணை, - ஏரி, குளங்கள், மதகு - சோழர்காலக் குமிழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பொருங்கடல் குறித்த பண்டைய அறிவு - அறிவு சார் சமூகம்.

அலகு - 5 அறிவியல் தமிழ் மற்றும் கணித்தமிழ் 3
அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

TOTAL: 15 PERIODS

TEXT BOOKS:

- 1 முனைவர் ஆ. பூபாலன் "தமிழரும் தொழில்நுட்பமும்" வி.ஆர்.பி. வெளியீடு புதிய பாடத்திட்டம் 2023 - 2024 அண்ணா பல்கலைக்கழகம்.
- 2 முனைவர் ஆ. வேறமமாலினி "தமிழரும் தொழில்நுட்பமும்" வி.ஆர்.பி. வெளியீடு புதிய பாடத்திட்டம் 2023 - 2024 அண்ணா பல்கலைக்கழகம்.

REFERENCES:

- 1 முனைவர் கே. கே. பிள்ளை "தமிழக வரலாறு, மக்களும், பண்பாடும்," வெளியீடு:

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- தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம், 1972.
- 2 முனைவர் இல. சுந்தரம், “பொருறை, ஆற்றங்கரை நாகரிகம்,” வெளியீடு: தொல்லியல் துறை மற்றும் தமிழ்நாடு அரசுத் துறை, 2022.
- 3 Dr. S. V. சுப்பிரமணியன், னுச.மு.னு. திருநாவுக்கரசு “தமிழர்களின் வரலாற்று பாரம்பரியம்”, சர்வதேச தமிழ் ஆய்வு நிறுவனம், 2022.

ONLINE RESOURCES:

- 1 <https://youtu.be/7qTXrUs02fs?si=SBBluhJu1i14o6yw>
- 2 <https://youtu.be/A0mxzo4f-s4?si=1C92FLv93BliZ2pn>
- 3 https://youtu.be/Qia72HEV_uE?si=dp06r09Gi1SsKEyQ

COURSE OUTCOMES:

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

- CO1** தமிழின் தொன்மையான வரலாறு மற்றும் தொழில் நுட்பத்தை தொகுக்க இயலும்.
Summarize the ancient history and technology of Tamil.
- CO2** சங்க கால வாழ்க்கை முறை மற்றும் கட்டிடக்கலை நுட்பங்களைப் பற்றி விளக்க இயலும்.
Explain the lifestyle and architectural techniques of the sangam period.
- CO3** பண்டைய தமிழ் மக்களின் வணிக நடை முறைகள் மற்றும் நாணய பரிமாற்றம் பற்றி விளக்க இயலும்.
Explain the business practices and currency exchange of ancient Tamil people.
- CO4** சங்க காலத்தில் வேளாண்மை மற்றும் நீர்பாசனத் தொழில்நுட்ப முறைகளைப் பற்றி தொகுக்க இயலும்.
Summarize the Agriculture and Irrigation Technology in sangam period.
- CO5** கணினி பயன்பாடுகளில், தமிழின் தொழில்நுட்ப வளர்ச்சியினைப் பற்றி விளக்க இயலும்.
Explain the computer applications in Tamil technological development.

CO - PO - PSO MAPPING:

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

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U23PC101

PHYSICS AND CHEMISTRY LABORATORY

L T P C

(Common to all branches)

0 0 3 1.5

Prerequisites: Principles of Physics and Chemistry

COURSE OBJECTIVES:

- To provide an experimental foundation for the theoretical concepts introduced in the lectures.
- To teach how to make careful experimental observations and how to think about and draw conclusions from such data.
- To help students understand the role of direct observation in physics and chemistry to distinguish between inferences based on theory and the outcomes of experiments.

PHYSICS LABORATORY

LIST OF EXPERIMENTS (Any FIVE Experiments)

1. Determination of Young's modulus by Non uniform bending method.
2. Determination of Rigidity modulus of wire and moment of inertia using torsional pendulum.
3. Determination of Young's modulus by Simple harmonic oscillations of cantilever.
4. Determination of Wavelength of the Laser using grating.
5. Determination of Numerical aperture and acceptance angle in an optical fiber.
6. Determination of velocity of sound and compressibility of liquid –Ultrasonic Interferometer.
7. Determination of thickness of a thin sheet of wire–Air wedge.

CHEMISTRY LABORATORY

LIST OF EXPERIMENTS (Any FIVE Experiments)

1. Determination of total, temporary and permanent hardness of water by EDTA method.
2. Determination of chloride content of water sample by Argentometric method.
3. Determination of alkalinity in water sample.
4. Preparation of nanoparticles (TiO₂/ZnO/CuO) by Sol-Gel method.
5. Determination of strength of given hydrochloric acid using pH meter.
6. Conductometric titration of strong acid Vs strong base.
7. Conductometric titration of barium chloride Vs sodium sulphate.
8. Estimation of iron content of the given solution by using potentiometer.

TOTAL: 45 PERIODS

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COURSE OUTCOMES:

- CO1** Calculate the Young's modulus by non-uniform bending, simple harmonic oscillations by Torsion Pendulum.
- CO2** Calculate the thickness of a thin wire by air wedge and velocity of sound, compressibility of liquid using ultra sonic interferometer.
- CO3** Calculate the wavelength, acceptance angle and numerical aperture using laser.
- CO4** Estimate the amount of Hardness, chloride, alkalinity in water samples.
- CO5** Estimate the amount of acid, iron content present in a given solution by using pH, conductivity and potentiometric titration.

CO - PO - PSO MAPPING:

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	3	2	1	1	-	-	-	1	1	2	-	1
CO2	3	2	1	1	-	-	-	1	1	2	-	1
CO3	3	2	1	1	-	-	-	1	1	2	-	1
CO4	3	3	1	3	-	-	-	1	1	2	-	1
CO5	3	3	1	3	-	-	-	1	1	2	-	1

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U23EE202

ELECTRIC CIRCUITS LABORATORY

L T P C
0 0 3 1.5

Prerequisites: Nil

COURSE OBJECTIVES:

- To simulate various electric circuits using Pspice/ Matlab/e-Sim / Scilab.
- To gain practical experience on electric circuits, verification of theorems and power measurement.
- To design and implement resonance circuits.

LIST OF EXPERIMENTS

1. Experimental verification of series and parallel electrical circuits using fundamental laws.
2. Simulation and experimental verification of electrical circuit problems using Thevenin's theorem.
3. Simulation and experimental verification of electrical circuit problems using Norton's theorem.
4. Simulation and experimental verification of electrical circuit problems using Superposition theorem.
5. Experimental verification of Maximum Power transfer theorem.
6. Measurement of sinusoidal voltage, frequency and Power factor using analog/digital oscilloscope.
7. Simulation / Experimental validation of R-C electric circuit transients
8. Simulation /Experimental validation of R-L electric circuit transients
9. Design and implementation of series and parallel resonance circuit.
10. Experimental verification of power measurement in three phase balanced and unbalanced star & delta networks.
11. Experimental verification of Superposition theorem
12. Simulation of Maximum Power Transfer and Reciprocity theorem.
13. Simulation of RL, RC and RLC transient circuits.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- CO1** Evaluate output current and voltage for electric circuits using fundamental electrical laws & network theorems with experimental set up & simulation of PN Diode, Zener Diode, BJT, JFET and SCR.
- CO2** Design series and parallel RLC circuit and obtain its frequency response.
- CO3** Analyze transient behavior of the given RL & RC circuits using simulation and experimental methods.
- CO4** Demonstrate the measurement of sinusoidal voltage, frequency & power factor using analog & digital oscilloscope.
- CO5** Analyze the performance of the given three-phase circuit using simulation and experimental methods.

CO - PO - PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	-	-	2	2	2	-	-	3	2
CO2	3	3	3	3	2	-	-	2	2	2	-	-	3	2
CO3	3	3	2	2	2	-	-	2	2	2	-	-	3	2
CO4	3	3	2	2	-	-	-	2	2	2	-	-	3	2
CO5	3	3	2	2	2	-	-	2	2	2	-	-	3	2

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U23MA301 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS L T P C

Pre requisites: Engineering Mathematics 3 1 0 4

COURSE OBJECTIVES:

- To know the importance of partial differential equations in modelling various engineering problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To introduce the techniques of Fourier transform and Z – Transform to analyze continuous and discrete signals.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations – Singular integrals – Solutions of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients of homogeneous type.

UNIT II FOURIER SERIES 12

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 12

Classification of PDE – Method of separation of variables – Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (excluding insulated edges).

UNIT IV FOURIER TRANSFORMS 12

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

UNIT V Z – TRANSFORMS AND DIFFERENCE EQUATIONS 12

Z- transforms – Elementary properties – Inverse Z – transform (using partial fraction and residues) – Convolution theorem– Solution of difference equations using Z – transform.

TOTAL: 60 PERIODS

TEXT BOOKS:

- 1 Richard Haberman, "Applied Partial Differential Equations with Fourier Series and Boundary Value Problems", 5th Edition, Pearson Education, 2019.
- 2 B S Grewal, "Higher Engineering Mathematics", 45th Edition, Khanna Publishers, 2020.

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REFERENCES:

- 1 Macieg Borodzik, Pawel Goldstein, "Problems on Partial Differential Equations", Springer, 2019.
- 2 J O Bird, "Higher Engineering Mathematics", 9th Edition, Taylor & Francis, 2021.

ONLINE RESOURCES:

- 1 <https://nptel.ac.in/courses/111/103/111103021/>
- 2 <https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/lecture-notes/>
- 3 <https://archive.nptel.ac.in/courses/111/101/1111011153/>

COURSE OUTCOMES:

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

- CO1** Solve the various types of partial differential equations.
CO2 Solve differential equations using Fourier series.
CO3 Apply Fourier series techniques to solve one and two-dimensional heat flow and wave phenomena.
CO4 Solve the mathematical principles of Fourier transforms.
CO5 Apply Z-transform techniques in partial differential equations.

CO - PO - PSO MAPPING:

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
CO1	3	2	1	1	-	-	-	1	-	-	-	1	1	-
CO2	3	2	1	1	-	-	-	1	-	-	-	1	1	-
CO3	3	2	1	1	-	-	-	1	-	-	-	1	-	-
CO4	3	2	1	1	-	-	-	1	-	-	-	1	1	-
CO5	3	2	1	1	-	-	-	1	-	-	-	1	1	-

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U23EE301	ELECTROMAGNETIC FIELDS	L	T	P	C
Pre requisites: Engineering Mathematics		3	1	0	4

COURSE OBJECTIVES:

- To impart knowledge on the basics of electric and magnetic fields and their applications for utilization in the development of the theory for power transmission lines and electrical machines.
- To analyse the relation between the fields under time varying situations.
- To introduce the concepts of electromagnetic waves and characterizing parameters

UNIT I INTRODUCTION 12

Sources and effects of Electro-Magnetic Fields, Scalar and vector, Unit vector, Mathematical operations of Vector, Scalar and vector fields, Different Coordinate System, Operator Del, Physical interpretation of gradient, divergence and curl, Conversion between coordinate system, Expression for gradient, divergence and curl in three coordinate system.

UNIT II BASIC ELECTROSTATICS 12

Coulomb's law, Electric field, Electric Field Intensity (EFI), EFI due to - point charge, line charge, surface charge and volume charge, Electric displacement, Electric flux density, Gauss's law (scalar and vector form), Applications of Gauss law, Electric field due to - point charge, infinite long straight conductor and infinite plane sheet of charge, Divergence theorem, Stoke's theorem.

UNIT III APPLIED ELECTROSTATICS 12

Electric Potential, Relationship between E and V, Equipotential surfaces, Electric dipole and flux lines, Electric field due to dipole, Energy density in electrostatic field, Energy stored in terms of D and E, Convection and Conduction currents, Current and current density, Continuity equation for current, Poisson's and Laplace's equations, Capacitor and its capacitance, Parallel plate capacitor, Capacitors with multiple dielectrics, Spherical capacitor, Coaxial capacitor.

UNIT IV MAGNETOSTATICS AND APPLICATIONS 12

Magnetic flux density, Magnetic field intensity (MFI), Magnetic permeability, Biot-Savart's law, Applications of Biot-Savart's law, MFI due to - infinite long straight filament, finite length element, on the axis of circular loop, Ampere's Circuital law, Field due to - infinite line current, coaxial cable, Magnetic flux density, Scalar magnetic potential, Vector magnetic potential, Poisson's Equations for Magneto static field, Forces due to magnetic field, Magnetic dipole. Boundary conditions for Magnetostatic Fields.

UNIT V TIME VARYING FIELDS AND MAXWELL'S EQUATIONS 12

Faraday's law, Transformer and motional EMFs - stationary loop in time varying B field, moving loop in static B field and moving loop in time varying field, Displacement current, Maxwell's equations in point form and integral form, Power and Poynting theorem, Concept of uniform plane wave.

TOTAL: 60 PERIODS

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TEXT BOOKS:

- 1 William H Hayt, John A Buck, "Engineering Electromagnetics", 9th Edition, Tata McGraw Hill, 2020.
- 2 Mathew N O Sadiku, "Elements of Electromagnetics", 7th Edition, Oxford University Press, 2018.

REFERENCES:

- 1 Constantine Balanis, "Balanis's Engineering Electromagnetics", 3rd Edition, John Wiley & Sons, 2024.
- 2 Robert Strangeway, Steven S Holland, Kames E Richie, "Electromagnetics and Transmission lines", 2nd Edition, John Wiley & Sons, 2023.
- 3 Nathan Ida, "Engineering Electromagnetics", 4th Edition, Springer Cham Publishers, 2021.

ONLINE RESOURCES:

- 1 <https://archive.nptel.ac.in/courses/115/104/115104088/>
- 2 <http://nitttrc.edu.in/nptel/courses/video/108104099/L38.html>
- 3 <https://archive.nptel.ac.in/courses/115/106/115106122/>

COURSE OUTCOMES:

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

- CO1** Apply the vector operators on electric field and magnetic field in a three dimensional coordinate system.
- CO2** Apply the electrostatic laws and theorems to obtain electric field intensity & electric force with discrete and continuous charges.
- CO3** Apply the concepts of electrostatics to obtain the electric field, electric potential, boundary conditions & capacitance in different mediums.
- CO4** Apply the magneto static laws to obtain magnetic field intensity, flux density, force potential, energy density & torque.
- CO5** Explain the different methods of emf generation, Maxwell's equations & its applications

CO - PO - PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	-	-	-	1	-	-	-	-	3	1
CO2	3	2	1	2	-	-	-	1	-	-	-	-	3	1
CO3	3	2	1	2	-	-	-	1	-	-	-	-	3	1
CO4	3	2	1	2	-	-	-	1	-	-	-	-	3	1
CO5	2	2	1	1	-	-	-	-	-	-	-	-	3	1

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U23EE302

ELECTRON DEVICES AND CIRCUITS

L T P C

Pre requisites : Electric Circuit Analysis

3 0 2 4

COURSE OBJECTIVES:

- To understand the structure, operation and applications of basic electronic devices.
- To explore the characteristics of amplifier gain and frequency response.
- To learn the required functionality of positive and negative feedback systems.

UNIT I

PN JUNCTION DEVICES

9

PN junction diode –Structure, operation and V-I characteristics, diffusion and transition capacitance Clipping & Clamping circuits - Rectifiers – Half Wave and Full Wave Rectifier– Display devices- LED, Laser diodes, Zener diode characteristics- Zener diode Reverse characteristics – Zener diode as regulator.

UNIT II

TRANSISTORS AND THYRISTORS

9

BJT, JFET, MOSFET- structure, operation, characteristics and Biasing UJT, Thyristors and IGBT Structure and characteristics.

UNIT III

AMPLIFIERS

9

BJT small signal model – Analysis of CE, CB, CC amplifiers- Gain and frequency response – MOSFET small signal model– Analysis of CS and Source follower – Gain and frequency response- High frequency analysis.

UNIT IV

MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER

9

BIMOS cascade amplifier, Differential amplifier – Common mode and Difference mode analysis – FET input stages – Single tuned amplifiers – Gain and frequency response – Neutralization methods, Power amplifiers –Types (Qualitative analysis).

UNIT V

FEEDBACK AMPLIFIERS AND OSCILLATORS

9

Advantages of negative feedback – voltage / current, series, Shunt feedback –Positive feedback – Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators.

45 PERIODS

PRACTICAL EXERCISES:

1. Simulate and Design, Construct and Test a Voltage Regulator with Zener Diode (ZENER/6.1V) using SCILAB/MATLAB.
2. Simulate and Design, Construct and Test a Half Wave Rectifier using diode and to draw its performance characteristics using discrete Components using SCILAB/MATLAB
3. Study and plot the Drain and Transfer characteristics of a Junction Field Effect Transistor using SCILAB/MATLAB.
4. Study and plot the characteristics of Uni- Junction Transistor (UJT) using SCILAB/MATLAB
5. Verify the characteristics of LDR, Photodiode and Phototransistor

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6. Analyze the drain characteristics and transfer characteristics of MOSFET using Pspice Software.
7. Verify the working of a Half wave rectifier, Full wave rectifier and full wave bridge rectifier and measure the ripple factor.

30 PERIODS

TOTAL: 75 PERIODS

TEXT BOOKS:

- 1 Dale R Patrick, Stephen W Fardo, Ray E Richardson, "Electronic Devices and Circuit Fundamentals", 1st Edition, River Publishers, 2023.
- 2 Sedra, Smith, "Microelectronic Circuits", 7th Edition, Oxford University Press, 2017.

REFERENCES:

1. S Salaivahanan, N Sureshkumar, "Electronic Devices and Circuits", 5th Edition, Tata McGraw Hill, 2022.
2. Thomas L Floyd, "Electronic Devices", 10th Edition, Pearson Education, 2017.
3. Suman Lata Tirupati, Parvej Ahmed Alvi, "Electrical and Electronic Devices, Circuits and Materials", 2nd Edition, CRC Press, 2021.

ONLINE RESOURCES

- 1 https://onlinecourses.nptel.ac.in/noc21_ee55/preview
- 2 <https://archive.nptel.ac.in/courses/108/102/108102097/>
- 3 <https://nptel.ac.in/courses/108101091>

COURSE OUTCOMES:

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

- CO1** Evaluate the characteristics of PN junction devices (diode, Zener diode, LED and Laser diode)
- CO2** Analyze the structure and characteristics BJT, FET, MOSFET, UJT, Thyristor and IGBT
- CO3** Analyze the performance of various configurations of BJT and MOSFET based amplifier
- CO4** Explain the characteristics of MOS based cascade and differential amplifier
- CO5** Explain the operation of various feedback amplifiers and oscillators

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	1	-	-	1	-	1	-	1	3	2
CO2	2	2	3	2	1	-	-	1	-	1	-	1	3	2
CO3	2	2	3	2	1	-	-	1	-	1	-	1	3	2
CO4	2	2	1	1	1	-	-	1	-	-	-	1	3	2
CO5	2	2	1	1	1	-	-	1	-	-	-	1	3	2

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U23EE303

ELECTRICAL MACHINES - I

L T P C

Pre requisites : Electric Circuit Analysis

3 0 0 3

COURSE OBJECTIVES:

- To introduce the concept of rotating machines and the principle of electromechanical energy conversion in single and multiple excited systems
- To impart knowledge on the generation of D.C. voltages by using different type of generators and study their performance and to study the working principles of D.C. motors and their load characteristics, starting and methods of speed control.
- To familiarize with the constructional details of different type of transformers, working principle and their performance.

UNIT I BASIC CONCEPTS OF ROTATING MACHINES 9

Principles of electromechanical energy conversion – Single and multiple excited systems – m.m.f of distributed A.C. windings – Rotating magnetic field.

UNIT II DC GENERATORS 9

Constructional details – emf equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators – Armature reaction and commutation – Parallel operation of DC shunt and compound generators.

UNIT III DC MOTORS 9

Principle of operation – Back emf and torque equation – Series, Shunt and Compound motors – Characteristics - Starting – Types of starters – Speed control.

UNIT IV TRANSFORMERS 9

Constructional details of core and shell type transformers – Types of windings – Principle of operation – emf equation – Transformer on no-load – Parameters referred to HV / LV windings – Equivalent circuit – Transformer on load – Regulation – Parallel operation of single phase transformers – Auto transformer – Three phase transformers – Vector group-tap changing.

UNIT V TESTING OF DC MACHINES AND TRANSFORMERS 9

Losses and efficiency in DC machines and transformers – Condition for maximum efficiency – Testing of DC machines – Brake test, Swinburne's test, Retardation test and Hopkinson's test – Testing of transformers – Polarity test, Sumpner's test, load test – All day efficiency.

TOTAL: 45PERIODS

TEXT BOOKS:

- 1 D P Kothari, I J Nagrath, "Electric Machines", 4th Edition, Tata McGraw Hill, 2018.
- 2 P S Bimbhra, "Electrical Machinery", 1st Edition, Khanna Publishers, 2021.

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REFERENCES

- 1 A E Fitzgerald, Charles Kingsley, Stephen D Umans, "Electric Machinery", 8th Edition, Tata McGraw Hill, 2017.
- 2 B L Theraja, A K Theraja, "A Textbook of Electrical Technology", 2nd Volume, S Chand Publications, 2019.
- 3 J B Gupta, "Theory and Performance of Electrical Machines", S K Kataria & Sons, 2019.

ONLINE RESOURCES:

- 1 <https://archive.nptel.ac.in/courses/108/102/108102146/>
- 2 https://onlinecourses.nptel.ac.in/noc22_ee111/preview
- 3 <https://www.classcentral.com/course/swayam-electrical-machines-i-iitkgp-14031>

COURSE OUTCOMES:

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

- CO1** Summarize the basics of magnetic circuits and the energy conversion in electromagnetic fields.
- CO2** Comprehend the construction and winding structure of the DC Generators.
- CO3** Explain the operation, classification and performance analysis of DC motors.
- CO4** Summarize the construction, operating principle and performance analysis of transformers.
- CO5** Explain the various losses in D.C. machines and transformers and to study the different testing methods to arrive at their performance

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	1	-	-	-	-	3	2
CO2	2	2	1	1	-	-	-	1	-	-	-	-	3	2
CO3	2	2	1	1	-	-	-	1	-	-	-	-	3	2
CO4	2	2	1	1	-	-	-	1	-	-	-	-	3	2
CO5	2	2	1	1	-	-	-	1	-	-	-	-	3	2

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U23EE304 MEASUREMENTS AND INSTRUMENTATION L T P C

Pre requisites: Electric Circuit Analysis 3 0 0 3

COURSE OBJECTIVES:

- To educate the fundamental concepts and characteristics of measurement and errors
- To impart knowledge on the functional aspects of measuring instruments
- To infer the importance of various bridge circuits used with measuring instruments.

UNIT I CONCEPTS OF MEASUREMENTS 9

Instruments: classification, applications – Elements of a generalized measurement system - Static and dynamic characteristics - Errors in measurement -Statistical evaluation of measurement data.

UNIT II MEASUREMENT OF PARAMETERS IN ELECTRICAL SYSTEMS 9

Classification of instruments–moving coil and moving iron meters – Induction type, dynamometer type watt meters – Energy meter – Megger – Instrument transformers (CT & PT).

UNIT III AC/DC BRIDGES AND INSTRUMENTATION AMPLIFIERS 9

Wheatstone bridge, Kelvin double bridge - Maxwell, Hay, Wien and Schering bridges – Errors and compensation in A.C. bridges - Instrumentation Amplifiers.

UNIT IV TRANSDUCERS FOR MEASUREMENT OF NON- ELECTRICAL 9
PARAMETERS

Classification of transducers – Measurement of pressure, temperature, displacement, flow, angular velocity – Digital transducers – Smart Sensors.

UNIT V DIGITAL INSTRUMENTATION 9

A/D converters: types and characteristics – Sampling, Errors- Measurement of voltage, Current,frequency and phase - D/A converters: types and characteristics- DSO- Data Loggers – Basics of PLC programming and Introduction to Virtual Instrumentation - Instrument standards.

TOTAL:45PERIODS

TEXT BOOKS:

- 1 A K Sawhney, “A Course in Electrical and Electronic Measurements & Instrumentation”, Dhanpat Rai and Co., 2023.
- 2 Mark L Zya, “Fair Value Measurement: Practical Guidance and Implementation”, John Wiley & Sons, 2019.

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REFERENCES

- 1 E O Doebelin, D N Manik, "Measurement Systems – Application and Design", 6th Edition, Tata McGraw Hill, 2020.
- 2 Chaudhary Nakra, "Instrumentation Measurement and Analysis", 4th Edition, McGraw Hill, 2022
- 3 S Salivahanan, N Suresh Kumar, "Electronic Devices and Circuits", 4th Edition, Tata McGraw Hill, 2022.

ONLINE RESOURCES:

- 1 <https://archive.nptel.ac.in/courses/108/105/108105064/>
- 2 <http://digimat.in/nptel/courses/video/108105153/L12.html>
- 3 <http://digimat.in/nptel/courses/video/108105153/L16.html>

COURSE OUTCOMES:

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

- CO1** Explain the classification static and dynamic characteristics and error of instruments
- CO2** Describe the types of moving iron and moving coil instruments .
- CO3** Summarize the types of AC/DC bridges and instrumentation amplifiers.
- CO4** Explain the classification of transducers and smart sensors
- CO5** Describe A/D converters, D/A converters and basics of PLC programming.

CO - PO - PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	-	-	-	-	-	3	2
CO2	2	2	1	1	-	-	-	-	-	-	-	-	3	2
CO3	2	2	1	1	-	-	-	-	-	-	-	-	3	2
CO4	2	2	1	1	-	-	-	-	-	-	-	1	3	2
CO5	2	2	1	1	-	-	-	-	-	-	-	1	3	2

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U23EE305	DIGITAL LOGIC CIRCUITS	L	T	P	C
Pre requisites: Engineering Mathematics		3	0	2	4

COURSE OBJECTIVES:

- To understand Basic theorems of Boolean algebra and gate level minimization and implementation.
- To explore the Procedures for the analysis and design of combinational circuits and sequential circuits.
- To introduce digital simulation techniques for development of application oriented logic circuits.

UNIT I BOOLEAN ALGEBRA AND GATE LEVEL MINIMIZATION 9

Boolean theorems and properties –Boolean functions -Logic gates –Gate Level Minimization using Karnaugh map, POS simplification, Don't Care conditions and Quine-McCluskey method. Implementations of Logic Functions using gates-NAND–NOR implementations.

UNIT II COMBINATIONAL LOGIC CIRCUITS 9

Design of adders, subtractor, Adder with Look Ahead Carry, Subtraction using adder, Multiplexers-Combinational logic design using Multiplexers-Demultiplexers and their use in combinational logic design-Magnitude comparators, Code Converters-BCD to Binary and Binary to BCD, Priority Encoders-Decimal to BCD, Octal to Binary, Decoders-BCD to Decimal and BCD to Seven Segment Display driver.

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 PROGRAMMABLE LOGIC DEVICES 9

Asynchronous sequential logic Circuits-Transition stability, flow stability-race conditions, hazards & errors in digital circuits; analysis of asynchronous sequential logic circuits introduction to Programmability Logic Devices: PROM – PLA –PAL, CPLD-FPGA.

UNIT V DIGITAL LOGIC FAMILIES AND VHDL 9

Digital Logic Families -comparison of RTL, DTL, TTL, ECL and MOS families - operation, characteristics of digital logic family, RTL Design – combinational logic – Sequential circuit – Operators – Introduction to Packages – Subprograms – Test bench. (Simulation /Tutorial Examples: adders, counters, flip flops, Multiplexers & Demultiplexers).

TOTAL: 45 PERIODS

PRACTICAL EXERCISES

1. Implementation of Adder and Subtractor circuits.
2. Verify Code converters: Excess-3 to BCD and Binary to Gray code converter.
3. Verify the output of Parity generator and parity checking.
4. Verify the truth table of Encoders and Decoders.

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5. Design of Magnitude Comparators.
6. Synchronous and asynchronous Counters: Design and implementation of 3-bit modulo counters.
7. Shift Registers: Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitability IC's.

30 PERIODS
TOTAL:75 PERIODS

TEXT BOOKS:

- 1 M Morris Mano, "Digital Logic and Computer Design", Pearson Education, 2023.
- 2 Shamsheer S Dillon, "Fundamentals of Digital Logic Design and Computer Organization", 2021.

REFERENCES:

- 1 Thomas L Floyd, "Digital Fundamentals", 11th Edition, Pearson Education, 2019.
- 2 Narendra S Jadhav, Alpana P Adsul, "Digital Logic Design", Nirali Prakashan Publication, 2019.
- 3 Alam Mansaf, Alam Bashir, "Digital Logic Design", Pearson Education, 2015.

ONLINE RESOURCES:

- 1 https://onlinecourses.nptel.ac.in/noc21_ee75/preview
- 2 <https://freevideolectures.com/course/4238/nptel-digital-electronic-circuits>
- 3 <http://www.nitttrc.edu.in/nptel/courses/video/117105080/L06.html>

COURSE OUTCOMES:

Upon completion of the course, students will be able to

- CO1** Apply Boolean algebra and gate level minimization to design digital circuits.
- CO2** Design combinational logic circuits.
- CO3** Design various synchronous circuits using Flip Flops.
- CO4** Design asynchronous sequential circuits and programmable logic devices.
- CO5** Write VHDL code for simulating RTL, combination and sequential circuits.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	-	-	2	2	2	-	-	3	2
CO2	3	3	3	3	2	-	-	2	2	2	-	-	3	2
CO3	3	3	3	3	2	-	-	2	2	2	-	-	3	2
CO4	3	3	3	3	2	-	-	2	2	2	-	-	3	2
CO5	3	3	3	3	2	-	-	2	2	2	-	-	3	2

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U23EE306

ELECTRICAL MACHINES – I LABORATORY

L T P C

Pre requisites: Electrical Machines – I

0 0 3 1.5

COURSE OBJECTIVES:

- To determine the characteristics of DC Machines and Transformers .
- To provide hands on experience to evaluate the performance parameters of machines .
- To provide hands on experience to evaluate performance parameters of transformer.

LIST OF EXPERIMENTS

- 1 Open and load characteristics of DC shunt generator - Calculation of critical values.
- 2 Load characteristics of DC differential and Cumulative Compound Generator.
- 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.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the completion of this laboratory course, the student will be able to

- CO1 Examine the circuit with appropriate connections for DC Machine/ Transformer.
- CO2 Analyse experimentally the characteristics of different types of DC Machines.
- CO3 Analyse the speed control techniques for a DC Motor for industrial applications.
- CO4 Analyse experimentally the performance parameters of Transformers and DC Motor.
- CO5 Explain DC Motor starters and 3-phase Transformer connections.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2	-	-	-	1	1	1	-	-	3	2
CO2	3	3	1	2	-	-	-	1	1	1	-	-	3	2
CO3	3	3	1	2	-	-	-	1	1	1	-	-	3	2
CO4	3	3	1	2	-	-	-	1	1	1	-	-	3	2
CO5	2	1	1	1	-	-	-	1	1	1	-	-	3	2

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U23EEC301	EMPLOYABILITY SKILLS – I	L T P C
Prerequisites: Nil		0 0 2 1

COURSE OBJECTIVES:

- To educate and enrich the students on quantitative aptitude, logical reasoning and written communication.

UNIT I **QUANTITATIVE APTITUDE – PART 1** **6**
Numbers: Number system – Squaring of Numbers – Square Roots – Cube Roots – Divisibility – HCF, LCM – Decimals – Clocks.

UNIT II **QUANTITATIVE APTITUDE – PART 2** **6**
Averages – problem on Ages – Ratio & Proportion – Mixture and Allegations.

UNIT III **LOGICAL REASONING – PART – 1** **6**
Alphabet Test Series – Number Test Series– Analogies – Odd Words – Statement & Conclusions – Blood Relations – Odd man out.

UNIT IV **EFFECTIVE ENGLISH – SPOKEN ENGLISH** **6**
Basic Rules of Grammar – Parts of Speech – Tenses – Verbs – Sentences construction – Vocabulary – idioms & phrases – Synonyms – Antonyms – Dialogues and conversation – Exercise (Speaking).

UNIT V **WRITTEN COMMUNICATION – PART 1** **6**
Usage of noun, pronoun, adjective (Comparative Forms), Verb, Adjectives, Adverb, Tenses, Articles and Preposition – Change of Voice – Change of Speech.

TOTAL: 30 PERIODS

TEXT BOOKS:

- R S Aggarwal, “Quantitative Aptitude”, Revised Edition, S Chand & Co Ltd., 2017.
- R S Aggarwal, “A Modern Approach to Verbal and Non-verbal Reasoning”, S Chand & Co Ltd., 2018.

REFERENCES:

- Abhijit Guha, “Quantitative Aptitude”, 3rd Edition, Tata McGraw Hill, 2009.
- Raj N Bakshmi, "English Grammar Practice," 1st Edition, Orient Black Swan, 2009.
- M Ashra Rizvi, "Effective Technical Communication," 2nd Edition, Tata McGraw Hill, 2017.
- Norman Lewis, “Word Power Made Easy”, W.R. Goyal Publishers, 2020.

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U23MA401 **NUMERICAL METHODS** **L T P C**

Pre Requisites: Engineering Mathematics **3 1 0 4**

COURSE OBJECTIVES:

- To introduce the concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of interpolation in various intervals and role in engineering and technology disciplines.
- To understand the knowledge of various techniques and methods of solving various types of partial differential equations.

UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 12

Solution of algebraic and transcendental equations - Newton Raphson method - Solution of linear system of equations - Gauss elimination method - Pivoting - Gauss Jordan method - Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

UNIT II INTERPOLATION AND APPROXIMATION 12

Interpolation with unequal intervals - Lagrange's interpolation - Newton's divided difference interpolation - Difference operators and relations - Interpolation with equal intervals - Newton's forward and backward difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 12

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

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

Single step methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge - Kutta method for solving first order equations - Multi step methods - Milne's and Adams - Bash forth predictor corrector methods for solving first order equations.

UNIT V BOUNDARY VALUE PROBLEMS FOR ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 12

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

TOTAL: 60 PERIODS

TEXT BOOKS:

- 1 Stevan C Chapra, "Numerical Methods for Engineers", 8th Edition, Tata McGraw Hill, 2021.
- 2 P N Chaterjee, "Numerical Analysis", 3rd Edition, Pragati Prakashan, 2023.

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REFERENCES:

- 1 Rajesh Kumar Gupta, "Numerical Methods: Fundamentals and Applications", 1st Edition, Cambridge University Press, May 2019.
- 2 Jeffrey J Leader, "Numerical Analysis and Scientific Computation", 2nd Edition, CRC Press, 2022.
- 3 S S Sastry, "Introductory Methods of Numerical Analysis", 5th Edition, Cambridge University Press, 2019.

ONLINE RESOURCES:

- 1 <https://archive.nptel.ac.in/courses/111/107/111107105/>
- 2 <https://archive.nptel.ac.in/courses/127/106/127106019/>
- 3 <https://archive.nptel.ac.in/courses/111/104/111104030/>

COURSE OUTCOMES:

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

- C01 Solve the algebraic and transcendental equations using different methods.
- C02 Calculate unknown values in interpolation and approximation using various methods.
- C03 Evaluate the numerical integration and differentiation using the numerical techniques.
- C04 Apply the various techniques and methods for solving first and second order ordinary differential equations.
- C05 Solve the partial and ordinary differential equations with initial and boundary conditions using certain techniques with engineering applications.

CO - PO - PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	1	2	-	-	-	1	-	-	-	-	-	-
C02	3	2	1	2	-	-	-	-	-	-	-	-	-	-
C03	3	3	2	3	-	-	-	-	-	-	-	-	2	-
C04	3	2	1	2	-	-	-	1	-	-	-	1	-	-
C05	3	2	1	2	-	-	-	1	-	-	-	1	2	2

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U23EE401

TRANSMISSION AND DISTRIBUTION

L T P C

Pre requisites: Electric Circuit Analysis

3 1 0 4

COURSE OBJECTIVES:

- To impart knowledge about the configuration of the line parameters and mechanical design of performance analysis in transmission lines.
- To learn about line support by different insulators and underground cables.
- To understand and analyse the distribution system.

UNIT I

TRANSMISSION LINE PARAMETERS

12

Structure of electric power system - Parameters of single and three phase transmission lines with single and double circuits -Resistance, inductance, and capacitance of solid, stranded, and bundled conductors - Typical configuration, conductor types - Symmetrical and unsymmetrical spacing and transposition - application of self and mutual GMD; skin and proximity effects - Effects of earth on the capacitance of the transmission line.

UNIT II

MODELLING AND PERFORMANCE OF TRANSMISSION LINES

12

Performance of Transmission lines - short line, medium line and long line - equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance - transmission efficiency and voltage regulation, real and reactive power flow in lines - Ferranti effect - Formation of Corona - Critical Voltages - Effect on line Performance.

UNIT III

SAG CALCULATION AND LINE SUPPORTS

12

Mechanical design of overhead lines - Line Supports -Types of towers - Tension and Sag Calculation for different weather conditions - Methods of grounding - Insulators: Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators.

UNIT IV

UNDERGROUND CABLES

12

Underground cables - Types of cables - Construction of single-core and 3-core belted cables - Insulation Resistance - Potential Gradient - Capacitance of single-core and 3-core belted cables - Grading of cables - Power factor and heating of cables.

UNIT V

DISTRIBUTION SYSTEMS

12

Distribution Systems - General Aspects -AC and DC distributions -Concentrated and Distributed loading- Techniques of Voltage Control and Power factor improvement - Distribution Loss - Types of Substations.

TOTAL: 60 PERIODS

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TEXT BOOKS:

- 1 Nicole Gruber, "Fundamentals of Power Transmission and Distribution", Trittech Digital Media, 2018.
- 2 Anthony J Pansini, "Power Transmission and Distribution", 2nd Edition, Taylor & Francis Group, 2020.

REFERENCES:

- 1 B R Gupta, "Power System Analysis and Design", 7th Edition, S Chand, 2019.
- 2 A S Pabla, "Electric Power Distribution", 7th Edition, Tata McGraw Hill, 2019.
- 3 Noam Chomsky, "Power Systems: Conversations with David Barsamian on Global Democratic Uprisings and the New Challenges to U.S. Empire Hardcover", Haymarket Books, 2024.

ONLINE RESOURCES:

- 1 <https://www.udemy.com/course/transmission-power-engineering-fundamentals/>
- 2 <https://archive.nptel.ac.in/courses/108/102/108102047/>
- 3 <https://electrical-engineering-portal.com/courses/transmission-distribution-line-infra/>

COURSE OUTCOMES:

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

- CO1** Summarize the structure of the power system, computation of transmission line parameters for different configurations.
- CO2** Apply the transmission line concepts to determine the line performance and the impact of Ferranti effect and corona.
- CO3** Describe a mechanical design of transmission lines, grounding and to understand about the insulators in the transmission system.
- CO4** Explain the underground cables and understand the performance analysis of UG cable.
- CO5** Apply the modelling, performance analysis and modern trends in the distribution system.

CO - PO - PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	2	-	-	-	1	-	-	-	-	3	2
CO2	3	2	1	1	-	-	-	2	-	-	-	-	3	2
CO3	2	2	1	2	-	-	-	2	-	-	-	-	3	2
CO4	2	2	1	2	-	-	-	2	-	-	-	-	3	2
CO5	3	2	1	1	-	-	-	2	-	-	-	-	3	2

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U23EE402	ELECTRICAL MACHINES – II	L	T	P	C
Pre requisites : Electrical Machines – I		3	0	0	3

COURSE OBJECTIVES:

- To impart knowledge on construction, theory of operation and performance of non – salient types of synchronous generators.
- To teach the principle of operation and performance of synchronous motors under varying excitation and load condition.
- To impart knowledge on construction, principle of operation and performance, starting and speed control of of phase induction machines

UNIT I SYNCHRONOUS GENERATORS 9

Constructional details – Types of rotors – EMF equation – Synchronous reactance – Armature reaction – Voltage regulation – EMF, MMF, ZPF and ASA methods

UNIT II SYNCHRONIZING AND PARALLEL OPERATION OF SYNCHRONOUS GENERATORS 9

Synchronizing and parallel operation – Synchronizing torque - Change of excitation and mechanical input – Two reaction theory – Determination of direct and quadrature axis synchronous reactance using slip test – Operating characteristics - Capability curves

UNIT III SYNCHRONOUS MOTORS 9

Principle of operation – Torque equation – Operation on infinite bus bars - V-curves – Power input and power developed equations – Starting methods – Current loci for constant power input, constant excitation and constant power developed

UNIT IV INDUCTION MOTORS 9

Constructional details – Types of rotors – Principle of operation – Slip – Equivalent circuit – Slip-torque characteristics - Condition for maximum torque -No load and blocked rotor tests- Load test – Losses and efficiency – Circle diagram – Separation of no load losses -- Induction generators – Self-excited and Grid connected. Constructional details of single phase induction motor – Double revolving field theory and operation – Equivalent circuit – No load and blocked rotor test – Performance analysis

UNIT V STARTING AND SPEED CONTROL OF INDUCTION MOTORS 9

Need for starting – Types of starters in three phase induction motors – autotransformer , star-delta and rotor resistance starters – Methods of speed control – Change of voltage, frequency - number of poles and slip – Slip power recovery scheme. Starting methods of single-phase induction motors – Universal motor

TOTAL: 45 PERIODS

TEXT BOOKS:

- 1 A E Fitzgerald, Charles Kingsley, Stephen. D Umans, “Electric Machinery”, 6th Edition, Tata McGraw Hill, 2017.
- 2 Stephen J Chapman, “Electric Machinery Fundamentals” 4th Edition, Tata McGraw Hill, 2017.

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REFERENCES

- 1 D P Kothari and I J Nagrath, "Electric Machines", 6th Edition, Tata McGraw Hill, 2018.
- 2 P S Bhimbhra, "Electrical Machinery", 2nd Edition, Khanna Publishing Ltd., 2021.
- 3 Slobodan N Vukosavic, "Electrical Machines", Springer, 2013

ONLINE RESOURCES:

- 1 <https://archive.nptel.ac.in/courses/108/105/108105131/>
- 2 <https://www.coursera.org/courses?query=electrical%20engineering&productTypeDescription=Degrees>
- 3 https://onlinecourses.nptel.ac.in/noc24_ee53/preview

COURSE OUTCOMES:

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

- CO1** Summarise the theory of synchronous machines and will be able to calculate the regulation of non- salient pole alternators by different methods
- CO2** Analyse the parallel operation of alternators and will be able to calculate the regulation of salient pole alternators by two reaction theory.
- CO3** Comprehend the principle of operation and performance of synchronous motors under varying excitation and load condition.
- CO4** Explain the construction and complete working of three phase induction machines, including its performance as induction generators.
- CO5** Summarise the methods of starting and speed control of single phase induction motors.

CO - PO - PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	-	-	-	-	-	3	2
CO2	3	3	2	2	-	-	-	1	-	-	-	-	3	2
CO3	2	2	1	1	-	-	-	-	-	-	-	-	3	2
CO4	2	2	1	1	-	-	-	-	-	-	-	-	3	2
CO5	2	2	1	1	-	-	-	-	-	-	-	-	3	2

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U23EE403	LINEAR INTEGRATED CIRCUITS	L	T	P	C
Pre requisites: Electronic Devices and Circuits		3	0	2	4

COURSE OBJECTIVES:

- To understand the basic building blocks of linear integrated circuits, characteristics and their configurations.
- To explore the design procedure of applications using operational amplifiers, analog multipliers and PLL
- To learn the concepts of waveform generation operation of ADC , DAC and introduce some special function ICs

UNIT I IC FABRICATION 9

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realisation of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance, FETs and PV Cell.

UNIT II CHARACTERISTICS OF OPAMP 9

Ideal OP-AMP characteristics, Basic op-amp configurations, Ideal op-amp circuit analysis, Loop gain, General operational amplifier stages -and internal circuit diagrams of IC 741, differential amplifier; frequency response of OP-AMP, DC and AC performance characteristics, slew rate.

UNIT III APPLICATIONS OF OPAMP 9

Applications of op-amp – summer, differentiator and integrator, Instrumentation amplifier, AC amplifier, first order active filters, V/I & I/V converters, comparators, waveform generators, clippers, clampers, peak detector, S/H circuit, Log and anti-log amplifier, Multiplier and divider, Power amplifiers, D/A (R- 2R ladder and weighted resistor types) and A/D converters.

UNIT IV TIMER AND PLL 9

555 Timer circuit – Functional block, characteristics & applications; 566-voltage controlled oscillator circuit; 565- phase lock loop circuit functioning and applications, AD633 Analog multiplier ICs

UNIT V APPLICATION ICS 9

AD623 Instrumentation Amplifier and its application as load cell weight measurement - IC voltage regulators –LM78XX, LM79XX; Fixed voltage regulators its application as Linear power supply - LM317, 723 Variability voltage regulators, switching regulator- SMPS - ICL 8038 function generator IC.

45 PERIODS

PRACTICAL EXERCISES

1. Verify the output of Inverting and Non Inverting amplifiers for AC and DC input.
2. Verify output of Differential Amplifier.
3. Verify the frequency response of the operational amplifier.
4. Timer IC application: Study of NE/SE 555 timer in Astability, Mono Stability operation.

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5. Verify the output of Wien Bridge Oscillator.
6. Verify Voltage to frequency characteristics of NE/ SE 566 IC.
7. Verify the Variable Voltage Regulator using IC LM317.

30 PERIODS
TOTAL: 75 PERIODS

TEXT BOOKS:

- 1 D Roy Choudhary, Sheil B Jani, "Linear Integrated Circuits", 6th Edition, New Age International Pvt. Ltd., 2021.
- 2 Ramakant A Gayakward, "Op-amps and Linear Integrated Circuits", 4th Edition, Pearson Education, 2021.

REFERENCES:

- 1 Christopher Reilly, "Linear Integrated Circuits", American Publisher, 2023.
- 2 Jacob Millman, Christos C Halkias, "Integrated Electronics - Analog and Digital circuits system", 2nd Edition, Tata McGraw Hill, 2017.
- 3 Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", 3rd Edition, Tata McGraw Hill, 2017.

ONLINE RESOURCES:

- 1 https://onlinecourses.nptel.ac.in/noc24_ee73/preview
- 2 https://onlinecourses.nptel.ac.in/noc23_ee65/preview
- 3 <https://www.digimat.in/nptel/courses/video/108108111/L01.html>

COURSE OUTCOMES:

- CO1** Explain monolithic IC fabrication process.
- CO2** Analyse the AC and DC characteristics and basic op-amp configurations.
- CO3** Design op-amp based instrumentation amplifier, log/antilog amplifier, analog multiplier / divider, active filters, comparators, waveform generators, A/D and D/A converters.
- CO4** Design of Timer, PLL, analog multiplier ICs.
- CO5** Analyze the applications of ICs in Instrumentation amplifier, fixed and variable voltage regulators, SMPS and function generators.

CO - PO - PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	2	-	-	-	-	3	2
CO2	3	3	2	2	2	-	-	2	2	2	-	-	3	2
CO3	3	3	3	3	2	-	-	2	2	2	-	-	3	2
CO4	3	3	3	3	2	-	-	2	2	2	-	-	3	2
CO5	3	3	2	2	2	-	-	2	2	2	-	-	3	2

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TEXT BOOKS:

- 1 Ramesh S Gaonkar, "Microprocessor Architecture Programming and Application", 6th Edition, Penram International Publishing, 2016.
- 2 Douglas V Hall, "Micro-processors & Interfacing", 3rd Edition, Tata McGraw Hill, 2017.

REFERENCES:

- 1 K H Kamal, "Micro-processors, Micro-controller and Interfacing", Notion Press, 2022.
- 2 B Ram, Sanjaykumar, "Fundamentals of Microprocessors & Microcontrollers", 8th Edition, Dhanpat Rai Publications (P) Ltd., 2021.
- 3 Nagoor Kani A, "Micro-processors & Micro-controllers", 4th Edition, CBS Publishers, 2022.

ONLINE RESOURCES

- 1 <https://archive.nptel.ac.in/courses/108/105/108105102/>
- 2 <https://nptel.ac.in/courses/117104072>
- 3 <https://archive.nptel.ac.in/courses/108/103/108103157/>

COURSE OUTCOMES:

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

- CO1** Describe the architecture, memory organization, I/O ports, interrupts and timing diagram of 8085.
- CO2** Write an assembly language program for 8085 processor with loop structure, counting and indexing
- CO3** Explain the architecture, memory organization, I/O ports, Interrupts and Timers of 8051.
- CO4** Analyse the configuration & Interfacing of Interfacing ICs with 8085 & 8051
- CO5** Design the Microprocessor and Microcontroller based application systems.

CO - PO - PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	1	-	-	1	2	1	-	-	3	1
CO2	3	3	3	3	1	-	-	1	2	1	-	1	3	1
CO3	2	2	1	1	1	-	-	1	2	1	-	1	3	1
CO4	3	3	1	1	1	-	-	1	2	1	-	1	3	1
CO5	3	3	3	3	1	-	-	1	2	1	-	1	3	1

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U23CS306 OBJECT ORIENTED PROGRAMMING WITH DATA STRUCTURES L T P C
3 0 2 4

Prerequisites: Programming in C, Problem Solving and Python Programming

COURSE OBJECTIVES:

- To enable the students to learn the basic concepts of Java programming
- To have an overview of interfaces, packages, multithreading and exceptions.
- To familiarize students with basic data structures and their use in algorithms.

UNIT I INTRODUCTION TO OOP AND JAVA 9

Overview of OOP – Object oriented programming paradigms – Features of Object Oriented Programming – Java Buzzwords – Overview of Java – Data Types, Variables and Arrays – Operators – Control Statements – Programming Structures in Java – Defining classes in Java – Constructors-Methods -Access specifiers.

UNIT II INHERITANCE, PACKAGES AND INTERFACES 9

Overloading Methods – Objects as Parameters – Returning Objects –Static, Nested and Inner Classes. Inheritance: Basics– Types of Inheritance -Super keyword -Method Overriding – Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces: Packages – Packages and Member Access –Importing Packages – Interfaces.

UNIT III EXCEPTION HANDLING AND MULTITHREADING 9

Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java’s Built-in Exceptions – User defined Exception. Multithreaded Programming: Java Thread Model–Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication Suspending –Resuming, and Stopping Threads

UNIT IV ABSTRACT DATA TYPES 9

Abstract Data Types (ADTs)-List ADT-Array based implementation-linked list implementation-singly linked list-doubly linked list-circular linked list-Stack ADT operations-Applications- Queue ADT-operations-Applications of Queues.

UNIT V TREES 9

Trees-Binary Trees- representation - Operations on Binary Trees- Traversal of a Binary Tree -Binary Search Trees, Graphs-Representation of Graphs - Traversal in Graph - Dijkstra’s Algorithm, Depth-First vs Breadth-First Search

45 PERIODS

TEXT BOOKS:

1. Herbert Schildt, "Java: The Complete Reference", 12th Edition, Tata McGraw Hill, 2022.
2. James Cutajar, "Beginning Java Data Structures and Algorithms", 4th Edition, Packt Publishing, 2018.

REFERENCES:

- 1 Cay S Horstmann, "Core Java Fundamentals", Volume 1, 11th Edition, Prentice Hall, 2018
- 2 Y Daniel Liang, "Introduction To Java Programming, Comprehensive", 10th Edition, Pearson Education, 2018.
- 3 Michael T Goodrich, Roberto Tamassia, Michael H Goldwasser, Subhasish Banerjee, "Data Structures and Algorithms in Java", 6th Edition, Wiley & Sons, 2022.

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ONLINE RESOURCES:

- 1 https://onlinecourses.nptel.ac.in/noc23_cs74/
- 2 <https://nptel.ac.in/courses/106106127/>
- 3 <https://nptel.ac.in/courses/106105191/>

PRACTICAL EXERCISES:

1. Develop a java application with an Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club funds. Generate pay slips for the employees with their gross and net salary.
2. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea() that prints the area of the given shape.
3. Write a program to Check Prime Number using Interface.
4. Implement exception handling and creation of user defined exceptions.
5. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.
6. Solve problems by using sequential search and binary search.
7. Develop stack and queue data structures using classes and objects

30 PERIODS

TOTAL: 75 PERIODS

COURSE OUTCOMES:

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

- CO1** Comprehend the basic concepts of Java programming
CO2 Summarize interfaces, packages, multithreading and exception
CO3 Apply features of exception handling and multithreading in Java program.
CO4 Apply basic data structures concepts and their algorithms.
CO5 Explain data structure concepts trees for modelling given problem.

CO - PO - PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	-	-	-	-	-	-	-	-	1	1
CO2	3	2	2	2	1	2	-	2	2	-	-	2	1	1
CO3	3	2	2	2	1	2	-	2	2	-	-	2	1	1
CO4	3	3	3	3	1	2	-	2	2	-	-	2	1	1
CO5	3	3	3	3	1	2	-	2	2	-	-	2	1	1

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U23MX01 **PERSONAL VALUES** **L T P C**
Prerequisites: Nil **2 0 0 0**

COURSE OBJECTIVES:

- To understand the values through practical activities.
- To understand about physical and mental well-being.
- To know about meditation methods.

UNIT I **SELF CONCEPT** **6**
Understanding self-Concept – Identify Yourself – Who am I – an individual, Engineer, citizen – Attitude – Measuring Behaviour – Change of Behaviour – Personality – Characteristics in personal, professional life.

UNIT II **INDIVIDUAL VALUES** **6**
Personal Values – Attributes – Courage – Creativity, Honesty, Perfection, Simplicity, and Responsibility – Measuring personal values.

UNIT III **MORAL VALUES** **6**
Understanding self-Concept – Identify Yourself – Who am I – an individual, engineer, and citizen – Attitude – Measuring Behaviour – Change of Behaviour – Personality – Characteristics in personal, professional life. Personal Values – Attributes – Courage – Creativity, Honesty, Perfection, Simplicity, Responsibility – Measuring personal values
Moral – Understanding right and wrong – Positive thoughts – Respect to others – Doing good to society.

UNIT IV **PHYSICAL AND MENTAL WELL-BEING** **6**
Health – Physical fitness – Mental vigour – Diet management – Yoga – Meditation – Peaceful life – Happiness in life Goal Setting – Decision making skill – Overcome of Barriers – Success – Mental strength and weakness.

UNIT V **DECISION MAKING** **6**
Goal Setting – Decision making skill – Overcome of Barriers – Success – Mental strength and weakness.

TOTAL: 30 PERIODS

REFERENCES:

- 1 Barun K Mitra, "Personality Development and Soft Skills", Oxford University Press, 2016.
- 2 B N Ghosh, "Managing Soft Skills for Personality Development", Tata McGraw Hill, 2012.

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COURSE OUTCOMES:

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

- C01 Become an individual in knowing the self.
- C02 Acquire and express Personal Values, Spiritual values and fitness.
- C03 Practice simple physical exercise and breathing techniques.
- C04 Practice Yoga asana which will enhance the quality of life.
- C05 Practice Meditation and get benefitted.

CO - PO - PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	-	-	-	-	-	-	-	1	-	-	-	1
C02	-	-	-	-	-	-	-	1	-	-	-	1
C03	-	-	-	-	-	-	-	1	-	-	-	1
C04	-	-	-	-	-	-	-	1	-	-	-	1
C05	-	-	-	-	-	-	-	1	-	-	-	1

Approved
(R)
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U23EE405 **ELECTRICAL MACHINES - II LABORATORY** **L T P C**
Pre requisites: **Electrical Machines – I, Electrical Machines - II** **0 0 3 1.5**

COURSE OBJECTIVES:

- To understand the operation of synchronous machines.
- To understand the analysis of power angle curve of synchronous machines.
- To understand the operation of induction motors.

LIST OF EXPERIMENTS

- 1 Regulation of three phase alternator by EMF and MMF methods.
- 2 Regulation of three phase alternator by ZPF and ASA methods.
- 3 Regulation of three phase salient pole alternator by slip test.
- 4 Measurements of negative sequence and zero sequence impedance of alternators.
- 5 V and Inverted V curves of Three Phase Synchronous Motor.
- 6 Load test on three-phase induction motor.
- 7 Determine equivalent circuit parameters of 3 ϕ IM by No load and blocked rotor tests.
- 8 Separation of No-load losses of three-phase induction motor.
- 9 Load test on single-phase induction motor.
- 10 No load and blocked rotor test on single-phase induction motor.
- 11 Study of Induction Motor Starters
- 12 Equivalent Circuit of a single phase induction motor

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the completion of this laboratory course, the student will be able to

- C01** Analyse EMF and MMF methods.
C02 Examine V and Inverted V characteristics curves.
C03 Examine various tests on Synchronous Machines and obtain their performance indices.
C04 Analyse the single and three phase Induction motors by conducting various tests.
C05 Analyse the separation of losses.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	1	2	-	-	-	1	1	1	-	-	3	2
C02	3	3	1	2	-	-	-	1	1	1	-	-	3	2
C03	3	3	1	2	-	-	-	1	1	1	-	-	3	2
C04	3	3	1	2	-	-	-	1	1	1	-	-	3	2
C05	3	3	1	2	-	-	-	1	1	1	-	-	3	2

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U23EEC401 EMPLOYABILITY SKILLS - II L T P C
Prerequisites: Nil 0 0 2 1

COURSE OBJECTIVES:

- To educate and enrich the students on quantitative aptitude, logical reasoning and written communication.

UNIT I QUANTITATIVE APTITUDE PART - 3 6
Percentages - Profit and Loss - Simple Interest & Compound Interest - logarithms.

UNIT II QUANTITATIVE APTITUDE PART - 4 6
Algebra - Linear Equation - Quadratic equation - Polynomials - Time and Distance - Problems on train - Time and Work.

UNIT III LOGICAL REASONING PART - 2 6
Coding and Decoding - Data Sufficiency - Seating Arrangement - syllogism.

UNIT IV WRITTEN COMMUNICATION PART - 2 6
Sentences Formation - Sentence Completion - Sentence Correction - Jumbled Sentences - Letter Drafting - Reading Comprehension - Contextual Usage.

UNIT V WRITTEN COMMUNICATION PART - 3 6
Practices: Sentence Completion - Sentence Correction - Jumbled Sentences - Synonyms and Antonyms - Using the same word as different parts of speech - Interpretation of Pictorial Representations - Editing.

TOTAL: 30 PERIODS

TEXT BOOKS:

- 1 R S Aggarwal, "Quantitative Aptitude", Revised Edition, S Chand & Co Ltd., 2017.
- 2 R S Aggarwal, "A Modern Approach to Verbal and Non-verbal Reasoning", S Chand & Co Ltd., 2018.

REFERENCES:

- 1 Abhijit Guha, "Quantitative Aptitude", 3rd Edition, Tata McGraw Hill, 2009.
- 2 Raj N Bakshmi, "English Grammar Practice," 1st Edition, Orient Black Swan, 2009.
- 3 M Ashra Rizvi, "Effective Technical Communication," 2nd Edition, Tata McGraw Hill, 2017.
- 4 Norman Lewis, "Word Power Made Easy", W.R. Goyal Publishers, 2020.

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