Course Structure
&
Detailed Syllabus

B. Tech.
Electrical and Electronics Engineering

Academic Regulations - R24

Applicable for the Batches Admitted from 2024 - 2025

AVANTHI
INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

(Approved by AICTE., New Delhi, & Permanently Affiliated to JNTU-GV, Vizianagaram)

NAAC "A+" Accredited Institute

Cherukupally (Village), Near Tagarapuvalasa Bridge, Vizianagaram (Dist)-531162

AVANTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

(Approved by A.I.C.T.E., New Delhi& Permanently Affiliated to JNTU-GV., Vizianagaram)
NAAC "A+" Accredited Institute
Cherukupally (Village), Near TagarapuvalasaBridge, Vizianagaram (Dist)-531162.
www.aietta.ac.in, principal@aietta.ac.in

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Course Structure

Program: B. Tech Electrical and Electronics Engineering

Regulations-R24

(Applicable from the academic year 2024-2025 to 2026-2027)

Induction Programme

S.No	Course Title	Category	L-T-P-C
1	Physical Activities--Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counseling	MC	2-0-2-0
3	Orientation to all branches -- career options, tools, etc	MC	3-0-0-0
4	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2-0-3-0
5	Proficiency Modules & Productivity Tools	ES	2-1-2-0
6	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7	Remedial Training in Foundation Courses	MC	2-1-2-0
8	Human Values & Professional Ethics	MC	3-0-0-0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0
10	Concepts of Programming	ES	2-0-2-0

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Program: B. Tech Electrical and Electronics Engineering Regulation: R24

I Year I Semester- Course Structure

S.No	Category	Course Code	Course Title	Hours per Week			
				Lecture	Tutorial	Practical	Credits
1	BS	R24BS01	Linear Algebra & Calculus	3	0	0	3
2	BS	R24BS05	Applied Chemistry	3	0	0	3
3	ES	R24ES02	Problem Solving& Programming with C	3	0	0	3
4	ES	R24ES06	Engineering Graphics	1	0	4	3
5	ES	R24ES05	Basic Electrical & Electronics Engineering	3	0	0	3
6	BS	R24BS06	Applied Chemistry Lab	0	0	2	1
7	ES	R24ES03	Problem Solving & Programming with C Lab	0	0	3	1.5
8	ES	R24ES07	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
9	ES	R24ES08	Engineering Workshop	0	0	3	1.5
10	MC	R24MC01	Health and Wellness, Yoga and Sports	0	0	1	0.5
			Total	**13**	**0**	**16**	**21**

Category	Courses	Credits
BS -Basic Science Courses	3	7
ES-Engineering Science Courses	6	13.5
MC-Mandatory Courses	1	0.5
Total	**10**	**21**

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Program: B. Tech Electrical and Electronics Engineering Regulation: R24

I Year II Semester- Course Structure

S.No	Category	Course Code	Course Title	Lecture	Tutorial	Practical	Credits
1	BS	R24BS04	Differential Equations and Vector Calculus	3	0	0	3
2	BS	R24BS02	Engineering Physics	3	0	0	3
3	HS	R24HS01	Communicative English	2	0	0	2
4	ES	R24ES01	Basic Civil & Mechanical Engineering	3	0	0	3
5	PC	R24EEPC01	Electrical Circuit Analysis-I	3	0	0	3
6	HS	R24HS02	Communicative English Lab	0	0	2	1
7	BS	R24BS03	Engineering Physics Lab	0	0	2	1
8	ES	R24ES04	IT Workshop	0	0	2	1
9	PC	R24EEPC02	Electrical Circuits Lab	0	0	3	1.5
10	MC	R24MC02	NSS/NCC/Scouts & Guides/Community Service	0	0	1	0.5
			Total	**14**	**00**	**10**	**19**

Category	Courses	Credits
BS -Basic Science Courses	3	7
HS-Humanities Management & Social Sciences Courses	2	3
ES -Engineering Science Courses	2	4
PC-Professional Core Courses	2	4.5
MC-Mandatory Courses	1	0.5
Total	**10**	**19**

Chairperson
Board of Studies (EEE)

AVANTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

(Approved by A.I.C.T.E., New Delhi& Permanently Affiliated to JNTU-GV., Vizianagaram)

NAAC "A+" Accredited Institute

Cherukupally (Village), Near Tagarapuvalasa Bridge, Vizianagaram (Dist), AP, Pin-531162.

www.aietta.ac.in, principal@aietta.ac.in

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Program: B. Tech Electrical and Electronics Engineering **Regulation: R24**

II Year I Semester- Course Structure

S№	Cate-gory	Course Code	Course Title	Hours per Week			
				Lecture	Tutorial	Practical	Credits
1	BS	R24BS10	Numerical Methods and Transform Techniques	3	0	0	3
2	HS	R24HS03	Universal Human Values–Understanding Harmony & Ethical Human Conduct	2	0	0	2
3	PC	R24EEPC03	Electrical Circuit Analysis-II	3	0	0	3
4	PC	R24EEPC04	DC Machines & Transformers	3	0	0	3
5	PC	R24EEPC05	Electromagnetic Field Theory	3	0	0	3
6	PC	R24EEPC06	DC Machines & Transformers Lab	0	0	3	1.5
7	PC	R24EEPC07	Electrical Circuit Simulation Lab	0	0	3	1.5
8	SC	R24CSSC04	Computing Skills Using C	0	0	3	1.5
9	HS	R24HS04	Logical Reasoning & Corporate Skills	0	0	2	1
10	MC	R24MC03	Environmental Science	2	0	0	-
			Total	**16**	**0**	**11**	**19.5**

Category	Courses	Credits
BS –Basic Science Courses	1	3
HS-Humanities Management & Social Sciences Courses	2	3
PC-Professional Core Courses	5	12
SC- Skill Course	1	1.5
MC-Mandatory Courses	1	-
Total	**10**	**19.5**

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Program: B. Tech Electrical and Electronics Engineering **Regulation: R24**

II Year II Semester- Course Structure

S№	Cate-gory	Course Code	Course Title	Lecture	Tutorial	Prac-tical	Credits
1	BS	R24BS09	Complex Variables and Statistical Methods	3	0	0	3
2	PC	R24EEPC08	Electric Power Generation, Transmission and Distribution	3	0	0	3
3	PC	R24EEPC09	Induction and Synchronous Machines	3	0	0	3
4	PC	R24EEPC10	Control Systems	3	0	0	3
5	ES	R24ES10	Analog Electronic Circuits Design	3	0	0	3
6	ES	R24ES13	Design Thinking & Innovation	0	1	2	2
7	PC	R24EEPC11	Control Systems Lab	0	0	3	1.5
8	PC	R24EEPC12	Induction and Synchronous Machines Lab	0	0	3	1.5
9	SC	R24CSSC01	Python Programming	0	0	3	1.5
10	HS	R24HS05	Numerical Ability & Professional Communication Skills	0	0	2	1
			Total	**17**	**01**	**12**	**22.5**
Mandatory Community Service Project Internship of 08 weeks duration during summer vacation							

Category	Courses	Credits
BS -Basic Science Courses	1	3
HS-Humanities Management & Social Sciences Courses	1	1
ES-Engineering Sciences Courses	2	5
PC-Professional Core Courses	5	12
SC- Skill Course	1	1.5
Total	**10**	**22.5**

Chairperson
Board of Studies (EEE)

24BS01 **Linear Algebra and Calculus** **3 0 0 3**

(Common to all Branches)

Course Objectives:

1. To equip the students with standard concepts and tools of mathematics to handle various real- world problems and their applications.
2. To enable the students to apply linear algebra to solve engineering problems.
3. To enable the students to apply calculus to solve engineering problems.

Course Code	Course Outcomes	Mapping with POs			Dok
		PO1	PO2	PO12	
R24BS01.1	Develop matrix algebra techniques that are needed by engineers for practical applications.	3	2	1	L1,L2,L3
R24BS01.2	To find the eigen values and eigen vectors and solve the problems by using linear transformation.	3	2	1	L1,L2,L3
R24BS01.3	Apply the knowledge of mean value theorems, solve inequality.	3	2	1	L1,L2,L3
R24BS01.4	Familiarize with functions of several variables which is useful in optimization.	3	2	1	L3,L4
R24BS01.5	Familiarize with double and triple integrals of functions of several variables in two and three dimensions.	3	2	1	L4,L5

SYLLABUS

UNIT-I: Matrices and Linear System of Equations **10 Hours**

Matrices: Vector Space, Linear independent, dependent (only definitions).

Rank of a matrix by echelon form, normal form. Cauchy-Binet formulae (without proof). Inverse of Non- singular matrices by Gauss- Jordan method.

System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method. **COs-CO1**

Self-Learning Topic: Encoding and Decoding messages by using matrices

UNIT- II: Linear Transformation and Orthogonal Transformation **10 Hours**

Eigen values and Eigen vectors and their properties(without proof), Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley–Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation. **COs-CO2**

Self-Learning Topic: Google's page rank Algorithm.

UNIT–III: Calculus **10 Hours**

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), problems on the above theorems. **COs-CO3**

Self-Learning Topic: Application of mean value theorems

UNIT- IV: Partial differentiation and Applications **10 Hours**

Partial derivatives, total derivatives, chain rule, change of variables, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobian, maxima and minima of functions of two variables, method of Lagrange multipliers. **COs-CO4**

Self-Learning Topic: Jacobian of implicit functions.

UNIT-V: Multiple Integrals **10 Hours**

Double integrals - change of variables (Cartesian and Polar coordinates), change of order of integration, Cylindrical and Spherical coordinates, triple integrals. Finding areas (by double integrals) and volumes (by double integrals and triple integrals). **COs-CO5**

Self-Learning topic: Calculating Centers of Mass and Moment of inertia

Board of Studies : Mathematics-Basic Science and Humanities
Approved in BOS No:01, August, 2024
Approved in ACM No: 01, August, 2024

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.

Reference Books:

1. Dennis G. Zill and Warren S. Wright , Advanced Engineering Mathematics, Jones and Bartlett, 2018.
2. Michael Green berg, Advanced Engineering Mathematics, 9th edition, Pearson edn.
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, Pearson Publishers, 2018.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5/e, Alpha Science
5. International Ltd., 2021 (9th reprint).
6. B.V. Ramana, Higher Engineering Mathematics, McGraw Hill Education, 2017.

Web References:

1. http://onlinecourses.nptel.ac.in
2. https://nptel.ac.in/courses/111105121
3. https://onlinecourses.nptel.ac.in/noc24_ma91/course
4. https://onlinecourses.nptel.ac.in/noc24_ma53/course
5. https://onlinecourses.nptel.ac.in/noc24_ma11/course

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	30	10
L2	30	10
L3	40	30
L4	--	25
L5	--	25
Total (%)	100	100

Sample Short and Long Answers questions of Various Cognitive Levels

UNIT-I

1. State Cauchy-Binet formulae (L1)
2. Define Echelon form of a matrix(L1)
3. Test for consistency and solve $2x+3y+7z=5;3x+y-3z=12;2x+19y-47z=32(L2)$
4. Discuss for what value of λ,μ the simultaneous equations

$x+y+z=6, x+2y+3z=10, x+2y+\lambda z=10$ have (i)no solution(ii) a unique solution (iii) an infinite number of solutions.(L2)

5. Reduce the matrix $\begin{bmatrix} 8 & 1 & 3 & 6 \\ 0 & 3 & 2 & 2 \\ -8 & -1 & -3 & 4 \end{bmatrix}$ into its normal form and hence find its rank.(L2)
6. Find the value of k such that the rank of $\begin{bmatrix} 1 & 2 & 3 \\ 2 & k & 7 \\ 3 & 6 & 10 \end{bmatrix}$ is 2. (L2)

UNIT-II

1. State Cayley-Hamilton theorem (L1)
2. Find the sum and product of the eigen values of $\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$ (L1)
3. Find the latent roots and latent vectors of $A=\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ (L2)
4. Use Cayley-Hamilton theorem to express $A^5-4A^4-7A^3+11A^2-A-10I$ as a linear polynomial in A. where $A=\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ (L3)

UNIT-III

1. State Lagrange's mean value theorem(L1)
2. Verify Rolle's theorem for the function $f(x)=(x-a)^m(y-b)^n$ where m.n are positive integers in $[a,b]$ (L2)
3. Calculate approximately $\sqrt[5]{245}$ by using Lagrange's mean value theorem (L3)

UNIT-IV

1. Find the maximum and minimum values of $3x^4-2x^3-6x^2+6x+1$ in $(0,2)$ (L4)
2. If $x+y+z, uv=y+z, uvw=z$, show that $\frac{\partial(x,y,z}{\partial(u,v,w)}=u^2v$ (L4)
3. In plane triangle, finds the maximum value of $\cos A\cos B\cos C$ (L4)

UNIT-V

1. $\int_0^\infty\int_0^\infty e^{-(x^2+y^2)}dxdy$ (L5)
2. Evaluate $\iint(x^2+y^2)dxdy$ over the area bounded by the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ (L5)

Chairperson
Board of Studies (Mathematics)

R24BS05 **APPLIED CHEMISTRY** **3 0 0 3**

(Common to EEE, ECE, CSE, CSE (AI&ML), CSE (DS))

Course objectives:

1. To familiarize Applied Chemistry and its application.
2. To train the students on the principles and applications of electrochemistry and polymers
3. To elucidate the Structure and bonding of molecules
4. To impart Basic concepts of Semiconductors
5. To introduce modern engineering materials
6. To introduce instrumental methods, chromatographic technique

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

Course Code	Course Outcomes	Mapping with Pos		DOK
		PO1	PO12	
R24BS05.1	Describe Molecular orbital diagrams	3	1	L1, L2, L4
R24BS05.2	Importance of Graphenes. Apply the principle of band diagrams in the applications of Super conductors and semiconductors.	3	1	L1, L2, L4,L5
R24BS05.3	Compare the Materials of Construction for Battery and Electro Chemical Sensors.	3	1	L1, L2, L3
R24BS05.4	Explain the Preparation, Properties and applications of thermos plastics and thermo setting plastics, Elastomers and conducting polymers.	3	1	L1, L2, L3
R24BS05.5	Summarize the concepts of instrumental methods	3	1	L1, L2, L4, L5

SYLLABUS

UNIT- I: Structure and Bonding models **10 Hours**

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ2, LCAO theory, molecular orbital theory – bonding in homo and hetero nuclear diatomic molecules – energy level diagrams of O2,N2 and CO, NO etc. π-molecular orbitals of butadiene and calculation of bond order. **COs-CO1**

Self-Learning Topics: Energy Level Diagrams of H2 & CN Molecules.

UNIT- II: Modern Engineering materials **10 Hours**

Semiconductors – Introduction, Classification semiconductor devices P-N junction diode as a rectifier and transistor, applications. Super conductors-Introduction basic concept, Classification, applications. Super capacitors: Introduction, Basic Concept-Classification – Applications. Nanomaterials: Introduction, Sol-gel method, classification, properties and applications of Fullerenes, carbon nano tubes and Graphenes **COs-CO2**

Self Learning Topics: Band Theory of Solids, Preparation of Fullerenes.

UNIT- III: Electrochemistry and Applications **14 Hours**

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), Conductometry- conduct metric titrations (acid-base titrations).

Primary cells – Zinc-air battery, Secondary cells –Lead-acid and lithium-ion batteries- working of the batteries including cell reactions.

Fuel cells- hydrogen-oxygen and Methanol-Oxygen fuel cells. **COs-CO3**

Self Learning Topics: Galvanic Cell, Differences between Primary Cells & secondary cells.

UNIT- IV: Polymer Chemistry **14 Hours**

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation (Freeradical).

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6 6.

Elastomers– Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene mechanism of conduction and applications. Bio-Degradable polymers - PolyGlycolicAcid (PGA), PolyLacticAcid (PLA). **COs-CO4**

Self Learning Topics: Differences between Thermo and Thermo Setting Plastics. Vulcanization of rubber.

UNIT- V: Instrumental Methods and Applications **10 Hours**

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications. **COs-CO5**

Self Learning Topics: Intensity Shifts in UV-Spectroscopy, Gas Chromatography.

Board of Studies : Basic Sciences and Humanities-Chemistry
Approved in BOS No: 5th, August, 2024
Approved in ACM No: 01

Text Books:

1. Jain and Jain, Engineering Chemistry,16/e, DhanpatRai,2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford UniversityPress,2010

Reference Books:

1. Skoog and West, Principles of Instrumental Analysis,6/e,Thomson,2007.
2. J.D.Lee,Concise Inorganic Chemistry ,5thEdition,WileyPublications,Feb.2008
3. Text book of Polymer Science, FredW.BillmayerJr,3rdEdition

.Web References:

1. https://swayam.gov.in/nc_details/NPTEL
2. https://onlinecourses.nptel.ac.in/noc19_cy29
3. https://archive.nptel.ac.in/noc/courses/noc21/SEM2/noc21-cy50

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	20	20
L2	30	30
L3	30	30

L4	10	10
L5	10	10
Total (%)	**100**	**100**

Sample Short and Long Answers questions of Various Cognitive Level

UNIIT I: **Structure and Bonding models**

1. Write is the Significance of Ψ and Ψ2 (L1)
2. Derive Schrodinger Wave equation? (L4)
3. Explain about the Molecular orbital theory Give any two examples?(L2)
4. Draw the Energy level diagram of Homo diatomic molecules? (L2)

UNIT- II: Modern Engineering materials

1. Describe the Semiconductors and its Applications? (L1)
2. Explain about the Superconductors with examples? (L2)
3. Discuss the Super capacitors? Classification of Super capacitors? Mention the applications of Super capacitor? (L2)
4. Write a short note on Fullerenes, properties and Applications? (L1)
5. Importance of Graphene (L5)

UNIT III: Electrochemistry and Applications.

1. Write the Nernst equation and calculate the cell potential for single electrodes? (L1)
2. Discuss the Potentiometric titrations (redox titrations)? (L2)
3. Discuss the Conductometric titrations (acid-base titrations)? (L2)
4. Write the construction & working of Zinc-air battery? (L1)
5. Classify Primary and Secondary cells? (L3)

UNITIV: **Polymer chemistry**

1. Write the functionality of monomers? (L1)
2. Discuss the mechanism of Chain growth and coordination polymerization . (L2)
3. Comparison between the Thermo Plastics and Thermosetting plastics? (L3)
4. Explain about the Preparation, properties and applications (L2)
   a. Bakelite
   b. Nylon-6,6
5. Uses of Bio-Degradable polymers? (L3)

UNIT-V: Instrumental Methods and Applications

1. Explain the Beer-Lambert's law? (L4)
2. Discuss the Instrumentation of IR spectroscopy? (L2)
3. Write the fundamental modes and selection rules of IR spectroscopy? (L1)
4. Explain Instrumentation of HPLC? (L4)
5. Compare various Chromatographic techniques (L5)

Chairperson
Board of Studies (Chemistry)

R24ES02 **Problem Solving & Programming with C** **3 0 0 3**
(Common to all Branches)

Course Objectives:

1. To impart adequate knowledge on the need of programming languages and problem-solving techniques and develop programming skills.
2. To express algorithms and draw flowcharts in a language independent manner.
3. To enable effective usage of Operators &Control Structures.
4. To learn about the design concept of Arrays, Strings and Functions.
5. To understand Structures and Unions and their usage.
6. To assimilate about Pointers, Dynamic Memory Allocation and know the significance of Pre-processors, perform operations on files.

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

Course Code	Course Outcomes	Mapping with POs and PSOs					Dok
		PO1	PO2	PO3	PS01	PS02	
R24ES02.1	Illustrate the fundamental concepts of computers and basic computer programming and problem-solving approach.	3	3	2	3	2	L1, L2
R24ES02.2	Understand the Control structures, Branching and Looping.	3	3	3	3	2	L1, L2 L3
R24ES02.3	Make use of Arrays and Develop Programs on modular programming using functions and strings.	3	3	3	2	3	L1, L2, L3
R24ES02.4	Demonstrate the ability to write programs using Structures and Unions.	3	3	3	3	2	L4
R24ES02.5	Apply File handling operations.	3	3	3	3	3	L4, L5

SYLLABUS

UNIT-I: Introduction to Programming and Algorithm for Problem Solving: 10 Hours

Introduction to Programming: The Basic Model of Computation, Algorithms, Flow-charts, Programming Languages, Compilation, Linking and Loading, Testing and Debugging, Documentation,

Algorithm for Problem Solving: Exchanging values of two variables, summation of a set of numbers, Decimal Base to Binary Base conversion, Reversing digits of an integer, GCD (Greatest Common Division) of two numbers, Test whether a number is prime, Organize numbers in ascending order, Find square root of a number, factorial computation, Fibonacci sequence, Evaluate 'sin x' as sum of a series, Reverse order of elements of an array, Find largest number in an array, Print elements of upper triangular matrix, multiplication of two matrices, Evaluate a Polynomial

COs–CO1

Self-Learning Topics: Compilation and Interpretation

UNIT- II: Introduction to the 'C' Programming **15 Hours**

Introduction: Character set, Variables and Identifiers, Built-in Data Types, Input/output statements, Variable Definition, Arithmetic operators and Expressions, Constants and Literals, Simple assignment statement, Basic input/output statement, Type Casting and Type def Simple 'C' programs

Conditional Statements and Loops: Decision making within a program, Conditions, Relational Operators, Logical Connectives, if statement, if-else statement, Loops: while loop, do while, for loop, Nested loops, Infinite loops, Switch statement, Break statement, Go to statement. **COs-CO2**

Self-Learning Topics: Escape Sequences

UNIT – III: Arrays, Strings and Functions **15 Hours**

Arrays: One dimensional array: Array manipulation; Searching, Insertion, Deletion of an element from an array; Finding the largest/smallest element in an array; two dimensional arrays with examples.

Strings: Concepts, String Types, String Input / Output functions, String manipulation functions, Null terminated strings as array of characters, Standard library string functions.

Functions: Top-down approach of problem solving, Modular programming and functions, Standard Library of C functions, Prototype of a function: Formal parameter list, Return Type, Function call, Block structure, passing arguments to a Function: call by reference; call by value, Recursive Functions, arrays as function arguments. **COs–CO3**

Self-Learning Topics: String Pattern Matching

UNIT- IV: Structures and Unions **10 Hours**

Structures and Unions: Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions, Enumeration.

Storage Classes**:** Scope and extent, Storage Classes in a single source file: auto, extern and static, register, Storage Classes in multiple source files: extern and static **COs–CO4**

Self-Learning Topics: How do you pass a structure to a function?

UNIT-V: Pointers & File Processing **10 Hours**

Pointers: Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, Arrays and Pointers, pointer arrays, pointers and structures, dynamic memory allocation.

File Processing: Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input/output functions (standard library input/output functions for files), file status functions (error handling), Positioning functions

COs-CO5

Self-Learning Topics: Binary Files and operations on Binary files

Board of Studies : Computer Science and Engineering

Approved in BOS No: 01, 30th July, 2024

Approved in ACM No: 01, 30th July, 2024

Expert Talk (To be Delivered by SMEs from Industries)	**COs**	**POs / PSOs**
1. Logic Develop using C Programming	CO1–CO5,	PO1,PO2,PO3,PO12,PSO1,PSO2
2. Real Time Applications of C Programming	CO1–CO5,	PO1, PO2,PO3,PO12,PSO1,PSO2

TEXT BOOKS:

1. Byron S Gottfried "Programming with C" Second edition, Tata McGrawhill, 2007 (Paperback)
2. R.G. Dromey, "How to solve it by Computer", Pearson Education, 2008.
3. Kanetkar Y, "Let us C", BPB Publications, 2007.
4. 4. Hanly J R & Koffman E.B, "Problem Solving and Program design in C", Pearson Education, 2009.

REFERENCE BOOKS:

1. E. Balaguruswamy, "Programming with ANSI-C", Fourth Edition, 2008, Tata McGraw Hill.
2. Venugopal K. R and Prasad S. R, "Mastering 'C'", Third Edition, 2008, Tata McGraw Hill.
3. B.W. Kernighan & D. M. Ritchie, "The C Programming Language", Second Edition, 2001, Pearson Education
4. ISRD Group, "Programming and Problem-solving Using C", Tata McGraw Hill, 2008.
5. Pradip Dey, Manas Ghosh, "Programming in C", Oxford University Press, 2007.

Web References:

1. http://www.c4learn.com/
2. http://www.geeksforgeeks.org/c/
3. http://nptel.ac.in/courses/122104019/
4. http://www.learn-c.org/
5. https://www.tutorialspoint.com/c programming/

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	35	--
L2	40	--
L3	25	40
L4	--	35
L5	--	25
Total (%)	**100**	**100**

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. What are the five key features of the C programming language?
2. What are the top 5 applications of C programming language?
3. What do you mean by reserved words in C programming language?
4. What do you mean by library functions?
5. List the name of the tokens

6. What is static() function in C programming?
7. What is the difference between operators = and ==?
8. What are 3 main drawbacks of C language?
9. What is the difference between R-value and L-value?
10. How does const char*p differ from the char const* p

L2: Understand

1. What is the importance of function?
2. Explain the function prototype with an example.
3. What do you mean by error? Discuss types of errors() in C language.
4. What do you mean by function pointer?
5. What is a header file in the C programming language?
6. How can you implement decision-making processes in C language?
7. What are the 4 primary sections to define a function in C language?
8. What are modifiers? List the C programming modifiers?
9. What is an array, and why does it play a major role in C programming?
10. Is sizeof( ) a function or operator?

L3: Apply

1. Program to find Factorial of number?
2. Fibonacci Series Program?
3. Palindrome Program?
4. Program to reverse a String?
5. Find a given number is Armstrong Number?
6. Print first n Prime Numbers?
7. Find Largest among n Numbers?
8. LCM of Two Numbers?
9. GCD of Two Numbers?
10. Reverse a String?

L4: Analysing

1. Swapping Two Numbers using Bitwise operators?
2. Copy File to another File?
3. C program to get and set system current system date and time?
4. C program to run DOS command?

L5: Evaluating

1. C program to find two smallest elements in a one-dimensional array?
2. C program to find odd or even numbers using Bit masking?
3. Swapping two bits of byte using C program?

Chairperson
Board of Studies (CSE)

R24ES06 **ENGINEERING GRAPHICS** **1 0 4 3**

(Common To All Branches)

Course Objectives:

1. Understand the fundamentals of engineering drawing, including lines, lettering, and dimensioning.
2. Develop skills in geometrical constructions, including regular polygons and curves.
3. Learn orthographic projection techniques, including projections of points, lines, and planes.
4. Understand how to project solids in simple positions and create sectional views.
5. Develop skills in converting isometric views to orthographic views and vice versa.
6. Apply computer-aided design (CAD) techniques using AutoCAD to create 2D and 3D drawings.
7. Understand the importance of reference planes and reference lines in orthographic projection.
8. Develop problem-solving skills in engineering drawing, including creating and interpreting drawings.

Course Code	Course Outcomes	Mapping with POs and PSOs					Dok
		PO1	PO2	PO3	PO5	PO10	
R24ES06.1	Understand the basics of Engineering Graphics to construct the polygon, curves, and scales.	3	2	2	1	1	L1, L2, L3
R24ES06.2	Draw the orthographic projections of points and straight lines inclined to both the planes.	3	2	2	1	1	L2, L3
R24ES06.3	Draw the projections of planes in various conditions.	3	2	2	1	1	L2, L3
R24ES06.4	Draw the projections of regular solids, with its axis inclined to one plane and sections of solids.	3	2	2	1	1	L3,
R24ES06.5	Visualize the 3D isometric views from 2D orthographic views and vice versa along with basic introduction to CAD.	3	2	3	1	1	L2, L4

SYLLABUS

UNIT-1 **12 Hours**

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general method.

Curves: construction of ellipse, parabola, and hyperbola by general method, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales. **COs: CO1**

UNIT-2 **16 Hours**

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes. **COs: CO2**

UNIT-3 **10 Hours**

Projections of Planes: Regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes. **COs: CO3**

UNIT-4 **16 Hours**

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of sections for simple position only. **COs: CO4**

UNIT-5 **12 Hours**

Conversion of Views: Conversion of isometric views to orthographic views and Conversion of orthographic views to isometric views for simple objects only.

Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (Not for end examination). **COs: CO5**

Textbook:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House.

Reference Books:

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc.
3. Engineering Drawing with an Introduction to AutoCAD, DhananjayJolhe, Tata McGraw Hill.

Board of Studies: Mechanical Engineering
Approved in BOS No: 01, 31st July, 2024
Approved in ACM No: 01

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1 (%)	Internal Assessment #2 (%)
L1	30	20
L2	30	40
L3	40	40
Total (%)	**100**	**100**

Sample Short and Long Answer Questions of Various Cognitive Levels

L1: Remember

1. Draw an octagon given the length of side 25mm.
2. Construct a regular hexagon of 40mm side. Using general method?
3. Construct a regular pentagon inscribed in a circle of diameter 80 mm?
4. Construct a pentagon of side 50mm with one side vertical. Attach a non-overlapping hexagon of same side length with common vertical side.

L2: Understand

1. A fixed-point F is 7.5cm from a fixed straight line. Draw the locus of a point P moving in such a way that its distance from the fixed straight line is 2/3 times its distance from F. Plot at least 9 points. Name the curves. Also draw a normal and a tangent to the curve at a point on it 6cm from F.
2. Construct a parabola whose focus is at a distance of 40mm from the directrix. Draw a tangent and a normal to the parabola at point 50mm away from the principal axis. Determine the double ordinate through a point 90mm from the directrix.
3. Construct an ellipse when the distance between the locus and the directrix is 30mm and the eccentricity is 3/4. Draw the tangent and normal at any point P on the curve using directrix.
4. Construct a hyperbola when the distance between the focus and the directrix is 40mm and the eccentricity is 4/3. Draw a tangent and normal at any point on the hyperbola.
5. Draw the involute of hexagon of side 25mm A disc is in the form of a square of side 30mm surmounted by a semi-circle on one of the sides of the square and a half hexagon on the opposite side. Draw the path of the end of a string which is unwound from the circumference of the disc.
6. Draw a vernier scale of R.F = 1/25 to read centimetres up to 4 metres and on it, show lengths representing 3.14m, 2.39 m and 0.91 m.
7. Construct a vernier scale to read distance correct to decimetre on a map in which the actual distances are reduced in the ratio of 1:40000. The scale should be long enough to measure up to 6km. Mark on the scale a length of 3034km and 0.59km.
8. The front view of a line, inclined at 30^0 to the VP is 65mm long. Draw the projections of the line, when it is parallel to and 40 mm above the HP, its one end being 30mm in front of the VP.
9. Mark the projections of the following points on a common reference line, keeping the projectors 35mm apart.
   (i) A, 25mm above H.P and 35mm in front of V.P
   (ii) B, 25mm above H.P and 40 mm behind V.P
   (iii) C, 30mm below H.P and 45 mm behind V.P
   (iv) D, 30 mm below H.P and 40 mm in front V.P
10. Draw the FV, TV of the following points:
    (i) Point P lies in the HP and 20mm behind the VP
    (ii)Point Q lies in the VP and 30mm below the HP
    (iii)Point R lies 35mm below the HP and 25mm behind the VP
11. Draw the involute of hexagon of side 25mm.
12. A 100 mm long line is parallel to and 40mm above the HP. Its two ends are 25 mm and 50 mm in front of the VP respectively. Draw the projections and find its inclination with the VP.
13. Draw the projections of a straight-line AB of 60mm long, in the following positions
    (i)Perpendicular to the HP and in the VP and one end on the HP
    (ii)Parallel to and 30 mm in front of the VP and on the HP

(iii)Inclined at 30^0 to the VP, in the HP and one end on the VP

14. Draw an involute of the circle of 40mm diameter. Also draw a normal and tangent at a point 100mm from the centre of the circle.
15. A rectangular plot of 100sq.km. is represented on a certain map by a similar rectangular area of 4sq.cm. Draw a scale to show km and mark a distance of 43km on it.

L3: Apply

1. A truck is moving at the rate of 1.2 km per min. Construct a diagonal scale with RF value of 1/25000, showing minutes and seconds. Mark the distance moved by the truck in 4 minutes and 27 seconds?
2. A tunnel on the Konkan railway route has a size of 640m × 10m × 10m. It is represented on a model by the volume of 27 cm^3 Find RF. Devise a diagonal scale of this RF to read up to 300 meters. Show the distances of 299 meters, 171 meters and 9 meters on it.
3. A car is running at a speed of 50 km/hour. Construct a diagonal scale to show 1 km by 3 cm and to measure up to 6 km. Mark also on the scale the distance covered by the car in 5 min 28 seconds.

L4: Analyze

1. Analyze the importance of orthographic projection in CAD and explain how it aids in the visualization of 3D objects from 2D views. Provide examples and diagrams to support your answer.
2. Compare and contrast 2D orthographic views and 3D isometric views. How do they differ in terms of representation and application? Explain with examples and illustrations.
3. Explain the process of creating a 3D isometric view from 2D orthographic views. Use a simple object (e.g., a cube or a cylinder) as an example and provide step-by-step diagrams to illustrate the process.
4. Discuss the advantages and limitations of using CAD software for creating 2D orthographic views and 3D isometric views. How does CAD improve the design process, and what are its limitations?
5. Analyze a given 2D orthographic view (front, top, and side views) and create a 3D isometric view from it. Explain the process and provide diagrams. Then, reverse-engineer the process by creating 2D orthographic views from the 3D isometric view.
6. Explain the concept of dimensioning and annotation in CAD. How are dimensions and annotations added to 2D orthographic views and 3D isometric views? Provide examples and illustrations.

Chairperson
Board of Studies (ME)

R24ES05 Basic Electrical and Electronics Engineering 3 0 0 3

Course Objectives:

1. To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering
2. To acquire fundamental knowledge in the relevant field.
3. To teach the fundamentals of semiconductor devices and its applications.
4. To teach the working process and analysis of different rectifying and Amplifying Circuits.
5. To teach the fundamental principles and rules of digital electronic circuits like gates, Sequential and Combinational Circuits.

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

Course Code	Course Outcomes	Mapping with POs and PSOs							
		PO1	PO2	PO3	PO6	PO7	PO8	PO12	Dok
R24ES05.1	Understand the problem-solving concepts associated to AC and DC circuits	2	2	1	-	-	-	1	L1, L2,L3
R24ES05.2	Remember the fundamental laws, construction and operation of AC and DC machines, instruments.	2	2	1	-	-	-	1	L2,L3
R24ES05.3	Understand different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.	3	1	2	3	2	1	1	L1,L2
R24ES05.4	Understand the fundamental principles of electronic devices, analyzing the different rectifying and Amplifying Circuits.	1	2	3	-	-	-	1	L1, L2,L3
R24ES05.5	analyze and design different digital electronic circuits like gates, Sequential and Combinational Circuits	1	2	3	-	-	-	2	L1, L3,L4

SYLLABUS

Part A-Electrical Engineering

UNIT- I: DC & AC Circuits 10 Hours

DC Circuits: Electrical circuit elements (R, Land C), Ohm's Law and its limitations, KCL& KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems). **COs–CO1**

Self-Learning Topics: Circuit elements

UNIT-II: Machines and Measuring Instruments **10 Hours**

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge. **COs–CO2**

Self-Learning Topics: Magnetic materials

UNIT- III: Energy Resources, Electricity Bill & Safety Measures **10 Hours**

Energy Resources: Conventional and non-conventional energy resources; Layout and operation o various Power Generation systems: Hydal, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of ―unit‖ used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock. **COs– CO3**

Part B: Electronics Engineering

UNIT-IV: Semiconductor Devices and Basic Electronic Circuits **15 Hours**

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier. Rectifiers and power supplies: Block diagram description of a dc power supply, Half-Wave Rectifiers, Full-Wave Rectifiers, capacitor filter (no analysis). Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. **COs –CO4**

Self-Learning Topics: Electronic components and characteristics, Design Amplifier circuit at different R, C Values

UNIT -V: DIGITAL ELECTRONICS and INSTRUMENTTAION **15 Hours**

Overview of Number Systems, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits– Half and Full Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only), Electronic Instrumentation: Block diagram of an electronic instrumentation system **COs–CO5**

Self-Learning Topics: Develop digital circuits using minimum no. of gates, design principles of electronic instruments.

Board of Studies : Electrical and Electronics Engineering
Approved in BoS No: 01, 3rd August, 2024
Approved in ACM No: 01

Text Books: Electrical Engineering

1. Basic Electrical Engineering, D. C. Kulshreshtha, TataMcGrawHill,2019, First Edition
2. Power System Engineering, P.V. Gupta,M.L.Soni,U.S.BhatnagarandA.Chakrabarti,Dhanpat Rai & Co, 2013

3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, ThirdEdition

Text Books: Electronics Engineering

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

Reference Books: Electrical Engineering

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019,FourthEdition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S.Sukhija, Oxford University Press,2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Pearson Publications, 2018,Second Edition.

Reference Books: Electronics Engineering

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall,India, 2002.
3. R.T.Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version,Pearson Education,2009

Web References: (Electrical Engineering)

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

Web References: (Electronics Engineering)

1. https://archive.nptel.ac.in/courses/117/102/117102059
2. https://www.tutorialspoint.com/principles_of_communication
3. https://www.geeksforgeeks.org/electronics-and-communication-engineering

Internal Assessment Pattern (Electrical Engineering)

Cognitive Level	Internal Assessment #1(%)
L1	30
L2	30
L3	40
Total (%)	**100**

Internal Assessment Pattern (Electronics Engineering)

Cognitive Level	Internal Assessment #2(%)
L1	30
L2	30
L3	40
Total (%)	**100**

Sample Short and Long Answers questions of Various Cognitive Levels

Part-A: Electrical Engineering

L1: Remember

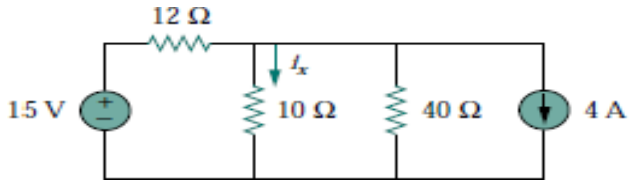
1. State Ohm's law?
2. Define Superposition theorem?
3. Define Active power?
4. Define Reactive power?
5. Define the term tariff?
6. Define form factor?
7. Define RMS value?

L2: Understand

1. Explain the principle and operation of DC Motor?
2. Explain the construction of Alternator?
3. Explain the principle and operation of Moving Iron instruments?
4. What is meant by Earthing and explain about process of earthing?
5. Draw the layout of wind power generating plant?

L3: Apply

1. For the circuit shown below in calculate Ix and the power dissipated by the 10-Ω resistor using superposition.



2. An alternating voltage is given by V=230sin314t.Calculate i)frequency, i)maximum value, iii)average value ,iv)RMS value
3. A Consumer has Maximum demand of 200 KW at 40% load factor. If the tariff is Rs.200per KW of maximum demand plus 10paise per KWH, find the annual charges?

Part-B: Electronics Engineering

L1: Remember

1. Draw the symbol of pn junction of diode
2. What is meant by BJT?
3. Define Avalanche and Zener break down voltages?
4. Draw the symbol of Zener diode.
5. Define Amplifier?
6. Define Rectifier?
7. What is the Zener voltage regulator?
8. Define latch and flip flop?
9. Symbol of JK flip flop?
10. Draw the logic symbols of OR, AND, NOT gate?

L2: Understand

1. Write the Differences between Avalanche and Zener break down voltages?
2. Draw the diagram and explain single input and dual input op-amps?
3. Compare BJT, CB, CE, CC transistor configuration characteristics?
4. Write the notes of PN junction diode?
5. Draw the block diagram of public address system and explain?
6. Discuss the working principal of zener voltage regulator?
7. Draw the block diagram of electronic instrumentation system and explain?

L3: Apply

1. What is doping? Describe P and N type semiconductors with Qualitative theory?
2. Draw the diagram and explain single input and dual input op-amps and design?
3. Design operational amplifier?
4. Explain the block diagram of DC power supply?
5. Explain the circuit diagram and working of RC coupled amplifier?
6. Operation of center tap full-wave rectifier?
7. Explain the operation of full –wave rectifier with capacitor?
8. Explain the JK, SR, D,T flip flops ?
9. Simplify the Boolean expressions to minimum number of literals i) A+B+A'B'C ii) AB + A (B +C) + B'(B+D).

Chairperson
Board of Studies (EEE& ECE)

R24BS06 **APPLIED CHEMISTRY LAB** **0 0 2 1**

(Common to EEE, ECE, CSE, CSE (AI&ML), CSE (DS))

Course Objectives:

1. Verify the fundamental concepts with experiments.
2. Learn and carry out some of the important experiments related to batteries and their properties.
3. Learn the preparation of engineering polymer materials like Bakelite
4. Know the fundamental principles of chemistry lab experiments which include volumetric Analysis, dichrometry, conductometry and potentiometry.

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

Course Code	Course Outcomes	Mapping with POs and PSOs		
		PO1	PO2	Dok
R24BS06.1	Determine the cell constant and conductance of solutions. Determine redox potentials.	1	3	L1, L2
R24BS06.2	Prepare advanced polymer Bakelite materials. Strength of Mn(II) and Ferrous Iron by dichrometry, Adsorption of acetic acid.	1	3	L1,L3
R24BS06.3	Measure the strength of an acid present in secondary batteries. Calculation of Hardness of Water.	1	3	L1, L4

Board of Studies : Basic Science Humanities (Chemistry)

Approved in BOS No: 01, 5th August, 2024

Approved in ACM No: 01

List of Experiments:

Week 1:

1. Conductometric titration of strong acid vs. strong base
2. Conductometric titration of weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emfs
5. PH metric titration – determination of Strength of Strong acid vs Strong base **COs:CO1**

Week 2:

1. Conductometric titration of strong acid vs. strong base
2. Conductometric titration of weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emfs
5. PH metric titration – determination of Strength of Strong acid vs Strong base **COs:CO2**

Week 3:

1. Conductometric titration of strong acid vs. strong base
2. Conductometric titration of weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emfs
5. PH metric titration – determination of Strength of Strong acid vs Strong base. **COs:CO1**

Week 4:

1. Conductometric titration of strong acid vs. strong base
2. Conductometric titration of weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emfs
5. PH metric titration – determination of Strength of Strong acid vs Strong base **COs:CO3**

Week 5:

1. Conductometric titration of strong acid vs. strong base
2. Conductometric titration of weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emfs
5. PH metric titration – determination of Strength of Strong acid vs Strong base **COs:CO1**

Week 6:

6. Determination of Strength of an acid in Pb-Acid battery **COs:CO3**

Week 7:

7. Determination of Hardness of Water **COs:CO3**

Week 8:

8. Determination of Mn (II) by using oxalic acid **COs:CO2**

Week 9:

9. Adsorption of acetic acid by charcoal **COs:CO2**

Week 10:

10. Estimation of Ferrous Iron by Dichrometry **COs:CO2**

Week 11:

11. Preparation of a Bakelite (Demo) **COs:CO4**

Week 12:

12. Preparation of nanomaterials by precipitation method. **COs: CO4**

Additional Experiments

1. Determination of Sodium carbonate by using Hydrochloric acid
2. Determination of Copper (II) using standard hypo solution. **COs:CO1**

Reference:

1."Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar
2. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

Chairperson
Board of Studies (Chemistry)

R24ES03 Problem Solving &Programming with C Lab 0 0 3 1.5
(Common to all Branches)

Course Objectives:

The course aims to give students hands – on experience and train them on the concepts of the C-programming language.

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

Course Code	Course Outcomes	Mapping with POs and PSOs			
		PO1	PO2	PO3	Dok
R24ES03.1	Read, understand, and trace the execution of programs written in C language.	2	2	2	L1, L2
R24ES03.2	Select the right control structure for solving the problems .and demonstrate the application of arrays functions and strings	3	3	3	L2,L3
R24ES03.3	Develop Debug and Execute programs to demonstrate the applications of Pointers, Structures& Unions, and Files.	3	3	3	L2, L3

Board of Studies : Computer Science and Engineering
Approved in BOS No: 01, 30th July, 2024
Approved in ACM No: 01, 30th July, 2024

Developing the following programs:

Week 1:

1. Write a C program using printf() and Scanf(). COs:CO1
2. Write a C program on swapping of two nos. COs:CO1
3. Write a C program using arithmetic Expressions. COs:CO1

Week 2:

4. Simple interest calculation COs:CO2
5. Finding compound interest COs:CO2
6. Area of a triangle using heron's formulae COs:CO2
7. Distance travelled by an object COs:CO2

Week 3:

8. Find the maximum of three numbers using conditional operator COs:CO2
9. Take marks of 5 subjects in integers, and find the total, average in float COs:CO2
10. Write a C program to shift/rotate using bit fields. COs:CO2
11. Finding the square root of a given number COs:CO2
12. Write a C program using if-else statement. COs:CO2

Week 4:

13. Write a C program to find the max and min of four numbers using if-else. COs:CO2
14. Write a C program to generate electricity bill. COs:CO2
15. Find the roots of the quadratic equation. ` COs:CO2

16. Write a C program to find the given year is a leap year or not. COs:CO2
17. Write a C program to simulate a calculator using switch case. COs:CO2

Week 5:

18. Find the factorial of given number using any loop. COs:CO2
19. Find the given number is a prime or not. COs:CO2
20. Compute sine and cos series. COs:CO2
21. Checking a number palindrome. COs:CO2
22. Construct a pyramid of numbers. COs:CO2

Week 6:

23. Write a C program on Linear Search. COs:CO3
24. Find the min and max of a 1-D integer array. COs:CO3
25. Perform linear search on1D array. COs:CO3
26. The reverse of a 1D integer array. COs:CO3

Week 7:

27. Find 2's complement of the given binary number. COs:CO3
28. Eliminate duplicate elements in an array. COs:CO3
29. Sort array elements using bubble sort. COs:CO3
30. Addition of two matrices. COs:CO3

Week 8:

31. Multiplication two matrices. COs:CO3
32. Write a C program using call by reference. COs:CO3
33. Write a C program to find factorial of n using recursion. COs:CO3
34. Write a C function to calculate NCR value COs:CO3
35. Concatenate two strings without built-in functions. COs:CO3

Week 9:

36. Write a C function to transpose of a matrix. COs:CO3
37. Write a C function to find the length of a string. COs:CO3
38. Reverse a string using built-in and without built-in string functions. COs:CO3
39. Write a C program to find the sum of a 1D array using malloc ( ). COs:CO3

Week 10:

40. Write a recursive function to find the lcm of two numbers. COs:CO3
41. Write a recursive function to find the sum of series. COs:CO3
42. Write a C program to swap two numbers using call by reference. COs:CO3
43. Write a C program using Pointers, Structures and Unions. COs:CO4
44. Write a C program to find the total, average of n students using structures. COs:CO4

Week 11:

45. Enter n students data using calloc() and display failed students list. COs:CO4
46. Read student name and marks from the command line and display the student details along with the total. COs:CO4
47. Write a C program to implement realloc(). COs:CO4
48. Write a C program to copy one structure variable to another structure of the same type. COs: CO4

Week 12:

49. Demonstrate Dangling pointer problem using a C program. COs: CO4
50. Write a C program to copy one string into another using pointer. COs: CO4

51. Write a C program to find no of lowercase, uppercase, digits and other characters using pointers. COs: CO4

Week 13:

52. Write a C program using Files operations. COs:CO5
    a. Sum and average of 3 numbers
    b. Conversion of Fahrenheit to Celsius and vice versa.
53. Write a C program to write and read text into a file. COs:CO5

Week 14:

54. Write a C program to write and read text into a binary file using fread() and fwrite() COs:CO5
55. Copy the contents of one file to another file. COs:CO5
56. Write a C program to merge two files into the third file using command-line arguments. COs: CO5

Week 15:

57. Find no. of lines, words and characters in a file. COs:CO5
58. Write a C program to print last n characters of a given file. COs:CO5

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum' s Outline of Programming with C, McGraw Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PrenticeHall of India
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

Chairperson
Board of Studies (CSE)

R24ES07 Basic Electrical and Electronics Engineering Lab 0 0 3 1.5
(Common to all branches of Engineering)

Course Objectives:

To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

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

Course Code	Course Outcomes	Mapping with POs and PSOs							
		PO1	PO2	PO3	PO4	PO5	PO11	PS01	Dok
R24ES07.1	Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.	1	1		3	1			L1, L2, L3
R24ES07.2	Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor and design suitable circuits for measurement of electrical parameters	1	1		3	1	2	2	L2, L3
R24ES07.3	Plot and discuss the characteristics of various electron devices/instruments.	1	1		3	1	2		L1, L2, L3

Board of Studies : Electrical and Electronics Engineering
Approved in BOS No: 01, 3rd August, 2024
Approved in ACM No: 01

Developing the following programs:

List of Experiments

1. Verification of KCL and KVL **COs: CO2**
2. Verification of Superposition theorem **COs: CO2**
3. Measurement of Resistance using Wheatstone bridge **COs: CO2**
4. Magnetization Characteristics of DC shunt Generator **COs: CO2**
5. Measurement of Power and Power factor using Single-phase wattmeter **COs: CO2**
6. Measurement of Earth Resistance using Megger **COs: CO2**
7. Calculation of Electrical Energy for Domestic Premises **COs: CO2**

Reference Books:

1. Basic Electrical Engineering, D.C.Kulshreshtha,TataMcGrawHill,2019, First Edition
2. Power System Engineering, P.V.Gupta, M.L.Soni, U.S.Bhatnagar and A. Chakrabarti,

DhanpatRai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition.

Web References:

1. https://www.jntumaterials.co.in/2015/06/jntuk-btech-lab-manuals
2. www.jntumaterials.in

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	30	20
L2	30	40
L3	40	40
Total (%)	**100**	**100**

Sample Lab Experiments of Various Cognitive Levels:

Experiments

1. Verification of KCL and KVL **COs: CO2**
2. Verification of Superposition theorem **COs: CO2**
3. Measurement of Resistance using Wheatstone bridge **COs: CO2**
4. Magnetization Characteristics of DC shunt Generator **COs: CO2**
5. Measurement of Power and Power factor using Single-phase wattmeter **COs: CO2**
6. Measurement of Earth Resistance using Megger **COs: CO2**
7. Calculation of Electrical Energy for Domestic Premises **COs: CO2**

S. No.	Title	Cognitive Level
1	Verification of KCL and KVL	L1, L2,L3
2	Verification of Superposition theorem	L1, L2,L3
3	Measurement of Resistance using Wheatstone bridge	L2,L3,
4	Magnetization Characteristics of DC shunt Generator	L1, L2,L3
5	Measurement of Power and Power factor using Single-phase wattmeter	L1, L2,L3
6	Measurement of Earth Resistance using Megger	L1,L3
7	Calculation of Electrical Energy for Domestic Premises	L1, L2

Note: Minimum Six Experiments to be performed.

PART B: Electronics Engineering Workshop

Course Objectives:

To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

List of Experiments:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias. **COs: CO3**
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator. **COs: CO3**
3. Implementation of half wave and full wave rectifiers **COs: CO3**
4. Plot Input & Output characteristics of BJT in CE and CB configurations **COs: CO3**
5. Frequency response of CE amplifier. **COs: CO3**
6. Simulation of RC coupled amplifier with the design supplied **COs: CO3**

7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs. **COs: CO2**
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs. **COs: CO2**

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

Reference Books:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using bothHardware and Software.

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	30	20
L2	30	40
L3	40	40
Total (%)	**100**	**100**

Web References:

1. https://www.jntumaterials.co.in/2015/06/jntuk-btech-lab-manuals
2. www.jntumaterials.in

Experiments of Various Cognitive Levels:

S. No.	Title	Cognitive Level
1	Plot V-I characteristics of PN Junction diode A)Forward bias B) Reverse bias.	L1, L2, L3
2	Plot V – I characteristics of Zener Diode and its application as voltage Regulator.	L1, L2, L3
3	Implementation of half wave and full waverectifiers	L2,L3,L4
4	Plot Input & Output characteristics of BJT in CEand CB configurations	L1, L2,L3
5	Frequency response of CE amplifier.	L1, L2,L3
6	Simulation of RC coupled amplifier with the designsupplied	L1,L3,L4
7	Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates	L1, L4
8	Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.	L1,L3,L4

Note: Minimum Six Experiments to be performed.

Chairperson
Board of Studies (EEE&ECE)

R24ES08 **ENGINEERING WORKSHOP** **0 0 3 1.5**
(Common to all Branches)

Course Objectives:

- Describe how different tools are used in home wiring, tin smiting, blacksmithing, carpentry, and fitting.

Course Code	Course Outcomes	Mapping with Pos					
		PO1	PO2	PO3	PO4	PO6	PO9
R24ES08.1	Identify workshop tools and their operational capabilities. Practice on manufacturing of components using workshop trades including carpentry, fitting, sheet metal	3	2	1	1	1	1
R24ES08.2	Practice on manufacturing of components using workshop trades including foundry and welding.	3	2	1	1	2	3
R24ES08.3	Apply fitting operations in various applications and engineering knowledge for Plumbing, House Wiring Practice, and Making square rod and L-bend from the round rod in black smithy	3	2	1	1	2	3

List of Experiments

1. **Wood Working:** **COs: CO1**
   a) Half – Lap joint
   b) Mortise and Tenon joint
   c) Corner Dovetail joint or Bridle joint
2. **Sheet Metal Working:** **COs: CO1**
   a) Tapered tray
   b) Conical funnel
   c) Elbow pipe
   d) Brazing
3. **Fitting:** **COs: CO1**
   a) V-fit
   b) Dovetail fit
   c) Semi-circular fit
   d) Bicycle tire puncture and change oftwo-wheeler tyre
4. **Foundry Trade:** Preparation of Green Sand Moulds **COs: CO2**
   a) Single piece pattern
   b) Double piece pattern
5. **Welding Shop: Arc welding Practice** **COs: CO2**
   a) Lap joint
   b) Butt joint

6. Electrical Wiring: **COs: CO3**

a) Parallel and series connection
b) Two-way switch connection
c) Tube light connection
d) Soldering of wires

7. Plumbing: **COs: CO3**

a) Prepare Pipe joint with coupling for 1 inch diameter
b) Prepare Pipe joint with coupling for 1.5 inch diameter

8. Black smithy: **COs: CO3**

a) Round rod to Square
b) Round rod to S-Hook

Textbooks:

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published, 2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 &2017

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan 2021-22

Board of Studies: Mechanical Engineering
Approved in BOS No: 01, 31st July, 2024
Approved in ACM No: 01

Sample Experiments

1. Prepare Half – Lap joint
2. Prepare Mortise and Tenon joint
3. Prepare Corner Dovetail joint or Bridle joint
4. Prepare Tapered tray
5. Prepare Conical funnel
6. Prepare Elbow pipe
7. Do Brazing operation
8. Prepare V-fit
9. Prepare Dovetail fit
10. Prepare Semi-circular fit
11. Do Bicycle tire puncture andchange of two-wheeler tyre
12. Prepare Parallel and series
13. Prepare Two-way switch
14. Prepare Tube light
15. Do Soldering of wires
16. Prepare Green Sand Moulds for single piece Pattern

17. Prepare Green Sand Moulds for double piece Patterns
18. Prepare Lap joint using arc welding
19. Prepare Butt joint using arc welding
20. Prepare Pipe joint with coupling for same diameter(10mm)
21. Prepare Pipe joint with coupling for same diameter(12mm)
22. Prepare Round rod to Square rod
23. Prepare Round rod to S-Hook

Chairperson
Board of Studies (ME)

R24MC01 Health and Wellness, Yoga and Sports 0 0 1 0.5
(Common to all Branches)

Course Objectives:

The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

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

Course Code	Course Outcomes	Mapping with POs				
		PO3	PO6	PO7	PO9	PO12
R24MC01.1	Understand the importance of yoga and sports for Physical fitness and sound health.	2	1	1	1	1
R24MC01.2	Demonstrate an understanding of health-related fitness components.	1	2	1	1	1
R24MC01.3	Compare and contrast various activities that help enhance their health	2	1	2	2	1
R24MC01.4	Assess current personal fitness levels.		1	1		1
R24MC01.5	Develop Positive Personality	1	1	2	1	1

SYLLABUS

UNIT-I: **3 Hours**

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

1. Organizing health awareness programmes in community.
2. Preparation of health profile.
3. Preparation of chart for balance diet for all age groups **COs-CO1**

UNIT- II: **3 Hours**

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities: Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar. **COs-CO2**

UNIT–III: **3 Hours**

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

1. Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
2. Practicing general and specific warm up, aerobics
3. Practicing cardio respiratory fitness, treadmill, run test, 9 min walk, skipping and running.

COs-CO3

Board of Studies : BS&H
Approved in BoS No: 01, August, 2024
Approved in ACM No: 01

Text Books:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc.2014

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Assessment Pattern:

1. Evaluated for a total of 100 marks.
2. A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totaling to 90 marks.
3. A student shall be evaluated by the concerned teacher for 10 marks by conducting viva
4. voce on the subject.

Chairperson
Board of Studies (Mathematics)

24BS04 Differential Equations and Vector Calculus (Common to all Branches) 3 0 0 3

Course Objectives:

1. To enlighten the learners in the concept of differential equations and multivariable calculus.
2. To furnish the learners with basic concept and techniques at plus two level to lead them in to advanced level by handling various real-world applications.

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

Course Code	Course Outcomes	Mapping with POs			Dok
		PO1	PO2	PO12	
R24BS04.1	Solve the first order differential equations related to various engineering fields.	3	2	1	L1,L2,L3
R24BS04.2	Model engineering problems as higher order differential equations and solve analytically.	3	2	1	L1,L2,L3
R24BS04.3	Identify solution methods for partial differential equations that model physical processes.	3	2	1	L1,L2,L3
R24BS04.4	Interpret the physical meaning of different operators such as gradient, curl and divergence.	3	2	1	L3,L4
R24BS04.5	Estimate the work done against a field, circulation and flux using vector calculus.	3	2	1	L4,L5

SYLLABUS

UNIT- I: Differential equations of first order and first degree 10 Hours

Formation of differential equations, order, degree, separation of variables (only Review). Linear differential equations-Bernoulli's equations-Exact equations and equations reducible to exact form.

Applications: Newton's Law of cooling – Law of natural growth and decay, Electrical circuits (RL and LC). **COs-CO1**

Self-Learning Topic: Mixed tank problems

UNIT- II: Higher order Linear differential equations with Constant Coefficients 10 Hours

Definitions, homogenous and non-homogenous, complimentary function, particular integral $\left(e^{ax}, \sin ax, \cos ax, \text{Polynomial in } x, e^{ax}V(x), xV(x)\right)$, general solution, Wronskian, method of variation of parameters. **COs-CO2**

Applications: L-C-R Circuit problems

Self-Learning Topic: Simple Harmonic motion

UNIT–III: Partial Differential Equations 10 Hours

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solution of first order linear equations using Lagrange's method. Homogenous Linear Partial differential equations with constant coefficients. **COs-CO3**

Self-Learning Topic: Method of Separation of Variables

UNIT- IV: Vector differentiation **10 Hours**

Vector, Scalar, dot product, cross product, unit vector, equation of a line passing through two points (Review only)

Scalar and vector point functions, vector operator del, del applies to scalar point function-Gradient, del applied to vector point function – Divergence and Curl, Vector Identities **COs-CO4**

Application: Scalar Potential

Self-Learning Topic: Equation of tangent plane and Normal plane.

UNIT-V: Vector integration **10 Hour**

Line integral – circulation – work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof). **COs-CO5**

Self-Learning Topic: Application of above theorems.

Board of Studies: Basic Science and Humanities
Approved in BOS No: 01, 2nd August, 2024
Approved in ACM No: 01

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2018.
2. Michael Green berg, Advanced Engineering Mathematics, 9th edition, Pearson edn
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, Pearson Publishers, 2018.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5/e, Alpha Science
5. International Ltd., 2021 (9th reprint).
6. B.V. Ramana, Higher Engineering Mathematics, McGraw Hill Education, 2017.

Web References:

1. http://onlinecourses.nptel.ac.in
2. https://nptel.ac.in/courses/111105121
3. https://onlinecourses.nptel.ac.in/noc24_ma86/course

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	30	10
L2	30	10
L3	40	30
L4	--	25
L5	--	25
Total (%)	**100**	**100**

Sample Short and Long Answers questions of Various Cognitive Levels

UNIT-I

1. Define Leibnitz's linear differential equation(L1)
2. State Newton's law of cooling(L1)
3. Write differential equation of L-R series circuit (L1)
4. solve the differential equation $\left(1+x^2\right)\frac{dy}{dx}+2xy=4x^2$ (L2)
5. If the temperature of the air is 30^0C and the substance cools from 100^0C to 70^0C in 15 minutes, find when the temperature will be 40^0C (L3)
6. The rate at which bacteria multiply is proportional to the instantaneous number present. If the original number doubles in two hours, then it will triple after ….hours (L3)

UNIT-II

1. Define Wronskian (L1)
2. solve the differential equation $\frac{d^2y}{dx^2}-6\frac{dy}{dx}+13y=8e^{3x}\sin 2x$ (L2)
3. An inductance of 2 henries and a resistance of 20 ohms are connected in series with e.n.f. E volts. If the current is zero when $t=0$. Find the current at the end of 0.01 seconds if E=100 volts. (L3)

UNIT-III

1. State Lagrange's Linear equation (L1)
2. form a partial differential equation by eliminating the arbitrary function φ from $lx+my+nz=\varphi\left(x^2+y^2+z^2\right)$ (L2)
3. solve $\frac{\partial^3 z}{\partial x^3}-2\frac{\partial^3 z}{\partial x^2\partial y}=2e^{3x}+3x^2y$ (L2)
4. Solve $\left(mz-ny\right)\frac{\partial z}{\partial x}+\left(nx-lz\right)\frac{\partial z}{\partial y}=ly-mx$ (L3)

UNIT-IV

1. The temperature of points in space is given by $T\left(x,y,z\right)=x^2+y^2-z.$ A mosquito located at $\left(1,1,2\right)$ desires to fly in such a direction that it will get warm as soon as possible. In what direction should it move? (L3)
2. Show that $\nabla^2\left(r^n\right)=n\left(n+1\right)r^{n-2}$ (L4)

UNIT-V

1. Evaluate $\iiint_v \nabla.\vec{F}dV$, where $\vec{F}=4x\hat{i}-2y^2j+z^2k$ and V is bounded by $x^2+y^2=4, z=0$ and $z=3$ (L4)
2. Evaluate $\int_C\left(3x^2-8y^2\right)dx+\left(4y-6xy\right)dy$ where C is the curve bounded by $y=\sqrt{x}$ and $y=x^2$ (L5)

Chairperson
Board of Studies (Mathematics)

R24BS02 **Engineering Physics** **3 0 0 3**
(Common to all Branches)

Course Objectives:

1. To bridge the gap between the physics in school at 10+2 level and UG level engineering courses.
2. To identify the importance of the optical phenomenon i.e. interference and diffraction related to its engineering applications.
3. To understand the mechanism of emission of light, utilization of lasers as coherent light sources for low and high energy applications.
4. To enlightening the periodic arrangement of atoms in crystalline solids and classify various crystal systems.
5. To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
6. To enlightenment of the concepts of quantum mechanics and to provide fundamentals of de-Broglie matter waves and the importance of free electron theory for metals.
7. To understand the physics of semiconductors and identify the type of semiconductor using Hall Effect.

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

Course Code	Course Outcomes	Mapping with Pos			Dok
		PO1	PO2	PO12	
R24BS02.1	Analyze the intensity variation of light due to interference, diffraction and classify various types of lasers.	3	2	1	L1 ,L2, L3
R24BS02.2	Identify various crystal systems and analyze the crystalline structure.	3	2	1	L1, L2, L3
R24BS02.3	Summarize various types of polarization of dielectrics and classify the magnetic materials.	2	2	1	L2, L3
R24BS02.4	Explain fundamentals of quantum mechanics and apply to one dimensional motion of particles.	3	2	2	L1, L4
R24BS02.5	Outline the properties of charge carriers in semiconductors	3	2	1	L2, L5

SYLLABUS

UNIT-I: Wave Optics and Lasers **14 Hours**

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit- Fraunhofer diffraction due to N-Slits -Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Lasers: Introduction - Characteristics of laser - Spontaneous and Stimulated emissions of radiation - Population inversion - Lasing action - Pumping mechanisms - Ruby laser - He-Ne laser- Applications of lasers. **COs–CO1**

Self-Learning Topics: Interference in thin films due to Transmission of light

UNIT-II: Crystallography and X-ray diffraction **10 Hours**

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters - Bravais Lattices - crystal systems (3D) - coordination number - packing fraction of SC, BCC & FCC - Miller indices - separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffraction - Crystal structure determination by Laue's and Powder methods. **COs–CO2**

Self-Learning Topics: Effect of crystallite size on diffracted X-Ray intensity

UNIT-III: Magnetic and Dielectric Materials **12 Hours**

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro& Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector - Relation between the electric vectors - Types of polarization- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - dielectric loss. **COs–CO3**

Self-Learning Topics: Frequency dependence of polarization.

UNIT-IV: Quantum Mechanics and Free electron theory **12 Hours**

Quantum Mechanics: Dual nature of matter - Heisenberg's Uncertainty Principle - Significance and properties of wave function - Schrodinger's time independent and dependent wave equations - Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) - Quantum free electron theory - electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Fermi energy. **COs– CO4**

Self-Learning Topics: Density of states, Origin of energy bands in solids

UNIT-V: Semiconductors **8 Hours**

Semiconductors: Formation of energy bands - classification of crystalline solids - Intrinsic semiconductors: - Fermi level - Extrinsic semiconductors- P-Type semiconductors- N-Type semiconductors- Principle of operation and Characteristics of P-N Junction diode - Drift and diffusion currents - Einstein's equation - Hall Effect and its applications. **COs-CO5**

Self-Learning Topics: Zener diode, Solar cells

Board of Studies : Department of Physics
Approved in BOS No: 01, 5th August, 2024
Approved in ACM No: 01

Textbooks:

1. A Text book of Engineering Physics - M. N. Avadhanulu, P.G. Kshirsagar& TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.
2. Introduction to Quantum Mechanics, David J. Griffiths, Pearson Education India Learning Private Limited (2015).
3. Laser Fundamentals, William T. Silfvast, 2nd edn, Cambridge University press, New York (2004).
4. Introduction to Solid State Physics, 8 th Edition, Charles Kittel, John Wiley & Sons, NJ,

USA (2005).
5. Engineering Physics - D.K. Bhattacharya and Poonam Tandon, Oxford press (2015).
6. Semiconductor Physics and Devices:Basic principle, Donald A. Neamen 4th ed,, McGraw-Hill, New York (2012).

Reference Books:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning.
2. The Principles of Quantum Mechanics, P. A. M. Dirac, fourth Edition (Oxford University Press, Oxford, 1958).
3. Physics-Resnick, Halliday, Krane, Fifth edison, Volume-1, Wiley student edition.
4. Engineering Physics - Dr.R. Swapna, Scientific International Publishing House.
5. Concepts of Modern Physics. Arthur Beiser, Tata McGraw-Hill, New Delhi (2010).
6. Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.
7. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web References:

1. https://www.ebooksdirectory.com/
2. http://www.sciencedirect.com/Science
3. https://onlinecourses.nptel.ac.in/
4. https://www.link.springer.com/physics/
5. https://www.loc.gov/rr/scitech/selected-internet/physics.html

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	40	20
L2	30	30
L3	30	--
L4	--	30
L5	--	20
Total (%)	**100**	**100**

Sample Short and Long Answers questions of Various Cognitive Levels

UNIT-1

1. Define interference? What are the necessary conditions for obtaining interference of light? (L1)
2. Explain interference in thin films due to reflected light. What are the conditions to obtain the maximum and minimum intensities in the reflected light? (L2)
3. Describe the principle and formation of Newton's rings and give a method to determine the radius of nth dark ring, radius of curvature (R) of plano convex lens and radius of nth dark ring. (L1,L3)
4. What is meant by diffraction? Distinguish between Fresnel and Fraunhofer diffraction. (L1)
5. Discuss Fraunhofer diffraction due to single slit and derive an expression for width of the central maxima? (L2,L3)
6. What is meant by stimulated emission. Describe Lasing action. (L1,L2)
7. Describe the construction and working of He-Ne Laser. (L1)

UNIT-2

1. Define the terms space lattice, basis, unit Cell, lattice parameters, bravais Lattice, atomic radius and coordination number. (L1)

2. Illustrate the SC, BCC and FCC crystal structures. (L3).
3. Explain body centered cubic (BCC) and determine the packing fraction of BCC. (L2,L3)
4. Explain body centered cubic (FCC) and determine the packing fraction of FCC. (L2,L3)
5. Classify the seven crystal systems and write the relationship between lattice parameters in various crystal systems. (L2)
6. What are the Miller indices? How are they obtained? (L1)
7. What are the important features of Miller indices? Draw the planes (100), (101) (110) (010) and (111), (123). (L1)
8. State and explain Bragg's law. (L2)
9. Describe the LAUE method for determination of crystal structure. (L2)

.UNIT-3

1. Define the terms magnetic dipole moment and magnetic susceptibility, magnetization, permeability, dielectric flux density and magnetic field intensity. (L1)
2. Summarize various types of polarization of dielectrics. (L2)
3. Show that $\mu r = 1 + \chi$. (L3)
4. Describe the origin of magnetic moment of an atom. (L1)
5. Explain the domain concept of ferromagnetism based on Hysteresis loop (B-H Curve). (L2)
6. Describe soft and hard magnetic materials? (L1)
7. What is meant by internal field or local field or Lorentz field? Derive an expression for internal field. (L1, L3)
8. Derive Clausius-Mosotti relation in dielectrics subjected to static fields. (L3)

UNIT-4

1. Discuss the de-Broglie's hypothesis. Show that $\lambda = h / \sqrt{2mE}$ (L1, L4)
2. Show that the wavelength of an electron accelerated by potential differences $\lambda = \frac{1.227}{\sqrt{V}} nm$. (L3)
3. What are the matter waves? Explain the properties of matter waves. (L1)
4. What is the physical significance of wave function ψ.(L4)
5. Derive the time independent and dependent Schrodinger wave equation. (L4)
6. Describe the particle in 1 dimensional infinite potential box. (L1)
7. Explain Heisenberg uncertainty principle? (L4)
8. Find the energy required to jump an electron from ground state to the second excited state in a metal.(L1),
9. Define the terms (i) mean free path (ii) drift velocity (iii) relaxation time. (L1)
10. What are the success and draw backs of classical free electron theory of metals. (L1)
11. Derive an expression for electrical conductivity on the basis of quantum free electron theory of metals. (L3)
12. What is Fermi level? Explain Fermi-Dirac distribution function (FDD) of the electrons. (L1, L4)

UNIT-5

1. Explain the classification of solids (conductors, semiconductors and insulators (L5).
2. What are the differences between intrinsic and extrinsic semiconductors? (L2)
3. Explain N-Type and P-Type semiconductors. Indicate on an energy level diagram the donor and acceptor level for intrinsic and extrinsic semiconductors. (L5)
4. Explain the characteristics of P-N Junction diode. (L5)

5. Describe the diffusion current and drift current in a semiconductor. (L2)
6. Derive an expression for Einstein's equation by using drift and diffusion currents. (L5)

7. What is Hall Effect? Identify the type of semiconductor using Hall effect and derive an expression for Hall coefficient. (L2, L3).
8. Write the applications of Hall Effect. (L1)

Chairperson
Board of studies (Physics)

R24HS01 COMMUNICATIVE ENGLISH 2 0 0 2

(Common to CSE, CSE-AI & ML, CSD Branches in Semester-I)

(Common to EEE, MECH & ECE in Semester-II)

Course Objectives:

1. To identify the English Communication Skills among the first year B.Tech students and to initiate measures to bridge the gap.
2. To enlighten the students on the necessity of cultivating good language habits through practising LSRW skills.
3 To explain them various topics of grammar and the importance of being grammatically correct in speech and writing.
4 To make them practise Phonetics and impart the nuances of fine speech.
5 To instruct them about the various types of format related to writing letters, paragraph, emails, essays and reports.
6 To make them appreciate English text and deepen their comprehension through reading of textual and non-detailed topics.

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

Course Code	Course Outcomes	Mapping with POs			Dok
		PO9	PO10	PO12	
R24HS01.1	To utilize the text, online resources, and other social, and real time situations with an aim to practice Communicative English	1	3	2	L2, L4
R24HS01.2	To apply grammatical knowledge for speaking, and writing purposes	2	3	1	L3, L6
R24HS01.3	To analyze and practice various devices of speech for effective conversation and presentations	2	3	1	L4, L6
R24HS01.4	Appraising the language competence of the learners and suggesting remedial action	2	3	1	L3,L5
R24HS01.5	To make the learners practice writing tasks which are relevant for job training and academic purposes.	1	2	3	L3,L6

SYLLABUS

UNIT-I **12 Hours**

Lesson: HUMAN VALUES: A Power of a Plate of Rice by Ifeoma Okoye (Short story)

Listening: Identifying the topic, the context and specific pieces of information

By listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words. **COs-C01**

Self learning topics : The Great Indian Scientists-Biography of CV Raman

UNIT-II **10 Hours**

Lesson: NATURE: Night of the Scorpion by Nissim Ezekiel (Indian and contemporary)

Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structure talks.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Structure of a paragraph - Paragraph writing (specific topics)

Grammar: Cohesive devices-linkers, use of articles and zero article prepositions.

Vocabulary: Homonyms, Homophones, Homographs. **COs-C02**

Self learning Topics : Seven Ages of Man by William Shakespeare.

UNIT-III **12 Hours**

Lesson: BIOGRAPHY: Steve Jobs

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: Reading a text in detail by making basic inferences-recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Note-making, paraphrasing

Grammar: Verbs-tenses; Subject-verb agreement; Compound words, Collocations

Vocabulary: Compound words, Collocations **COs-C03**

Self learning topics: Elon Musk

UNIT-IV **8 Hours**

Lesson: INSPIRATION: The Knowledge Society by APJ Abdul Kalam (Ignited minds)

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/ patterns / relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters and Resumes

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargons **COs-C04**

Self learning Topics: The writings of Sudha Murthy- "The day I stopped drinking milk"

UNIT-V **10 Hours**

Lesson: MOTIVATION: The Power of Intra personal Communication (An Essay)

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal Oral Presentation topics from academic contexts

Reading: Reading comprehension.

Writing: Writings structured essays on specific topics.

Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject-verb agreement)

Vocabulary: Technical Jargons **COs-C05**

Self learning Topics: Body Language (Allan Pease)

Board of Studies : ENGLISH
Approved in BOS No: 6th August, 2024
Approved in ACM No: 01

Textbooks:

1. Pathfinder: Communicative English for Undergraduate Students, 1stEdition,Orient BlackSwan, 2023 (Units 1,2,3 &5)
2. Empowering English by Cengage Publications, 2023
3. The Great Indian Scientists-Cengage Publications
4. English Essentials- Maruthi Publications.(Unit 4)

Reference Books:

1. P. Elian : A Hand book of English for Engineers and Technologists,
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3. Murphy Raymond English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. English for Engineers by Shyam Ji Dubey- Vikas Publishing House

Web References:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx
7. https://www.youtube.com/c/DailyVideoVocabulary/videos
8. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	25	25
L2	25	25
L3	15	15
L4	15	15
L5	10	10
L6	10	10
Total (%)	**100**	**100**

Sample Short and Long Answers questions of various cognitive levels

UNIT-I

1. List the major characters in the story.
2. How did the family financial circumstances affect narrator's behaviour and relationship with her family and students?
3. What are the different types of reading?
4. How to avoid errors in spellings and enlist few steps for vocabulary development?
5. What are the different parts of speech?

UNIT-II

1. Write the summary of the poem Night of the Scorpion?
2. How does the ruler setting serve as a perfect background for the programme?
3. Describe the superstitious beliefs and practices mentioned by writer Nissim Ezekiel in his poem.
4. Write a paragraph on Artificial intelligence
5. Write about Definite and In-definite articles with examples?

UNIT-III

1. How did informal jobs and formal education influence his career?
2. Sketch the biography of Elon Musk.
3. List three steps to effective note making.
4. Can technological advancements address the pressing human problems like climate change and disease prevention?
5. Can you come up with creative ideas to match the technological vision of Elon Musk for our humanity?

UNIT-IV

1. What are the various resources of knowledge that Abdul Kalam points out in the knowledge society?
2. What are three main objectives which need to be realized for India to become a Super Power?
3. How ancient Indian knowledge systems have informed the world over centuries?
4. What does it take according to Dr.Kalam for India to become a Knowledge Society?
5. What message can students import from Knowledge Society?

UNIT-V

1. Write the difference between Inter personal communication and Intra personal communication?
2. Mention the different ways through which Intra personal communication helps to improve every day's life.
3. What do you mean by non-verbal communication? Discuss the various types of non-verbal communication.
4. What is the most important type of non-verbal communication, justify your answer?
5. How to make an effective presentation?

Chairperson
Board of Studies (English)

R24ES01 BASIC CIVIL AND MECHANICAL ENGINEERING 3 0 0 3
(COMMON TO ALL BRANCHES)

Course Objectives:

1. **Understand the Role of Civil Engineers**: Familiarize students with the roles and responsibilities of civil engineers in society and the various sub-disciplines within civil engineering.
2. **Construction Materials**: Provide knowledge about different construction materials such as cement, aggregates, bricks, concrete, steel, soil, stones and their applications in building construction.
3. **Transportation Engineering**: Offer insights into the importance of transportation engineering for national economic development and the fundamentals of highway pavements, harbor, tunnel airport and railway engineering.
4. **Water Resources and Environmental Engineering**: Cover the basics of water sources, water quality specifications, hydrology, rainwater harvesting, and water storage structures, emphasizing their importance in environmental sustainability.
5. **Scope and Importance of Mechanical Engineering**: Familiarize students with the scope and significance of mechanical engineering in various sectors, including energy, manufacturing, automotive, aerospace and marine industries.
6. **Engineering Materials and Manufacturing Processes**: Explain different engineering materials and various manufacturing processes and computational manufacturing.
7. **Thermal Engineering**: Provide an overview of thermal engineering principles, including the working of boilers, IC engines, and power plants, and introduce concepts related to electric and hybrid vehicles.
8. **Mechanical Power Transmission Systems**: Describe different mechanical power transmission systems such as belt drives, chain drives, gear drives, and their applications.
9. **Basics of Robotics**: Introduce the basics of robotics, including joints, links, configurations, and applications, along with advancements in robotics technology.

Course Code	Course Outcomes	Mapping with POs and PSOs						Dok
		PO1	PO2	PO3	PO5	PO9	PO12	
R24ES01.1	Understand the role of civil engineers in various disciplines, the scope of each discipline, and the materials used in building construction and principles of surveying.	3	-	1	-	2	1	L1
R24ES01.2	Describe the fundamentals of transportation engineering, water resources, and environmental engineering, including highway pavements, water quality, hydrology, and water storage structures.	3	1	1	1	1	-	L2, L3
R24ES01.3	Understand and apply different manufacturing processes and engineering materials, including	3	2	1	2	2	2	L1

	their applications, and basic mechanical design principles.							
R24ES01.4	Explain the basics of thermal engineering, including working principles of engines, power plants, and related thermal cycles, along with their applications.	3	1	1	2	2	2	L1,L2
R24ES01.5	Describe the working of different mechanical power transmission systems and the basics of robotics and their applications.	3	1	1	2	1	2	L2, L3

SYLLABUS

UNIT I **10 Hours**

Role of Civil Engineers in Society, Various Disciplines of Civil Engineering, Structural Engineering, Geo-technical Engineering, Transportation Engineering, Hydraulics and Water Resources Engineering, Environmental Engineering, Scope of Each Discipline, Building Construction and Planning, Construction Materials Cement, Aggregate, Bricks, Cement Concrete-Steel, soils and stones. Introduction to Prefabricated construction Techniques.

Surveying: Objectives of Surveying, Horizontal Measurements, Angular Measurements, Introduction to Bearings Simple problems on bearings-Contour mapping.

Self-Learning Topic: Advancements in Prefabricated Construction Techniques **COs: CO1**

UNIT II **15 Hours**

Transportation Engineering: Importance of Transportation in Nation's economic development, Types of Highway Pavements, Flexible Pavements and Rigid Pavements, Simple Differences. Basics of Harbor, Tunnel, Airport, and Railway Engineering

Water Resources and Environmental Engineering: Introduction, Sources of water, Quality of water, Specifications, Introduction to Hydrology, Rainwater Harvesting, Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

Self-Learning Topic: Sustainable Transportation Engineering **COs: CO2**

UNIT-III: **12 Hours**

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Basic Mechanical Design Principles: Fundamentals of Mechanical Design- Introduction to the design process, understanding design requirements, and conceptual design, Design of Simple Machine Components - Design considerations for basic machine components like shafts, bearings, gears, and fasteners.

Engineering Materials – Metals - Ferrous and Non-ferrous, Ceramics, Composites, Smart materials**.**

Self-Learning Topics: Sustainable Engineering Practices, Advancements in Smart Materials.

COs: CO3

UNIT- IV: **12 Hours**

Thermal Engineering– Working principle of Boilers

Cycles- Otto cycle, Diesel cycle, Refrigeration and air conditioning cycles,

Engines- IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines,

Power plants – Working principle of Steam, Diesel, Hydro, Nuclear power plants, Introduction to Electric and Hybrid Vehicles.

Self-Learning Topics: Advanced Engine Technologies, Thermodynamics in Renewable Energy Systems. **COs: CO4**

UNIT – V: 12 Hours

Manufacturing Processes: Principles of Casting, Forming, joining processes,

Computational Manufacturing: Introduction to CNC machines, 3D printing, and Smart manufacturing.

Machining – Conventional & Non-Conventional,

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

Self-Learning Topics: Additive Manufacturing Technologies, Innovations in Mechanical Power Transmission **COs: CO5**

Text Books:

1. Basic Civil and Mechanical Engineering, by Ommi Srikanth, M. Sreenivasa Reddy S. Chand Publications
2. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
3. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
4. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, cengage learning India pvt. Ltd.

Reference Books:

1. AppuuKuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications
3. Thermal Engineering by Mahesh M Rathore Tata Mcgraw Hill publications (India) Pvt. Ltd.
4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata Mcgraw Hill publications (India) Pvt. Ltd.

Board of Studies: Mechanical Engineering
Approved in BOS No: 01, 31st July, 2024
Approved in ACM No: 01

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1 (%)	Internal Assessment #2 (%)
L1	50	30
L2	30	50
L3	20	20
Total (%)	**100**	**100**

Sample Short and Long Answers questions of Various Cognitive Levels

Basic Civil Engineering

L1: Remember

1. List out components of building.
2. Steps in preparation of bricks cement.
3. Explain various requirements of building
4. Write various principles in building planning
5. Write qualities of goods bricks
6. Write uses of concrete
7. What are types in soils.
8. Write about pre-fabricated structures.
9. What are the uses of surveying
10. What are types in surveying
11. Write about closed traverse and open traverse
12. Write about bearings and meridian.
13. What is contour mapping.
14. Write about flexible and rigid pavements.
15. What is runway
16. Write about dams and reservoirs
17. Write the sources of water

1. What are the main roles of mechanical engineering in different industries?
2. Define basic mechanical design principles.
3. List the types of engineering materials covered in this unit.
4. What are the key differences between ferrous and non-ferrous metals?
5. Name three applications of smart materials.
6. What is the working principle of a boiler?
7. Define the Otto cycle and Diesel cycle.
8. What are the key differences between 2-Stroke and 4-Stroke engines?
9. List the types of power plants covered in this unit.
10. Name a major advantage of electric vehicles over conventional vehicles.
11. What are the basic principles of casting in manufacturing processes?
12. Define CNC machining and its basic applications.
13. List the types of mechanical power transmission systems discussed in this unit.
14. What are the key differences between conventional and non-conventional machining?
15. Name the main components of a robotic system.

L2: Understand

1. Explain the process of designing a simple machine component like a shaft.
2. Describe the role of mechanical engineering in the aerospace sector.
3. Compare the properties of ceramics and composites used in engineering.
4. Discuss the importance of understanding material properties in mechanical design.
5. Summarize the technological advancements in smart materials.
6. Explain the basic operation of an IC engine.
7. Describe the differences between refrigeration and air conditioning cycles.
8. Compare the working principles of steam and hydro power plants.
9. Discuss the role of hybrid vehicles in reducing energy consumption.

10. Summarize the working principles of the Diesel cycle and its applications.
11. Explain the process of CNC machining and its advantages.
12. Describe the principles of gear drives and their applications in mechanical systems.

L3: Apply

1. Analyze the role of civil engineering in society.
2. Understanding the various disciplines of civil engineering.
3. Evaluate the use of materials in construction.
4. Create a case study on a recent innovation in civil engineering like prefabricated structures.
5. Apply the principles of the surveying to determine different measurements.
6. Solve problems related to bearings
7. Compare the flexible pavement and rigid pavements.
8. Evaluate the benefits water supply system.
9. Evaluate the benefits of dams.
10. Design a rain water harvesting.
11. Apply the basic mechanical design principles to design a simple gear system.
12. Using the properties of different engineering materials, suggest a suitable material for a specific mechanical component.
13. Design a basic component considering the design requirements and material properties.
14. Analyze how advancements in smart materials can impact the design of mechanical components.
15. Apply knowledge of engineering materials to solve a problem in a real-world mechanical system.
16. Apply the principles of thermal engineering to analyze the efficiency of a steam power plant.
17. Using the Otto cycle, calculate the performance parameters for a given engine setup.
18. Design a basic model of a hybrid vehicle considering its power source and energy efficiency.
19. Apply the knowledge of refrigeration cycles to improve the efficiency of a cooling system.
20. Analyze the impact of different thermal cycles on the performance of an IC engine.
21. Apply the principles of CNC machining to design a simple component.
22. Design a mechanical power transmission system for a specific application, considering the required drives and components.

Chairperson
Board of Studies (ME)

R24EEPC01 ELECTRICAL CIRCUIT ANALYSIS–I 3 0 0 3

Course Objectives:

1. Remembering the basic electrical elements and different fundamental laws
2. To understand the network reduction techniques, transformations, concept of self-inductance and mutual inductance,
3. To Understand phasor diagrams, resonance and network theorems
4. Apply the concepts to obtain various mathematical and graphical representations
5. Analyze nodal and mesh networks, series and parallel circuits

Course Code	Course Outcomes	Mapping with POs and PSOs							DoK
		PO1	PO2	PO3	PO 6	PO 8	P0 12	PS02	
R24EEPC01.1	Apply different fundamental laws and network reduction techniques to basic electrical networks.	3	3	2	1	1	1	1	L1,L2
R24EEPC01.2	Understand and apply the concept of self-inductance and mutual inductance to magnetic circuits.	3	3	2	1	1	1	1	L2, L3
R24EEPC01.3	Analyze single phase AC circuits under steady state for different circuit topologies (with R, L and C components).	3	3	2	1	1	1	1	L3, L4
R24EEPC01.4	Understand the concept of Resonance	3	3	2	1	1	1		L4, L5
R24EEPC01.5	Evaluation of Network theorems	3	3	2	1	1	1		L1,L5

SYLLABUS

UNIT I : INTRODUCTION TO ELECTRICAL CIRCUITS 14 Hours

Basic Concepts of passive elements of R, L, C and their V-I relations, Sources (dependent and independent), Kirchoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta-to-star transformation), source transformation technique, nodal analysis and mesh analysis to DC networks with dependent and independent voltage and current sources, node and mesh analysis. Concept of Dual Networks **COs – CO1**

Self-Learning Topics: T and ∏ Networks

UNIT II: MAGNETIC CIRCUITS 10 Hours

Basic definition of MMF, flux and reluctance, analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction – concept of self and mutual inductance, Dot convention – coefficient of coupling and composite magnetic circuit, analysis of series and parallel magnetic circuits. **COs – CO2**

Self-Learning Topics Magnetic Materials

UNIT III: SINGLE PHASE CIRCUITS 12 Hours

Characteristics of periodic functions, Average value, R.M.S. value, form factor, representation of a sine function, concept of phasor, phasor diagrams, Steady state analysis of R, L and C circuits to sinusoidal excitations-response of pure resistance, inductance, capacitance, series RL circuit, series RC circuit, series RLC circuit. **COs – CO3**

Self-Learning Topics: Applications of Sinusoidal Signal

UNIT IV: RESONANCE **10 Hours**

Series Resonance: Characteristics of a series resonant circuit, Q-factor, selectivity and bandwidth, expression for half power frequencies; Parallel resonance: Q-factor, selectivity and bandwidth **COs – CO4**

Self-Learning Topics: Applications of Resonance

UNIT V: NETWORK THEOREMS (DC & AC Excitations) **12 Hours**

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem. **COs – CO5**

Self-Learning Topics: Applications of Network Theorems in Electrical Engineering

Board of Studies : Electrical & Electronics Engineering
Approved in BOS No: 01,1st Aug 2024
Approved in ACM No: 01

Textbooks:

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata Mc Graw Hill Education, 2005, sixth edition.
2. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition

Reference Books:

1. Fundamentals of Electrical Circuits, Charles K. Alexander and Mathew N.O. Sadiku, Mc Graw Hill Education (India), 2013, Fifth Edition
2. Electric Circuits (Schaum's outline Series), Mahmood Nahvi, Joseph Edminister, and K. Rao, Mc Graw Hill Education, 2017, Fifth Edition.
3. Electric Circuits, David A. Bell, Oxford University Press, 2009, Seventh Edition.
4. Introductory Circuit Analysis, Robert L Boylestad, Pearson Publications, 2023, Fourteenth Edition.
5. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai & Co., 2018, Seventh Revised Edition.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc23_ee81/preview
2. https://nptel.ac.in/courses/108104139
3. https://nptel.ac.in/courses/108106172
4. https://nptel.ac.in/courses/117106108

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2 (%)
L1 L2	50	50

L3 L4	30	30
L5	20	20
Total (%)	100	100

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

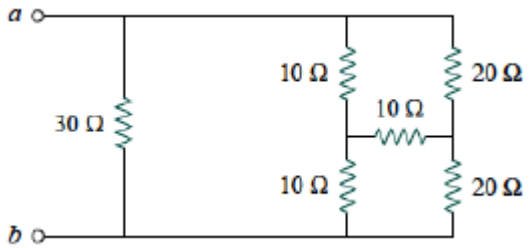
1. Classify the Network elements
2. Define Source Transformation with an example
3. State Kirchoffs law
4. State Faradays Law
5. State Millmans Theorem

L2: Understand

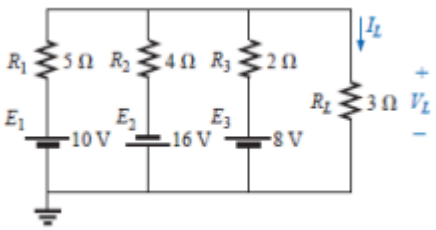
1. Explain the concept of Impedance and Power Factor
2. Explain the Types of sources
3. Explain the coefficient of coupling
4. Explain Quality factor and sensitivity
5. Understand V-I relationships of Passive elements. (L2)
6. Study and understand the concept of duality. (L2)
7. Understand the concept of self and mutual inductance. (L2)

L3: Apply

1. Obtain the equivalent resistance at the terminals a-b Using star delta Transformation



2. The air gap in a magnetic circuit is 1.5 mm long and 2500 mm^2 in cross- sectional area. Calculate (a) The reluctance of the air gap (b) The *mmf* required to set up a flux of 800 μWb in the air gap.
3. Derive the average value for Half wave rectified wave
4. A coil of negligible resistance and inductance 100mH is connected in series with a capacitance of 2 μF and a resistance of 10Ω across a 50V, variable frequency supply. Determine (a) the resonant frequency, (b) the current at resonance, (c) the Q-factor of the circuit.
5. Using Millman's theorem, find the current through the resistor RL of Fig. shown



L4: Analyzing

1. Analyze single phase AC circuits by using mesh and nodal analysis.
2. Analyze series and parallel magnetic circuits.
3. Analyze single phase ac circuits.
4. Analyze series and parallel R, L, C circuits.

L5: Evaluating

1. Determine average and complex power.
2. Determine mesh currents and node voltages
3. Estimate resonance frequency, bandwidth and selectivity of series and parallel resonant circuits.

Chairperson
Board of Studies (EEE)

R24HS02 COMMUNICATIVE ENGLISH LAB 0 0 2 1
(Common to CSE, CSE-AI & ML, CSD Branches in Semester-I)
(Common to EEE, MECH & ECE in Semester-II)

Course Objectives:

The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. Students undergo training in basic communication skills to make them into confident communicators in all situations.

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

Course Code	Course Outcomes	Mapping with POs			
		PO9	PO10	PO12	Dok
R24HS02.1	Understand and recognize the various facets of English language ability with a focus on the four basic skills- namely -LSRW abilities.	1	3	2	L1
R24HS02.2	Implement various activities for language learners to practise communication skills.	1	2	3	L2
R24HS02.3	To enhance listening and speaking comprehension, analyze the sounds, stress, rhythm, intonation, and syllable division of English speech.	1	3	2	L3
R24HS02.4	Assess the professionalism of students when taking part in group discussions, debates, JAM sessions, Presentations and Interviews.	3	1	2	L4
R24HS02.5	Equipping oneself with Interview Skills and a range of Soft Skills for life and career.	1	3	2	L5

Board of Studies : BS&H- English

Approved in BOS No: 6th August, 2024

Approved in ACM No: 01

SYLLABUS

Week1:

1. To explain and guide the students in decoding the sounds of English.
2. List all the consonant sounds and vowel sounds in English

Week2:

1. What is a syllable and describe the syllable structure.
2. Define stress, functional stress and various rules of stress.
3. What is connected speech?

Week3:

1. What is Intonation and mention the various pitch movements like rise, fall, fall-rise or rise-fall?
2. What is connected speech?

Week4:

1. To equip students to speak in English language confidently without any inhibitions.
2. Why are majority of the companies conducting JAM session as a preliminary interview?

3. What are the key skills tested in JAM round?

Week5:

1. To help students learn and understand different functions of language like greeting, asking
2. For information, giving information, meetings, requests, exchanging dialogues in formal and informal contexts.
3. Introduce yourself and others, give instructions and directions

Week 6:

1. To help the students understand and work on the digital age connector for personal correspondence, business communication, etc.
2. Write about email etiquette.
3. Draft an email to the HR Manager of Wipro Technologies requesting to consider your application for the post of Software Engineer.

Week 7:

1. To update students about the importance of Resume, the various types and the essentials of an effective resume
2. Draft a resume for a software post in reputed organization.

Week 8:

1. To educate students about the various styles of writing formal letters.
2. What is a cover letter? What are the different types of cover letters?
3. Write a job application letter for any post of your choice in a reputed company?

Week 9:

1. To help students know the importance of an SOP in their professional advancements?
2. What is an SOP and what are the different kinds and parts of an SOP?
3. Prepare an SOP to apply for a Master's Programme in any University of your choice.

Week 10:

1. To educate and guide the students about presentation skills and its importance in the technical evolving world.
2. To inform explain students about the importance of body language in various personal and professional forums
3. To help students to present papers, PPT's in seminars, workshops, conferences, research projects, interviews, etc.

Week 11:

1. To help students to give effective PPT's in various academic and professional platforms.
2. Describe various aspects that make PPT more effective.
3. Make a PPT on any topic of your choice and present it to the class.

Week 12:

1. To foster, creative, critical thinking skills, analytical skills and problem solving skills.
2. Suggest a few tips for preparing a poster.
3. Prepare posters from or outside your curriculum.

List of Activities:

1. Sounds of English (Vowels and Consonants) **COs: CO1,CO2**
2. Neutralization and Accent Rules **COs: CO1,CO2**
3. Improving communication skills /JAM. **COs: CO3,CO4**

4. Letter Writing and E-mail Writing **COs: CO1,CO2**
5. Cover letters and Resume Writing **COs: CO1,CO2**
6. Statement of Purpose. **COs: CO1,CO2**
7. Debates **COs: CO4:CO5**
8. Presentation skills- PPT and Poster **COs: CO4:CO5**
9. Group Discussions , types and practice **COs: CO4,CO5**
10. Interview skills – Mock interviews **COs: CO4,CO5**

Reference Books:

1. Prof. M. Hari Prasad, Prof. Vijaya Babu, Prof. Padmaja Kalapala, Skill Craft – A Communicative English Laboratory Workbook, Maruthi Publications first Edition, 2023
2. Meenakshi Ramana, Sangeeta-Sharma, 4thEdition, Technical Communication, Oxford Press, 2022.
3. Grant Taylor: English Conversation Practice, 1st Edition, Tata ,Mc Graw-Hill Education India, 2001.
4. Hewing,s, Martin, Cambridge Academic English(B2), Cambridge University Press,2012.
5. T. Balasubramanyam, A Textbook of English Phonetics for Indian Students, 3rd Edition, Trinity, 2022.
6. Dr. ShaliniSharma's Body Language Your Success Mantra, S. Chand publications 2010.
7. Sunitha Mishra and C.Murali Krishna's Communication Skills for Engineers Pearson Education Edition 2009.

Suggested software:

- English Wordsworth –Language Lab- Wordsworth Software

Web References for:

Spoken English

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. . https://www.youtube.com/c/ArnelsEverydayEnglish/featured
7. https://www.youtube.com/c/engvidAdam/featured
8. . https://www.youtube.com/c/EnglishClass101/featured
9. https://www.ted.com/watch/ted-ed
10. http://www.edest.org/

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

Chairperson
Board of Studies (English)

R24BS03 **Engineering Physics Lab** **0 0 2 1**
(Common to all Branches)

Course Objectives:

1. To study the concepts of optical phenomenon like interference, diffraction etc.,
2. To recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors
3. To study the parameters and applications of dielectric and magnetic materials by conducting experiments.

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

Course Code	Course Outcomes	Mapping with POs					Dok
		PO1	P02	P04	PO9	PO12	
R24BS03.1	Demonstrate the modern engineering physics techniques and tools in real times applications in engineering studies.	3	1	2	1	2	L1
R24BS03.2	Develop the laboratory skills in handling of electrical and optical instruments.	2	1	1	2	1	L3
R24BS03.3	Conduct experiment independently and in team to record the measurements	2	1	2	2	1	L2

Board of Studies : Department of Physics
Approved in BOS No: 01, 5th August, 2024
Approved in ACM No: 01

Developing the following programs:

List of Experiments

1. Determination of radius of curvature of a given plano convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Determination of thickness of thin object by air wedge method.
4. Determination of wavelength of Laser Source by diffraction grating.
5. Determination of rigidity modulus of the material of the given wire using Torsional Pendulum.
6. Magnetic field along the axis of a current carrying circular coil by Stewart & Gee's Method.
7. Determination of dispersive power of the prism.
8. Determination of acceleration due to gravity and radius of Gyration by using Compound Pendulum.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Determination of dielectric constant using charging and discharging method.
11. Sonometer: Verification of laws of stretched string.
12. Estimation of Planck's constant using photoelectric effect.
13. Study the variation of B versus H by magnetization of the magnetic material (B-H curve).
14. Determination of frequency of electrically maintained tuning fork by Melde's experiment.
15. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall

effect.

16. Determination of the resistivity of semiconductor by four probe method.
17. Determination of young's modulus for the given material of wooden scale by non- uniform bending (or double cantilever) method.
18. Determination of velocity of sound by Kundt's tube method.

Note: Any **TEN** of the listed experiments are to be conducted. Out of which any **TWO** experiments may be conducted in virtual mode.

Week 1:

1. What is the basic principle of newton's rings experiment?
2. Define Interference phenomena?.
3. Why the rings are circular?
4. What are Newton's Rings?
5. Why it is necessary for the light to fall normally on plano convex lens?
6. What is constructive interference and destructive interference?
7. What is the purpose of glass plate incline at 450 in this experiment?
8. Why the centre of the rings is dark?
9. Which light does u use in this experiment?
10. What will happen if we use White light in this experiment?
11. If u replace yellow light with green light, is there any difference in the formation of rings ?

Week 2:

1. What is diode?
2. What is energy gap?
3. What is valency band?
4. What is conduction band?
5. How many types of solid materials are there and what are those materials?
6. What is a conductor?
7. What is insulator?
8. What are Semi conductors?
9. What are the types of semi conductors are there?
10. What is intrinsic and extrinsic semi conductor?
11. What u meant by Fermi energy level?

Week 3:

1. What is the full form of laser?
2. How laser light is different from the ordinary light?
3. What is population inversion?
4. What is pumping?
5. What is laser?
6. What is meant by the term coherency?
7. What is diffraction?
8. Define Grating
9. What is active medium?
10. What is the action of the optical resonator?

Week 4:

1. What is the magnetic induction formula at a point x, away from the center of the circular

coil?

2. What will be the Magnetic field value at the center of a current-carrying coil?
3. Does earth's horizontal magnetic field value remain the same everywhere or it fluctuates?
4. What is Commutator and what its role in an experiment?
5. What is the relation between Gauss and Tesla?
6. Why do you put apparatus (Wooden Frame along with circular coil) in East-West Direction?
7. What are Tan A and Tan B Positions?
8. What is the unit of magnetic field intensity H?
9. Can you perform the experiment by using the Alternating Current?
10. What are the magnetic elements?

Week 5:

1. What is the purpose of Capacitors ?
2. What the resistor will do ?
3. What is the purpose of Inductors?
4. What is Time constant?
5. What you meant by capacity of a conductor.
6. Define potential.
7. What is capacitance.
8. Define dielectric Constant?
9. What is the significance of finding the dielectric strength of a material?
10. Give some examples of dielectric materials used in electric devices?

Week 6:

1. What is plane transmission diffraction grating?
2. In our experiment, what type of diffraction does occur and how?
3. What is meant by dispersive power of grating?
4. How the commercial gratings can be made?
5. Define grating element
6. Among Prism and grating which gives more intense spectrum and why?
7. Define diffraction grating?
8. What are the essential parts of the spectrometer?
9. Which colour in the spectrum is having more refractive index?
10. How many types of spectra are available?
11. Define grating element.

Week 7:

1. What is the significance of the beam splitter in this experiment?
2. How do you form a wedge shaped air film?
3. Why the fringes are straight?
4. Why the fringes are formed equally spaced?
5. What type of light source is required for this experiment?
6. Why the fringes are formed parallel and why not circular like Newton Ring's experiment?
7. What is the principle involved in this experiment?
8. What is meant by constructive and destructive interference?

Week 8:

1. What is prism?
2. What u meant by Angular Dispersion?

3. Dispersive power of the prism?
4. What is Refractive index?
5. What is Spectrometer?
6. What is the function of Collimator?
7. What u meant by Angle of Prism?
8. What is Dispersion of Light?
9. What is the main optical action of the prism?
10. What type of prism do u use in this experiment?
11. What are the units of Dispersive power?
12. What type of light do u use in this experiment?
13. Which colour in the spectrum is having more refractive index?

Week 9:

1. .Define Rigidity of modulus?
2. Define Moment Of Inertia?
3. What is the meaning in calling this a pendulum?
4. Difference between simple pendulum and torsional pendulum?
5. What is S.H.M ?
6. What is Young's modulus?
7. Define Time Period?
8. Mention the factors on which the rigidity modulus of a material depends?
9. What is meant by mechanical deformation?
10. Define restoring force?
11. Define stress and mention its units?
12. Define strain and mention its units?
13. If we increase the diameter of the wire, what happened to rigidity modulus?
14. Differentiate simple pendulum and torsional pendulum?

Week 10:

1. What does u mean by Frequency?
2. Define Resonance?
3. What u meant by Progressive wave?
4. How many types of progressive waves are there?
5. Difference between transverse wave and longitudinal wave?
6. What u meant by standing wave?
7. In our experiment which type of wave passing along the thread?
8. In our experiment which type of wave passing along the thread?

Week 11:

1. What is the purpose of Capacitors ?
2. What the resistor will do?
3. What is the purpose of Inductors?
4. What is Time constant?
5. What is capacitance?
6. Define potential?
7. What u meant by capacity of a conductor?
8. What is the relation between charge "Q" and capacitor?

References:

1. S. Balasubramanian, M.N.Srinivasan "A Text Book of Practical Physics"-S Chand Publishers, 2017.
2. R.K. Shukla, Anchal Srivastava, Practical Physics, New age international (2011).
3. H.G.Jerrad and D.B. Mc Neil -Theoretical and Experimental Physics.
4. Roman Kezerashvili, Physics laboratory experiments: electricity, magnetism, optics, New York: Gurami Pub., (2003).
5. Y. Aparna and K. Venkateswararao, Engineering Physics–I and II, VGS Techno series.
6. J.R.G. Patnaik, "Physics Laboratory Manual, "Paramount book distributors.
7. S. Panigrahi and B. Mallick, Engineering Practical Physics, Cengage leaning, Delhi, 2015.

Weblinks:

1. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype
2. http:/www./iitk.vlab.co.in

Chairperson
Board of studies (Physics)

R24ES04 **IT Workshop Lab** **0 0 2 1**

(Common to All Branches)

Course Objectives:

1. To assemble and disassemble a computer.
2. To solve hardware and software problems.
3. To learn about Networking of computers and use Internet facility for Browsing and Searching.
4. To develop project documentation using MS word
5. To work with various productivity tools including Excel, PowerPoint.
6. To work with different online repositories such as GITHUB, AI CHATBOT.

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

Course Code	Course Outcomes	Mapping with POs and PSOs					Dok
		PO1	PO2	PO3	PS01	PS02	
R24ES04.1	Perform Hardware troubleshooting and Perform Hardware troubleshooting	2	3	3	3	2	L2, L3
R24ES04.2	Apply different way of hooking the PC on to the internet from home and Workplace.	3	2	2	2	3	L1, L2 L3
R24ES04.3	Design word documents by learning word processing and Create presentations by using different styles and using AI Tools-Chat GPT and GITHUB	2	3	3	2	3	L2, L3, L4

SYLLABUS

PC Hardware & Software Installation **9 Hours**

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the Block diagram of the CPU along with the configuration of each peripheral and submit it to your Instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab Instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab Instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. Lab instructor should verify the installation and follow it up with a Viva. **COs-CO1**

Internet &World Wide Web **6 Hours**

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally, students Should demonstrate to the instructor, how to access the websites and email. If there is no internet Connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN Proxy settings, bookmarks, search toolbars and pop-up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to Use the search engines. A few topics would be given to the students for which they need to search On Google. This should be demonstrated to the instructors by the student. **COs-CO2**

MS WORD **6 Hours**

Task 1: Creating project abstract Features to be covered: -Formatting Styles, Inserting table, Bullets And Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 2: Creating a Newsletter: Features to be covered: - Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL **6 Hours**

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool; give the details of the four tasks and features that would be covered in Each. Using Excel – Accessing, overview of toolbars, saving excel files, using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, and auto Fill, Formatting Text**.**

Task 2: Calculating GPA -. Features to be covered: - Cell Referencing, Formulae in excel – Average, std. deviation, Charts, Renaming and Inserting worksheets, hyper linking, Count Function

POWER POINT **6 Hours**

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.**COs-CO3**

AI TOOLS – Chat GPT **6 Hours**

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model Responds. Try asking questions, starting conversations, or even providing incomplete sentences to See how the model completes them. Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to Brainstorm creative ideas Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Explore – GITHUB **6 Hours**

Task 1: Students should understand GITHUB and should possess accounts in it.

Task 2: Students should explore different repositories available in GITHUB and student should Create his/ her own simple repositories.

Task 3: Students should take simple experiments /presentations and upload them in their GITHUB Account.

Task 4: Students should understand how GITHUB Enterprise Cloud is used and also explore the GIT and GIT HUB resources. **COs-CO3**

Reference Books:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition

3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition
6. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCOPress, Pearson Education, 3rd edition
7. "Microsoft Word 2021: A Beginner's Guide"by Steve Lambert.
8. "Excel 2021: A Comprehensive Guide"by Chris Benham.
9. "Microsoft PowerPoint 2021: A Beginner's Guide" by Steve Lambert
10. GITHUB Quick Start Tutorials

WEB REFERENCES:

1. https://en.wikipedia.org/wiki/Main_Page
2. https://edu.gcfglobal.org/en/office2007
3. https://www.w3schools.com

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)
L1	30
L2	20
L3	30
L4	20
Total (%)	**100**

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. Identify Peripherals of a computer
2. Draw a Block Diagram of the CPU and explain the components along with the functions.
3. Explain the various steps in assembling and dissembling of the CPU.
4. Write the basic utilities used while creating a PowerPoint presentation.

L2: Understand

1. How to install windows operating system.
2. What are search engines and brief the advantages of search engines.
3. Explain the process of creating a project abstract.
4. Explain how to explore GITHUB resources

L3: Apply

1. Explain the process orientation and connectivity boot camp
2. Write the different formulae used while calculating GPA
3. Explain the insertion of various templates while creating power point presentations.
4. Discuss the format for customization your browser for effective searching and online etiquette

L4: Analysing

1. Analyze a structured approach to experiment with prompts.

2. Explore different repositories available in GITHUB.
3. "Imagine a world where every person is born with a unique, magical ability that reflects their deepest desire or fear. Describe a day in the life of a character who discovers that their ability is far more powerful and dangerous than they ever imagined. How does this revelation affect their relationships, their view of themselves, and their place in society?"

Chairperson
Board of Studies (CSE)

R24EEPC02 0 0 3 1.5

Electrical Circuits Lab

Course Objectives:

1. To impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics.
2. To determine the self and mutual inductances of a coil
3. To understand the series and parallel resonance

Course Code	Course Outcomes	Mapping with Pos and PSOs							
		PO1	PO2	PO3	PO4	PO6	PO8	PSO 1	PSO 2	DOK
R24EEPC02.1	Apply various theorems to electrical circuits	3	2	2	3	1	-	1	1	L1,L2
R24EEPC02.2	Determination of Two port parameters of a given electric circuits. Determination of self and mutual inductances	2	3	2	1	1	-	1	1	L1,L2
R24EEPC02.3	Determine the parameters of a given coil.	3	2	3	2	1	-	1	1	L1,L2

List of Experiments

1. Verification of Kirchhoff's circuit laws. **CO1**
2. Verification of Superposition theorem. **CO1**
3. Verification of Thevenin's and Norton's theorems. **CO1**
4. Verification of Maximum power transfer theorem. **CO1**
5. Verification of Compensation theorem. **CO2**
6. Verification of Reciprocity and Millman's Theorems. **CO2**
7. Series and parallel resonance. **CO3**
8. Determination of self, mutual inductances and coefficient of coupling **CO2**
9. Determination of Impedance (Z) and Admittance (Y) Parameters for a two port network **CO2**
10. Determination of Transmission and Hybrid parameters **CO3**
11. Determination of Parameters of a choke coil. **CO1**
12. Determination of cold and hot resistance of an electric lamp. **CO1**
13. Measurement of 3-phase power by two wattmeter method for unbalanced loads **CO1**

NOTE: Any 10 experiments are to be conducted

Exercise Problems

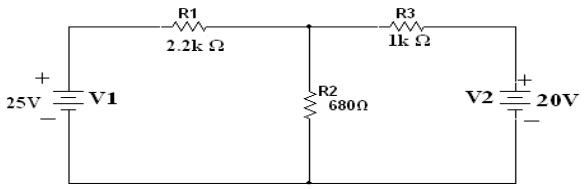
Level: 1

1. An Electric iron is rated 1000W, 240V. Find the current drawn & resistance of the heating element

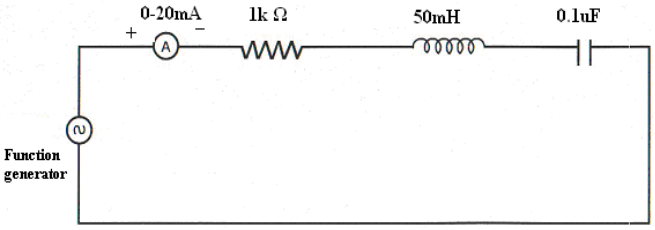
2. State Thevenins theorem.
3. State Norton's theorem
4. State maximum power transfer theorem.
5. Sate superposition theorem.
6. State Norton's theorem and find current using Norton's theorem through a load of 8

Level: 2

1. Determination of self, mutual inductances and coefficient of coupling
2. Determination of Impedance (Z) and Admittance (Y) Parameters for a two port network



3. To find the resonant frequency, quality factor and band width of a given series and parallel resonant circuits



4. Determination of self, mutual inductances and coefficient of coupling
5. Measure the active power for the given star and delta networks

Reference Books:

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata Mc Graw Hill Education, 2005, sixth edition 2.
2. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition

Chairperson
Board of Studies (EEE)

Code: R24MC02 NSS /NCC/ SCOUTS & GUIDES / COMMUNITY SERVICE 0 0 1 0.5

(Common to All branches of Engineering)

Course Objectives:

The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

SYLLABUS

UNIT I: Orientation

General Orientation on NSS/NCC/ Scouts & Guides/ Community Service activities, career guidance.

Activities:

i) Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
ii) Conducting orientations programs for the students –future plans-activities-releasing road map etc.
iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT II: Nature & Care

Activities:

i) Best out of waste competition.
ii) Poster and signs making competition to spread environmental awareness.
iii) Recycling and environmental pollution article writing competition.
iv) Organising Zero-waste day.
v) Digital Environmental awareness activity via various social media platforms.
vi) Virtual demonstration of different eco-friendly approaches for sustainable living.

UNIT III: Community Service

Activities:

i) Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media- authorities- experts-etc.
ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
iii) Conducting consumer Awareness. Explaining various legal provisions etc.
iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
v) Any other programmes in collaboration with local charities, NGOs etc.

.

Board of Studies : BS&H (Mathematics)
Approved in BoS No : 01, August, 2024
Approved in ACM No: 01

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service Scheme Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. Red Book - National Cadet Corps – Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., ―Introduction to Environmental Engineering‖, McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R ―Introduction to Environmental Engineering and Science‖, Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.

Chairperson
Board of Studies (Mathematics)

R24BS10 NUMERICAL METHODS AND TRANSFORM TECHNIQUES 3 0 0 3
(Common to MECH and EEE)

Course Objectives:

1. To elucidate the different numerical methods to solve nonlinear algebraic equations.
2. To disseminate the use of different numerical techniques for carrying out numerical integration.
3. To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

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

Course Code	Course Outcomes	Mapping with POs			Dok
		PO1	PO2	PO12	
R24BS10.1	Evaluate the approximate roots of polynomials and transcendental equations by different algorithms. Apply Newton's forward and backward interpolation and Lagrange's formulae for equal and unequal intervals.	2	2	1	L1,L2,L3
R24BS10.2	Apply numerical integral techniques to different Engineering problems. Apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations.	2	2	1	L1,L2,L3
R24BS10.3	Apply the knowledge of Laplace transforms to solve differential equations.	2	2	1	L1,L2,L3
R24BS10.4	Compute the Fourier series of periodic signals.	2	2	1	L3,L4
R24BS10.5	Know and be able to apply integral expressions for the forward and inverse Fourier transforms to a range of non-periodic wave forms.	2	2	1	L4,L5

SYLLABUS

UNIT- I: Iterative Methods **10 hours**

Introduction- Solution of algebraic and transcendental equations: Bisection method-Secant method-Method of false position-Iteration method –Newton-Raphson method.

Interpolation: Newton's forward and backward formulae for interpolation-interpolation with unequal intervals-Lagrange's interpolation formula. **Cos-CO1**

Self-Learning Topic: Gauss's forward and backward interpolation formula

UNIT- II: Numerical Integration, Solution of ordinary differential equation with initial conditions: **10 hours**

Trapezoidal rule-Simson's $1/3^{rd}$ and $3/8^{th}$ rule-Solution of initial value problems by Taylor's series-

Picard's method of successive approximations-Euler's method – Runge-Kutta method (second and fourth order). **Cos-CO2**

Self-Learning Topic: Milne's Predictor and Corrector Method

UNIT- III: Laplace Transforms: 10 hours

Definition of Laplace transform-Laplace transform of standard functions- Properties of Laplace Transforms-Shifting theorems-Transforms of derivatives and integrals-Unit step function-Dirac's delta function-Inverse Laplace transforms-Convolution theorem (without proof)

Applications: Solving ordinary differential equations (initial value problems) and integral differential equation using Laplace transforms. **COs-CO3**

Self-Learning Topic: Solution of simultaneous differential equations by Laplace transforms.

UNIT- IV: Fourier series 10 hours

Introduction- Periodic functions- Fourier series of periodic functions-Dirchlet's conditions –Even and odd functions- Change of intervals-Half-range sine and cosine series. **COs-CO4**

Self-Learning Topic: Applications of Fourier series

UNIT- V: Fourier Transforms: 10 hours

Fourier integrals theorems (without proof)-Fourier sine and cosine integrals-Infinite Fourier transforms-Sine and cosine transforms-Properties-Inverse transforms-Convolution theorem (without proof)-Finite Fourier transforms- Parseval's identity for Fourier transforms(without proof). **COs-CO5**

Self-Learning Topic: Solve Partial differential equation by Fourier transform.

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2017, 44th Edition
2. B.V.Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2018, 10th Edition.
2. M.K.Jain,S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Compuation, New Age International Publication.

Board of Studies : Basic Science and Humanities (Mathematics)
Approved in BOS No: 01, 2nd August, 2024
Approved in ACM No: 01

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	30	10
L2	30	10
L3	40	30
L4	-	25

L5	-	25
Total (%)	**100**	**100**

Sample Short and Long Answers questions of Various Cognitive Levels

UNIT 1

1. Find a real root of $xe^x = 3$ using Regula –Falsi method. (L1)
2. Using Newton Raphson method finds a real root of $\cos x = xe^x$ and correct to four decimal places. (L2)
3. Find a real root of the equation $x\log_{10} x = 1.2$ by Regula-Falsi method correct to four decimal Places (L2)
4. If $y(1) = -3, y(3) = 9, y(4) = 30, y(6) = 132$ find the $y(x)$ (L3)

UNIT 2

1. State Simson's 1/3 rule
2. Find $y(0.1)$ and$d\ y(0.2)$ using Picard's method given that $\frac{dy}{dx} = x + y$ given that $y = 1$ when $x = 0$ (L 2)
3.
4. By RK method of second order find $y(0.1)$ and $y(0.2)$ given that $\frac{dy}{dx} = 1 - 2xy^2$, $y(0) = 1$. (L 2)
5. By Taylor's series method find $y(0.2)$ given that $\frac{dy}{dx} = 3x + y^2$, $y(0) = 1$. (L 2)
6. Find $y(0.1)$ given that $\frac{dy}{dx} = x^2 - y^2$, $y(0) = 1$. (L 3)

UNIT 3

1. Define Laplace transform (L1)
2. Find the Laplace transform of $f(t) = \begin{cases} t^2, 0 \le t < 2 \\ t-1, 2 \le t < 3 \\ 7, t \ge 3 \end{cases}$ L2
3. Solve the differential equation $(D^2 + 9)y = \sin t, y(0)1, y'(0) = 0$ L3

UNIT 4

1. Find the Half range cosine series of $f(x) = \begin{cases} 1 & 0 < x < 1 \\ -1 & 1 < x < 2 \end{cases}$ in $[0,2]$ L3
2. Find the Fourier series of $f(x) = \frac{1}{4}(\pi - x)^2$, $0 < x < 2\pi$

   Hence deduce that $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} \ldots = \frac{\pi^2}{6}$

(L4)

UNIT 5

1. State Parseval's identity L1

2. .Find the Fourier transform of $f(x)$ defined by $f(x)=\begin{cases} x & \text{if } 0<x<1 \\ 1-x & \text{if } 1<x<2 \\ 0 & \text{if } x<2 \end{cases}$

   (L2)

3. Find the Fourier cosine transform of $\frac{1}{1+x^2}$ (L3)

4. If the Fourier sine transform of $f(x)=\frac{1-\cos n\pi}{n^2\pi^2}(0\le x\le \pi)$, find $f(x)$

   (L4)

5. Find the Fourier transform of $f(x)=\begin{cases} 1-x^2, |x|\le 1 \\ 0, \quad |x|>1 \end{cases}$ L4

6. hence evaluate $\int_0^\infty \frac{x\cos x-\sin x}{x^3}\cos\frac{x}{2}dx$ L5

Chairperson
Board of Studies (Mathematics)

R24HS03 Universal Human Values-Understanding Harmony & Human Ethical Conduct

(Common to CSE, CSE (DS), CSE (AI&ML), ECE, EEE, ME) **2 0 0 2**

Course Objectives:

The main objectives of the course are to:

- To enable students to recognize the vital connection between **values and skills**, emphasizing how their integration leads to lasting happiness and prosperity core aspirations shared by all human beings.
- To guide students in developing a **holistic outlook on life and profession** grounded in a deep understanding of human nature and existence. This perspective supports the cultivation of **Universal Human Values** and encourages a natural transition toward **value-based living**.
- To illustrate the practical outcomes of a holistic understanding, particularly in fostering **ethical behavior**, **trust-based and fulfilling relationships**, and **harmonious interaction with nature**.

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

Course Code	Course Outcomes	Mapping with POs & PSOs											DoK
		PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	
R24HS03.1	Develop an understanding of human values.	2	2	-	-	2	3	3	2	2	-	3	L1, L2
R24HS03.2	Achieve harmony within self and body.	2	-	-	-	-	3	3	2	-	-	3	L2, L3
R24HS03.3	Build trustful and respectful relationships.	2	-	-	2	3	2	3	3	3	-	3	L3, L4
R24HS03.4	Understand harmony in nature.	2	2	-	-	-	3	3	2	2	-	3	L4, L5
R24HS03.5	Practice ethical and value-based living.	2	2	-	-	2	2	3	2	2	-	3	L5, L6

SYLLABUS

Unit I: Introduction to Value Education (6 lectures and three tutorials for practice session)

Lecture 1: Introduction to Human Development – Physical, Emotional, and Intellectual Dimensions

Lecture 2: Core Concepts of Value Education in Contemporary Society

Tutorial 1: Practice Session PS1 – Reflective Sharing on Life Values and Personal Experiences

Lecture 3: Self-awareness and Self-exploration: Tools for Inner Clarity

Lecture 4: Aspirations of the Human Being – Joy, Fulfillment, and Meaning

Tutorial 2: Practice Session PS2 – Exploring Self-awareness and Emotional Intelligence

Lecture 5: Challenges to Human Fulfillment in Modern Life

Lecture 6: Mindfulness and Ethical Decision-Making as a Path to Human Aspiration Fulfillment

Tutorial 3: Practice Session PS3 – Identifying Personal Ethical Dilemmas and Responses **CO's CO1**

Self-Learning Concepts: Explore how education influences the development of core human values, the significance of emotional intelligence in personal growth, the role of mindfulness in enhancing self-awareness, the impact of consumerism and modern lifestyle on ethical choices, and reflect on one's own aspirations and value system – all of which build a foundation for inner development.

Unit II: Harmony in the Human Being (6 lectures and three tutorials for practice session)

Lecture 7: Human Being: Alignment of Thoughts, Emotions, and Actions

Lecture 8: Needs and Desires: Distinguishing Between Essentials and Superfluous

Tutorial 4: Practice Session PS4 – Mind Mapping Personal Needs and Desires

Lecture 9: The Role of Body, Mind, and Consciousness in Well-being

Lecture 10: Cultivating Harmony within the Self – Practices and Techniques

Tutorial 5: Practice Session PS5 – Journaling: Tracking Inner Conflicts and Clarity

Lecture 11: Body Awareness and Physical Well-being Practices (Yoga/Meditation)

Lecture 12: Sustainable Self-Regulation and Lifestyle Choices for Health

Tutorial 6: Practice Session PS6 – Wellness and Lifestyle Assessment Activity **CO's-CO2**

Self-Learning Concepts: Understand the benefits of journaling for emotional and mental clarity, examine the relationship between diet, exercise, and mental well-being, explore how to identify and manage sources of stress, study the scientific basis of meditation and mindfulness, and create a personalized routine for achieving physical and emotional balance – fostering harmony within the self.

Unit III: Harmony in the Family and Society (6 lectures and three tutorials for practice session)

Lecture 13: Foundations of Healthy Relationships – Emotional and Ethical Dimensions

Lecture 14: Cultivating Trust and Empathy in Family and Social Contexts

Tutorial 7: Practice Session PS7 – Role-play on Building Trust in Relationships

Lecture 15: Respect and Empathy – Cornerstones of Human Interaction

Tutorial 8: Practice Session PS8 – Group Activity: Expressing Respect in Conversations

Lecture 16: Conflict Resolution and Emotional Safety in Social Interaction

Lecture 17: Principles of Ethical Leadership and Community Engagement

Lecture 18: Global Citizenship and Social Justice in the Modern World

Tutorial 9: Practice Session PS9 – Simulation: Creating a Model Ethical Society **CO's-CO3**

Self-Learning Concepts: Learn how to practice active listening and empathy, recognize and overcome personal biases in relationships, analyze inspiring examples of ethical leadership and community service, understand the concept of emotional safety in interpersonal dynamics, and explore the role of volunteerism in building a responsible and connected society – enhancing harmony in relationships and the social fabric.

Unit IV: Harmony in the Nature/Existence (4 lectures and two tutorials for practice session)

Lecture 19: Ecological Intelligence and Human-Nature Relationship

Lecture 20: Sustainability and Resource Responsibility – A Human Imperative

Tutorial 10: Practice Session PS10 – Case Study: Local Environmental Issue & Action Plan

Lecture 21: Systems Thinking – Viewing Nature as an Interconnected Whole

Lecture 22: Eco-Spirituality and the Harmony of Existence

Tutorial 11: Practice Session PS11 – Nature Walk + Reflection on Human-Nature Coexistence

CO's-CO4

Self-Learning Concepts: Study the principles of minimalism as a lifestyle for environmental consciousness, calculate and reduce your carbon footprint, compare environmental issues in urban and rural areas, explore sustainable agriculture and local food movements, and research the involvement of youth in global climate action – deepening your understanding of harmony with nature.

Unit V: Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and tutorials for practice session)

Lecture 23: Personal Integrity and Professional Ethics – Building the Link

Lecture 24: Ethics in the Digital Age – Responsibility and Cyber Citizenship

Tutorial 12: Practice Session PS12 – Case Analysis: Ethical Dilemma in Technology Use

Lecture 25: Humanistic Leadership and Social Entrepreneurship

Lecture 26: Corporate Social Responsibility and Sustainable Business Models

Tutorial 13: Practice Session PS13 – Designing a Value-based Startup Idea

Lecture 27: Innovation with Purpose: Case Studies in Ethical Innovation

Lecture 28: Life Planning and Career Pathways Anchored in Values

Tutorial 14: Practice Session PS14 – Action Plan: Aligning Career with Core Human Values

CO's-CO5

Self-Learning Concepts: Explore ethical concerns in the digital age such as data privacy and responsible AI use, understand the concept of human-centered design in business, study successful examples of green and socially responsible enterprises, formulate your own personal code of ethics, and analyze real-life ethical dilemmas encountered in the workplace – promoting value-based professionalism and ethical living.

Practice Sessions for UNIT I – Introduction to Value Education

PS1 Sharing about Oneself

PS2 Exploring Human Consciousness

PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being

PS4 Exploring the difference between the Needs of the self and body

PS5 Exploring Sources of Imagination in the Self

PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society

PS7 Exploring the Feeling of Trust

PS8 Exploring the Feeling of Respect

PS9 Exploring Systems to Fulfill Human Goals

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)

PS10 Exploring the Four Orders of Nature

PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

Board of Studies: Master of Business Administration
Approved in BoS No: 02, 13th May, 2025
Approved in ACM No: 02

Text Book and Teachers Manual

1. **R R Gaur, R Asthana, G P Bagaria**, A Foundation Course in Human Values and Professional
2. Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1 **R R Gaur, R Asthana, G P Bagaria**, Teachers' Manual for A Foundation Course in Human
3. Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:

1. **JeevanVidya: EkParichaya**, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. **Human Values, A.N. Tripathi**, New Age Intl. Publishers, New Delhi, 2004.
3. **The Story of Stuff** (Book).
4. **The Story of My Experiments with Truth** - by Mohandas Karamchand Gandhi
5. **Small is Beautiful** - E. F Schumacher.
6. **Slow is Beautiful** - Cecile Andrews
7. **Economy of Permanence** - J C Kumarappa
8. **Bharat Mein Angreji Raj** – PanditSunderlal
9. **Rediscovering India** - by Dharampal
10. **Hind Swaraj or Indian Home Rule** - by Mohandas K. Gandhi
11. **India Wins Freedom** - Maulana Abdul Kalam Azad
12. **Vivekananda** - Romain Rolland (English)
13. **Gandhi** - Romain Rolland (English)

Web References:

1. **https://www.uhv.org.in/uhve**

2. https://fdp-si.aicte-india.org/UHVII.php
3. https://www.aicte-india.org/sites/default/files/Model_Curriculum/Minor%20Degree%20in%20UHV.pdf

Mode of Conduct:

1. Lecture hours are to be used for interactive discussion, where proposals about the topics are to be made and students are to be motivated to reflect, explore, and verify them.
2. Tutorial hours are to be used for practice sessions.
3. While analyzing and discussing the topic, the faculty mentor's role is to point to essential elements to help sort them out from the surface elements. In other words, it allows the students to explore the critical components.
4. In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with oneself and do self-observation, self-reflection, and self-exploration.
5. Scenarios may be used to initiate discussion. The student is encouraged to take up" ordinary" rather than" extraordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentors in a group setting.
6. Tutorials (experiments or practical) are essential for the course. The difference is that the laboratory is part of everyday life; it is helpful in how you behave and work in real life. Worksheets, home assignments, and/or activities are included depending on the nature of the topics.
7. The practice sessions (tutorials) would also support student in performing actions commensurate to their beliefs. It is intended that this would lead to the development of commitment, namely behaving and working based on fundamental human values.
8. It is recommended that this content be placed before the student as it is, in the form of an introductory foundation course, without including anything else or excluding any part of this content. Additional content maybe offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

Internal Assessment Pattern

Cognitive Level	Internal Assessment # 1 (%)	Internal Assessment # 2 (%)
L1	15	-
L2	34	-
L3	34	15
L4	17	34
L5	-	34
L6	-	17
Total (%)	**100**	**100**

Sample Short and Long Answers to Questions of Various Cognitive Levels

L1: Remember

1. What is meant by Natural Acceptance?
2. Define Right Understanding.
3. List the four orders of nature.
4. What are the basic human aspirations?
5. State the meaning of Sanyam (self-regulation).
6. What is meant by prosperity?
7. Name the two parts of a human being.
8. What is the role of the body according to Value Education?
9. List the feelings essential in human-to-human relationships.
10. What is meant by co-existence?

L2: Understand

1. Explain the relationship between Right Understanding and Relationship.
2. Describe the harmony between the self and the body.
3. Interpret the concept of continuous happiness and prosperity.
4. Discuss the difference between the needs of the self and the body.
5. Explain the meaning of justice in relationships.
6. Describe the importance of self-exploration.
7. Clarify the concept of mutual fulfillment in nature.
8. Discuss how education helps in holistic development.
9. Explain the vision of a universal human order.
10. Describe what is meant by 'respect' as the right evaluation.

L3: Apply

1. Apply the concept of Natural Acceptance in making ethical decisions.
2. Illustrate harmony in the family with an example from your own life.
3. Demonstrate how you can practice self-regulation in your daily routine.
4. Use the idea of mutual fulfillment in a plan for an eco-friendly campus.
5. Apply the idea of Right Understanding to resolve a conflict.
6. Show how holistic development can be integrated into your lifestyle.
7. Implement practices that promote harmony in your social group.
8. Use the concept of the body as an instrument to improve physical health.
9. Plan a group activity that promotes trust and respect.
10. Apply the principles of co-existence in managing natural resources.

L4: Analysing

1. Differentiate between happiness and prosperity with examples.
2. Analyze the role of the self and body in human behavior.
3. Compare trust and respect in family relationships.
4. Examine how lack of Right Understanding leads to disharmony.
5. Distinguish between self-regulation and external regulation.
6. Investigate the root causes of conflict in society.
7. Analyze the systems in nature that demonstrate harmony.
8. Examine how justice arises from mutual fulfillment.

9. Break down the structure of a universal human order.
10. Explore the interconnection between individual values and societal peace.

L5: Evaluating

1. Evaluate the relevance of Value Education in modern society.
2. Assess the impact of materialism on human happiness.
3. Judge the effectiveness of education in achieving holistic development.
4. Critique current societal systems in light of natural co-existence.
5. Appraise the role of mutual trust in building strong relationships.
6. Defend the need for harmony at all levels of human existence.
7. Evaluate the importance of distinguishing between self and body.
8. Justify the inclusion of Value Education in professional courses.
9. Compare the traditional vs. modern views on personal success.
10. Argue whether self-exploration is sufficient for understanding human values.

L6: Create and Develop

1. Design a value-based weekly routine for students.
2. Construct a model society based on mutual trust and justice.
3. Formulate strategies to integrate value education into school curricula.
4. Develop a plan for promoting harmony in a multicultural community.
5. Compose an essay on the role of harmony in personal and professional life.
6. Create a campaign to raise awareness on sustainable coexistence with nature.
7. Design a self-assessment tool for personal value alignment.
8. Develop a short workshop on self-exploration for college students.
9. Write a story that illustrates the principles of Right Understanding.
10. Create a visual mind map connecting harmony at the individual, family, and societal levels.

Chairperson
Board of Studies (MBA)

R24EEPC03 **Electrical Circuit Analysis –II** **3 0 0 3**

(Electrical and Electronics Engineering)

Course Objectives:

The main objectives of the course is to

1. To understand three phase circuits
2. To evaluate network parameters of given electrical network
3. To analyze transients in electrical systems
4. To understand the network synthesis concepts
5. To understand the behavior of filters

Course Code	Course Outcomes	Mapping with POs and PSOs							DoK
		PO1	PO2	PO3	PO4	PO6	PSO1	PSO2	
R24EEPC03.1	Analyze balanced and unbalanced three-phase systems.	-	3	2	2	1	2	1	L1,L2
R24EEPC03.2	Understand and evaluate parameters of two-port networks.	1	1	-	2	1	2	1	L2, L3
R24EEPC03.3	Determine the transient response of R-L, R-C, and R-L-C circuits for both DC and AC excitations.	-	3	2	2	-	1	1	L3, L4
R24EEPC03.4	Analyze Network Synthesis concepts.	-	3	2	2	1	1	1	L4,L5
R24EEPC03.5	Design and analyze various types of filters	-	3	2	1	1	-	2	L5,L6

SYLLABUS

Unit –I: Analysis of Three Phase Balanced Circuits **14 Hours**

Phase sequence, star and delta connection of sources and loads, relationship between line and phase quantities, analysis of balanced three phase circuits, and measurement of active and reactive power.

Three Phase Unbalanced Circuits

Loop method, Star-Delta transformation technique, measurement of active and reactive power.

Self-Learning Topics: Applications in Electrical Systems **CO's: CO1**

Unit –II: Two Port Networks **10 Hours**

Impedance parameters, Admittance parameters, Hybrid parameters, Transmission (ABCD) parameters, conversion of Parameters from one form to other, Interconnection of Two Port

networks in Series, Parallel and Cascaded configurations- problems, Symmetry and Reciprocity Conditions

Self-Learning Topics: Equivalent Circuits of Two Port Network **CO's: CO2**

Unit –III: Transient Analysis **12 Hours**

Initial conditions -Transient response of R-L, R-C and R-L-C circuits for D.C. and sinusoidal excitations –Solution using differential equation approach and Laplace transform approach.

Self-Learning Topics: Applications of Transients in Electrical Systems **CO's: CO3**

Unit –IV: Network Synthesis **10 Hours**

Driving point impedance and admittance, transfer impedance and admittance network function poles, zeros, Network functions- Hurwitz polynomials, Positive Real Functions Synthesis of LC, RC and function by Foster and Cauer methods.

Self-Learning Topics: Design Networks **CO's: CO4**

Unit –V: Filters **10 Hours**

Classification of filters-Low pass, High pass, Band pass and Band Elimination filters, Design of Constant-k filters -Low pass and High Pass, Design of m derived-Filters - Low pass and High pass.

Self-Learning Topics: Op-Amp Based Filters **CO's: CO5**

Board of Studies: Electrical & Electronics Engineering

Approved in BOS No: 02, 21st, May, 2025

Approved in ACM No: 02

Text Books:

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata Mc Graw Hill Education, 2005, sixth edition.
2. Fundamentals of Electrical Circuits, Charles K. Alexander and Mathew N.O. Sadiku, Mc Graw Hill Education (India), 2013, Fifth Edition

Reference Books:

1. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai & Co., 2018, Seventh Revised Edition.
2. Circuits and Networks Analysis and Synthesis, A. Sudhakar, Shyam Mohan S. Palli, 5th Edition, Tata McGraw-Hill, 2017
3. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition

Web References:

1. https://archive.nptel.ac.in/courses/117/106/117106108/
2. https://archive.nptel.ac.in/courses/108/105/108105159/

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1 (%)	Internal Assessment #2 (%)
L1	40	---
L2	30	---
L3	30	
L4	---	40
L5	---	40
L6	---	20
Total (%)	100	100

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. What are the standard phase sequence orders?
2. What are the conditions for reciprocity in a two-port network?
3. State the Laplace transform of a unit step function.
4. List the properties of positive real functions.

L2: Understand

1. Illustrate the relationship between current and voltage in a balanced delta-connected load
2. Explain the significance of each parameter in the Z-parameter model.
3. Explain the behavior of capacitors and inductors during the switching process.
4. Explain the significance of Hurwitz polynomials in network synthesis.

L3: Apply

1. Calculate the current in each line of a delta-connected load with given phase impedances.
2. Convert given Z-parameters to h-parameters.
3. Apply Laplace transform to find the complete response of an RLC circuit
4. Use the Foster I method to realize a given LC impedance function.
5. Design a constant-k low-pass filter for a given cutoff frequency and load impedance

L4: Analyzing

1. Compare the current and voltage characteristics of star and delta connections in a tabular form.
2. Identify if a given set of parameters satisfies the condition for reciprocity and symmetry
3. Identify the over damped, under damped, and critically damped cases in an RLC circuit.
4. Compare Foster and Cauer methods of network realization.
5. Compare the characteristics of low-pass, high-pass, and band-pass filters

L5: Evaluating

1. Evaluate the benefits of using a three-phase supply for residential versus industrial setups.
2. Justify the use of hybrid parameters in transistor modeling.
3. Evaluate the performance of various damping conditions in second-order circuits.
4. Determine whether the synthesized network meets design specifications
5. Justify the choice of filter type for specific applications

L6: Create

1. Design a Constant-k low pass filter with a specified cutoff frequency and load impedance. Determine the component values and sketch the frequency response curve.
2. Develop an m-derived high pass filter that addresses the limitations of the Constant-k design near the cutoff frequency.
3. Formulate a band pass filter by cascading appropriate low pass and high pass filter sections.

Chairperson
Board of Studies (EEE)

R24EEPC04 **DC Machines & Transformers** **3 0 0 3**

(Electrical and Electronics Engineering)

Course Objectives:

The main objectives of the course is to

1. Understand the characteristics and applications of DC Machines
2. Understand the characteristics and applications of DC Machines
3. Understand the concepts of efficiency and regulation of a transformer by obtaining equivalent circuit.
4. Understand the performance of single-phase transformers.
5. Understand the performance of single-phase transformers.

Course Code	Course Outcomes	Mapping with POs and PSOs						DoK
		PO1	PO2	PO3	PO4	PO6	PSO1	
R24EEPC04.1	Understand the process of voltage build-up in DC generators and characteristics.	3	1	-	2	1	3	L1, L2
R24EEPC04.1	Understand the process of torque production, starting and speed control of DC motors and illustrate their characteristics.	3	1	-	2	1	3	L2, L3
R24EEPC04.1	Obtain the equivalent circuit of single-phase transformer and deter-mine its efficiency & regulation.	-	3	2	3	1	3	L3, L4
R24EEPC04.1	Analyze the performance of Single- Phase Transformers	-	3	2	2	1	3	L4,L5
R24EEPC04.1	Analyse various configurations of three-phase transformers.	-	3	3	2	1	3	L5,L6

SYLLABUS

UNIT – I: Introduction to DC machines **14 Hours**

Introduction to DC machines (Construction and principle of operation of DC machines) – EMF equation for generator –Excitation techniques- Types of DC Machines-shunt, series and Compound – Characteristics of DC generators –applications of DC Generators, Back-EMF and torque equations of DC motor- Characteristics of DC motors - Applications of DC motors – Armature reaction and commutation, voltage regulation, losses-power flow, efficiency calculation.

CO's: CO1

Self-Learning Topics: Principle of Commutation

UNIT – II: Starting, Speed Control and Testing of DC Machines **12 Hours**

Necessity of a starter – starting by 3-point and 4-point starters – speed control by armature voltage and field current control – Testing of DC machines, losses and efficiency, Condition for maximum efficiency, – brake test, Swinburne's test –Hopkinson's test–Field Test – Retardation Test. **CO's: CO2**

Self-Learning Topics: Calculate Losses and Efficiency of DC Machines

UNIT – III: Single-phase Transformers **12 Hours**

Introduction to single-phase Transformers (Construction and principle of operation)–emf equation Ideal Transformer– operation on no-load and on load –lagging, leading and unity power factor loads –phasor diagrams– equivalent circuit –regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – auto transformer –equivalent circuit- all day efficiency, Applications. **CO's: CO3**

Self-Learning Topics: To Draw the Phasor Diagrams at different P.F.

UNIT –IV: Testing of Transformers **12 Hours**

Open-Circuit and Short-Circuit tests, Polarity Test – Sumpner's test – separation of losses— Parallel operation with equal and unequal voltage ratios— equivalent circuit – comparison with two winding transformers. **CO's: CO4**

Self-Learning Topics: Predetermination of Losses, Efficiency and Regulation of a Transformer

UNIT – V: **Three-Phase Transformers:** **12 Hours**

Polyphone connections- Y/Y, Y/Δ, Δ/Y, Δ/Δ, open Δ and Vector groups – third harmonics in phase voltages– Parallel operation–three winding transformers- transients in switching –off load and on load tap changers–Scott connection-Applications. **CO's: CO5**

Self-Learning Topics: transients, star and delta connections

Board of Studies:	Electrical & Electronics Engineering
Approved in BOS No:	02, 21st, May 2025
Approved in ACM No:	02

Text books:

1. Electrical Machinery by Dr. P S Bimbhra, Fully Revised edition, Khanna Publishers, New Delhi, 2021.
2. Performance and analysis of AC machines by M.G. Say, CBS, 2002.

Reference Books:

1. Electrical Machines by D. P.Kothari, I .J .Nagarth, McGraw Hill Publications, 5th edition, 2017.

2. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 2017
3. Generalized Theory of Electrical Machines by Dr. P S Bimbhra, 7th Edition, Khanna Publishers, 2021.
4. Theory & Performance of Electrical Machines by J.B.Gupta, S.K.Kataria& Sons,2013.
5. Electric Machinery by Fitzgerald, A.E.,Kingsley, Jr.,C.,& Umans, S. D, 7th edition, McGraw-Hill Education, 2014.

Web Resources:

1. nptel.ac.in/courses/108/105/108105112
2. nptel.ac.in/courses/108/105/108105155

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1 (%)	Internal Assessment #2 (%)
L1	40	---
L2	30	---
L3	30	---
L4	---	40
L5	---	40
L6	---	20
Total (%)	100	100

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. Describe the functions of individual parts of DC machines.
2. Describe different types of DC generators.
3. Derive the EMF equation of a DC machine.
4. Draw the open circuit and load characteristics of DC generators.
5. Explain armature reaction in DC machines and solutions to overcome its effects.
6. Derive the torque equation of a DC motor.

L2: Understand

1. Why starters are used in DC motors?
2. Explain types of speed control in DC motor.
3. Explain regenerative braking in DC motor.
4. What are the losses associated with DC motor?
5. Select suitable type of DC motor for specific applications.

6. Describe the principle of Swinburn's test for testing of DC motor and perform the calculations.

L3: Apply

1. Derive the EMF equation of single-phase transformer.
2. Derive the condition for maximum efficiency in a transformer.
3. Explain the difference between power transformer and distribution transformer.
4. Explain the current rating and kVA rating of auto transformers.

L4: Analyzing

1. Explain in detail no load and on load tap changing.
2. Draw the various three phase transformer connections.
3. Explain the stabilization by tertiary winding.
4. Draw the equivalent circuit of single-phase transformer referred to primary side.

L5: Evaluating

1. Define voltage regulation in transformers. How is it calculated?.
2. Describe the short-circuit test and how it helps in determining the equivalent circuit parameters of a transformer.
3. Explain the open-circuit test and its purpose in transformer testing.
4. Discuss the efficiency considerations in a Scott-T transformer connection. How does the load sharing between the two transformers affect overall performance?

L6: Create

1. Formulate a strategy to mitigate third harmonic distortions in phase voltages within a power system utilizing three-phase transformers.
2. Propose an implementation plan for integrating on-load tap changers in a substation to regulate voltage levels dynamically. Discuss the control strategies and protection schemes necessary for reliable operation.
3. Develop a use case for employing a Scott connection to supply two-phase equipment from a three-phase power source. Include the design calculations and potential applications in modern industry.

Chairperson
Board of Studies (EEE)

R24EEPC05 **Electro Magnetic Field Theory** **3 0 0 3**

(Electrical and Electronics Engineering)

Course Objectives:

The main objectives of the course is to

1. Electric field and potentials due to different configurations of static charges.
2. Behavior of conductors and dielectrics in the presence of external magnetic field, calculate the capacitance of different configurations
3. Magnetic fields produced by currents in different configurations, application of Ampere's law and the Maxwell's second and third equations and to study the magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops
4. Concept of self and mutual inductances and the energy stored.
5. Time varying and Maxwell's equations in different forms and Maxwell's fourth equation for the induced EMF

Course Code	Course Outcomes	Mapping with POs and PSOs							DoK
		PO1	PO2	PO3	PO5	PO6	PSO1	PSO2	
R24EEPC05.1	Determine EFI using Coulomb's and Gauss's law for various electric charge distributions	3	1	1	-	1	1	1	L1,L2
R24EEPC05.2	Calculate the capacitance for different configurations.	-	3	2	2	1	2	1	L2,L3
R24EEPC05.3	Calculate the MFI due to different current configuration using Biot-Savart's law and Ampere's law.	-	3	1	2	1	2	1	L3,L4
R24EEPC05.4	Determine the self inductances of solenoid and Toroid	-	3	2	2	1	1	-	L4,L5
R24EEPC05.5	Calculate induced emf, understand the concepts of displacement current and Poynting vector	-	3	2	2	1	1	1	L5,L6

SYLLABUS

Unit –I: Electrostatic Fields **12 Hours**

Coulomb's law and Electric field intensity (EFI) – EFI due to Continuous charge distributions due to a line and surface charge, Electric flux density, Work done in moving a point charge in an electrostatic field, Electric Potential- properties of potential function, Potential gradient, Gauss's law -Maxwell's first equation. **CO's: CO1**

Self-Learning Topics: work done in moving a point charge in an electrostatic field

Unit –II: Conductor-Dielectrics **14 Hours**

Conductors – Dielectrics and Capacitance Electric dipole – dipole moment – potential and **EFI** due to an electric dipole, Torque on an Electric dipole in an electric field conductors and Insulators – their behaviour in electric field, Ohm's law in Point form- Polarization, boundary conditions between dielectric to dielectrics, conductor to dielectric and conductor to free space.

Laplace's and Poison's equations and solution of Laplace's equation in one variable. Capacitance of parallel plates, spherical and coaxial cables, current density, conduction and convection current densities **CO's: CO2**

Self-Learning Topics: Ohm's law in point form, polarization and bound charges, current density (conduction and convection).

Unit –III: Magneto statics & Ampere's law **14 Hours**

Biot-Savart's law, Magnetic Field Intensity (**MFI**) – MFI due to a straight current carrying filament. Ampere's Law, point form of Ampere's circuital law, Ampere's circuital law and its applications. Maxwell's third equation. Magnetic force, moving charges in a magnetic field – Lorentz force equation, force on a current element in a magnetic field, force on a straight and a long current carrying conductor in a magnetic field. **CO's:CO3**

Self-Learning Topics: Magnetic vector potential, boundary conditions of magnetic fields at material interfaces

Unit –IV: Self and mutual inductance: **10 Hours**

Self and mutual inductance – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane. **CO's: CO4**

Self-Learning Topics: energy stored in magnetic fields, RL and RLC circuit analysis, LC oscillations.

Unit –V: Time Varying Fields **12 Hours**

Faraday's laws of electromagnetic induction – its integral and point forms, Maxwell's fourth equation, modification of Maxwell's equations for time varying fields - displacement current, Poynting theorem and Poynting vector **CO's: CO5**

Self-Learning Topics: skin effect in conductors, electromagnetic radiation from accelerating charges.

Board of Studies: Electrical & Electronics Engineering

Approved in BOS No: 02, 21st, May 2025

Approved in ACM No: 02

Text books:

1. Elements of Electromagnetic by Matthew N O Sadiku, Oxford Publications, 7th Edition, 2018.

2. Engineering Electromagnetic by William H. Hayt & John. A. Buck Mc. Graw-Hill,9th Editon.2020

Reference Books:

1. Introduction to Electro Dynamics. by D J Griffiths, Prentice-Hall of India Pvt. Ltd,4th Edition, 2020
2. Electromagnetic Field Theory. by Yaduvir Singh, Pearson India, 1st edition, 2011.
3. Fundamentals of Engineering Electromagnetic. by Sunil Bhooshan, Oxford University Press, 2012.

Web References:

1. https://archive.nptel.ac.in/courses/108/106/108106073/
2. https://nptel.ac.in/courses/117103065

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1 (%)	Internal Assessment #2 (%)
L1	40	---
L2	30	---
L3	30	---
L4	---	50
L5	---	40
L6	---	10
Total (%)	100	100

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. State Coulomb's law of electrostatic field.
2. Define electric field intensity.
3. State and explain the Biot-Savart's law.
4. Define ohm's law in Point form..
5. What is the Faraday's law of induction? What is the significance of the terms transformer e.m.f and generator e.m.f.?

L2: Understand

1. Derive an expression for the Electric field intensity due to a finite length line charge along the Z-axis at an arbitrary point Q(x,y,z)
2. Explain the behavior of conductors in an electric field.
3. Write the similarities between electrostatic field and magnetic field.
4. Show that the field strength at the end of a long solenoid is one-half of that at the Centre.

L3: Apply

1. Derive the expression for the total force experienced by a point charge due to Infinite number to point charges around it.
2. Derive Maxwell's first equation as applied to the electrostatics using Gauss law.
3. Derive the expression for electric potential due to a dipole.
4. Derive the Ohm's law in point form.
5. Obtain the expression for the magnetic field intensity due to infinite length Current carrying conductor.

L4: Analyzing

1. Prove that electric field intensity is equal to the negative gradient of the Potential, i.e., $E = -\nabla V$.
2. Deduce the Biot-Savart's law from Ampere's circuital law.
3. Explain the concept of displacement current and obtain an expression for the Displacement current density.
4. State Pointing theorem and derive the equation.
5. Explain about force on a straight and a long current carrying conductor in a Magnetic field.

L5: Evaluating

1. A parallel plate capacitor consists of two square metal plates with 500mm side and separated by 10 mm. A slab of super (er = 4) 6 mm thick is placed on the lower side of plate and air gap of 4 mm. Calculated 1ha capacitance of capacitor.
2. Show that the field strength at the end of a long solenoid is one-half of that at the centre.
3. A toroid has 600 turns of coil, circular cross section of 6 cm2 and a mean Diameter of 38 cm. The permeability of the toroid is 1000. Calculate the inductance of the coil.
4. Current in a coil is increased from 0 to 10 Amps at a uniform rate is 5 sec. It is found that this coil develops self-induced emf of 100V where as an emf of 20V is reduced in a neighboring coil. Compute self-inductance of the first coil and Mutual inductance between the two coils.
5. A solenoid with 300 turns is 300 mm long and 30 mm in diameter. If the current Flowing through it is 500 mA, find (i) inductance and (ii) energy stored in Solenoid. Assume $\mu r = 1$

L6: Create

1. Develop a computational model to simulate the propagation of an electromagnetic wave in free space, incorporating Maxwell's equations and the Poynting vector.
2. Design an experiment to demonstrate the existence of displacement current and its effects on the surrounding magnetic field.

Chairperson
Board of Studies (EEE)

R24EEPC06 **DC MACHINES & TRANSFORMERS LAB** **0 0 3 1.5**

(Electrical and Electronics Engineering)

Course Objectives:

The main objectives of the course is to

1. To conduct the experiment and plot the characteristics and applications of DC machines.
2. To perform the starting, speed control and testing methods of DC Machines.
3. To determine/Predetermine efficiency and regulation of the transformer through equivalent circuit.

Course code	Course outcomes	Mapping with POs and PSOs							DoK
		PO1	PO2	PO4	PO5	PO11	PSO1	PSO2	
R24EEPC06.1	Apply theoretical concepts in analysing the performance characteristics of DC Machines.	-	3	1	2	1	2	1	L1 L2
R24EEPC06.2	Determine the performance characteristics of DC machines using different testing methods.	-	2	3	2	1	3	1	L2 L3
R24EEPC06.3	Determine the performance parameters of single-phase transformer.	-	2	3	2	1	3	1	L2 L3

Board of Studies : Electrical & Electronics Engineering

Approved in BOS No : 02, 21st, May 2025

Approved in ACM No: 02

List of Experiments

1. Speed control of DC shunt motor by Field Current and Armature Voltage Control CO's: CO1
2. Brake test on DC shunt motor- Determination of performance curves. CO's: CO1
3. Load test on DC shunt generator-Determination of characteristics. CO's: CO1
4. Load test on DC compound generator-Determination of characteristics. CO's: CO1
5. Swinburne's test - Predetermination of efficiencies as DC Generator and Motor. CO's: CO2
6. Hopkinson's test on DC Shunt Machines. CO's: CO2
7. Fields test on DC series machines-Determination of efficiency. CO's: CO2
8. Brake test on DC compound motor-Determination of performance curves. CO's: CO2
9. OC & SC tests on single phase transformer. CO's: CO2
10. Sumpner's test on single phase transformer. CO's: CO3
11. Scott connection of transformers. CO's: CO3

12. Parallel operation of Single-phase Transformers. CO's: CO3
13. Separation of core losses of a single-phase transformer CO's: CO3

Any 10 experiments are to be conducted

Online Learning Resources:

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

References:

1. Dr. P. S Bimbhra, Electrical Machinery, 7/e, Khanna Publishers,2018.
2. . I.J. Nagarath and D.P. Kothari, Electric Machines,4/e, McGraw Hill, 2010.

L1: Remember

1. Why should the field resistance be kept in the position of minimum resistance?
2. What is the loading arrangement used in a DC motor?
3. What are the mechanical and electrical characteristics of DC shunt motor?

L2: Understand

1. How does the Speed of a DC shunt motor vary with armature voltage and field current?
2. Compare the resistance of armature winding and field winding?
3. What is the speed control of DC Shunt motor in industrial applications?
4. Which of the two speed control methods is better and why?

L3: Apply

1. What is the difference between external and internal characteristics?
2. Write the voltage equation of a separately excited DC generator. State the difference between generated EMF and terminal voltage
3. Why does the terminal voltage decrease as the load current increases?
4. If a DC shunt generator fails to build up voltage, what may be the probable reasons?

Chairperson
Board of Studies (EEE)

R24EEPC07 **Electrical Circuit Simulation Lab** **0 0 3 1.5**

(Electrical and Electronics Engineering)

Course Objectives:

The main objectives of the course is to

1. To measure three phase Active and Reactive power
2. To analyse transient behavior of circuits
3. To analyse electrical circuits using simulation tool

Course code	Course outcomes	Mapping with POs and PSOs									DOK
		PO1	PO2	PO3	PO4	PO6	PO8	PO11	PSO1	PSO2	
R24EEPC07.1	Evaluate the powers in three phase networks	-	3	2	2	1	-	1	2	1	L1, L2
R24EEPC07.2	Analyze the concepts of Transient response and time constants for the given circuits.	-	3	2	3	2	-	1	1	1	L1, L2
R24EEPC07.3	Simulate and analyze electrical circuits using MATLAB/PSPICE tools	-	3	3	3	2	2	1	2	1	L2, L3

Board of Studies : Electrical & Electronics Engineering

Approved in BOS No : 02, 21st, May 2025

Approved in ACM No: 02

List of Experiments: Any 10 experiments are to be conducted

1. Measurement of Active Power and Reactive Power for balanced and Unbalanced loads. CO's: CO1
2. Verification of Kirchhoff's current law and voltage law using simulation tools CO's: CO1
3. Verification of mesh and nodal analysis using simulation tools. CO's: CO1
4. Verification of super position and maximum power transfer theorems using simulation tools. CO's: CO1
5. Verification of Thevenin's and Norton's theorems using simulation tools. CO's: CO2
6. Verification of series and parallel resonance using simulation tools. CO's: CO2
7. Simulation and analysis of transient response of RL, RC circuits. CO's: CO2
8. Simulation and analysis of transient response of RLC circuit. CO's: CO2
9. Verification of Reciprocity and Compensation theorems using simulation tools. CO's: CO2
10. Verification of Millman's Theorems using simulation tools CO's: CO3
11. Design of filters-Low pass filter, High Pass and Band Pass Using simulation tools CO's: CO3
12. Analysis of Three Phase Circuits for Balanced Load Using Simulation. CO's: CO3

13. Analysis of Three Phase Circuits for Unbalanced Load Using Simulation. CO's: CO3

References:

1. Network Analysis - ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips,Steven M. Durbin, and 9th Edition 2020.

L1: Remember

1. What instrument is used to measure active power in a balanced three-phase system
2. Draw the Thevenin's equivalent circuit for the above circuit?
3. State Norton's theorem and Norton's current?
4. Draw the Norton's equivalent circuit?

L2: Understand

1. Explain the difference between mesh and nodal analysis.
2. What parameters are measured in simulation to verify nodal analysis?

L3: Apply

1. Simulate the step response of an RC circuit and determine the time constant (τ) from the output waveform.
2. Given an RL circuit, apply a pulse voltage and analyze the inductor current over time. What do you observe?
3. What changes in the transient response if you increase the capacitance in an RC circuit?

Chairperson
Board of Studies (EEE)

R24CSSC04 **COMPUTING SKILLS USING C** **0 0 3 1.5**
(Electrical & Electronics Engineering)

Course Objectives:

- To develop proficiency in using arrays and strings in C, including performing operations such as sorting, searching, insertion, and transformation based on logical conditions.
- To understand and implement linear data structures like stacks, queues, and linked lists using arrays and pointers, and apply them to solve structured programming problems.
- To enhance analytical and problem-solving skills by designing modular functions to handle real-world logical scenarios involving numeric operations, character manipulations, and validations.
- To apply control structures, functions, and user-defined logic in building efficient and modular C programs for various computational tasks.

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

Course Code	Course Outcomes	Mapping with POs and PSOs											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	Do K
R24CSSC04.1	Understand and implement basic array operations using C and sorting techniques in arrays.	3	2	1	1	2	0	0	0	1	1	1	L1, L2
R24CSSC04.2	Apply searching techniques on arrays and implement stack data structures using arrays.	3	3	2	2	2	0	0	0	1	1	1	L3
R24CSSC04.3	Implement queue data structures using arrays. Develop and manipulate singly linked lists. Implementation of queue, stack, arrays applications.	3	3	3	2	2	0	0	0	2	2	1	L3, L4

Board of Studies: Computer Science and Engineering

Approved in BOS No: 02, 9th May, 2025

Approved in ACM No: 02

Developing the following programs **Arrays with functions** **6 Hours**

In C you can pass single-dimensional arrays in two ways. You can either pass it directly to a function.

Week 1:

1. Write a program in C to read n number of values in an array and display them in reverse order. **CO's-CO1**
2. Write a program in C to find the sum of all elements of the array. **CO's-CO1**

Week 2:

1. Write a program in C to count the total number of duplicate elements in an array. **CO's-CO1**
2. Write a program in C to count the frequency of each element of an array. **CO's-CO1**

Week 3:

1. Write a program in C to separate odd and even integers into separate arrays. **CO's-CO1**

Sorting and Searching **6 Hours**

Week 4:

1. Write a program in C to sort elements of an array in ascending order. **CO's-CO1**
2. Write a program in C to sort the elements of the array in descending order. . **CO's-CO1**

Week 5:

1. Write a program in C to implement Linear Search **CO's-CO2**
2. Write a program in C to implement Binary Search **CO's-CO2**

Week 6:

1. Write a program in C to find the missing number in a given array. **CO's-CO2**

Stacks implementation **6 Hours**

Week 7:

1. Write a C program to check a stack is full or not using an array with push and pop operations. **CO's-CO2**
2. Write a C program to sort a given stack using another stack. **CO's-CO2**

Week 8:

1. Write a C program that reverses a stack using only stack operations push & pop. **CO's-CO2**

Queues implementation **6 Hours**

Week 9:

1. Write a C program to implement a queue using an array. Programs should contain functions for inserting elements into the queue, displaying queue elements, and checking whether the queue is empty or not. **CO's-CO3**
2. Write a C program to implement a queue using an array. Create a function that removes an element from the queue. **CO's-CO3**

Week 10:

1. Write a C program to count the number of elements in a queue. **CO's-CO3**

Linked list implementation **6 Hours**

1. Write a program in C to create and display a Singly Linked List. **CO's-CO3**

Week 11:

1. Write a program in C to create a singly linked list of n nodes and display it in reverse order. **CO's-CO3**
2. Write a program in C to create a singly linked list of n nodes and count the number of nodes. **CO's-CO3**

Problem solving **6 Hours**

Week 12:

1. The function accepts an integers arr of size 'length' as its arguments you are required to return the sum of second largest element from the even positions and second smallest from the odd position of given 'arr' **CO's-CO3**

Assumption:

- All array elements are unique
- Treat the 0th position as even

NOTE

- Return 0 if array is empty
- Return 0, if array length is 3 or less than 3

Example

Input

arr:3 2 1 7 5 4

Output

7

Explanation

- Second largest among even position elements(1 3 5) is 3
- Second smallest among odd position element is 4
- Thus output is 3+4 = 7

Sample Input

arr:1 8 0 2 3 5 6

Sample Output

8

2. The function accepts an integers sum and an integer array arr of size n. Implement the function to find the pair, (arr[j], arr[k]) where j!=k, Such that arr[j] and arr[k] are the least two elements of array (arr[j] + arr[k] <= sum) and return the product of element of this pair **CO's-CO3**

NOTE

- Return -1 if array is empty or if n<2
- Return 0, if no such pairs found
- All computed values lie within integer range

Example

Input

sum:9

size of Arr = 7

Arr:5 2 4 3 9 7 1

Output

2

Explanation

Pair of least two element is (2, 1) 2 + 1 = 3 < 9, Product of (2, 1) 2*1 = 2. Thus, output is 2

Sample Input

sum:4

size of Arr = 6

Arr: 9 8 3 -7 3 9

Sample Output

-21

3. The function accepts string str of size n as an argument. Implement the function which returns 1 if given string str is valid password else 0. **CO's-CO3**

   str is a valid password if it satisfies the below conditions.

- – At least 4 characters
- – At least one numeric digit
- – At Least one Capital Letter
- – Must not have space or slash (/)
- – Starting character must not be a number

Assumption:

Input string will not be empty.

Example:

Input 1: aA1_67

Input2:

a987 abC012

Output1:

1

Output2:

0

Week 13:

1. The function accepts an integer array 'arr', its length and two integer variables 'num' and 'diff'. Implement this function to find and return the number of elements of 'arr' having an absolute difference of less than or equal to 'diff' with 'num'. Note: In case there is no element in 'arr' whose absolute difference with 'num' is less than or equal to 'diff', return -1. **CO's-CO3**

Example:

Input:

- arr: 12 3 14 56 77 13
- num: 13
- diff: 2

Output: 3

Explanation:

Elements of 'arr' having absolute difference of less than or equal to 'diff' i.e. 2 with 'num' i.e. 13 are 12, 13 and 14.

2. The function accepts two integers n, m as arguments Find the sum of all numbers in range from 1 to m(both inclusive) that are not divisible by n. Return difference between sum of integers not divisible by n with sum of numbers divisible by n. C**O's-CO3**

Assumption:

- n>0 and m>0
- Sum lies between integral range

Example

Input
n:4
m:20
Output: 90
Explanation

- Sum of numbers divisible by 4 are 4 + 8 + 12 + 16 + 20 = 60
- Sum of numbers not divisible by 4 are 1 +2 + 3 + 5 + 6 + 7 + 9 + 10 + 11 + 13 + 14 + 15 + 17 + 18 + 19 = 150
- Difference 150 – 60 = 90

Sample Input n:3
m:10
Sample Output: 19

3. Implement the following function

char*MoveHyphen(char str[],int n);
The function accepts a string "str" of length 'n' that contains alphabets and hyphens (-). Implement the function to move all hyphens (-) in the string to the front of the given string. **CO's-CO3**
NOTE: - Return null if str is null.
Example:-

- **Input**:
  - str.Move-Hyphens-to-Front
- **Output:**
  - —MoveHyphenstoFront

Explanation:-
The string "Move-Hyphens -to-front" has 3 hyphens (-), which are moved to the front of the string, this output is "— MoveHyphen"
Sample Input

- Str: String-Compare

Sample Output-

- -StringCompare

Week 14:

4. **Problem Statement**

You are given a function,
Void *ReplaceCharacter(Char str[], int n, char ch1, char ch2);
The function accepts a string 'str' of length n and two characters 'ch1' and 'ch2' as its arguments . Implement the function to modify and return the string ' str' in such a way that all occurrences of 'ch1' in original string are replaced by 'ch2' and all occurrences of 'ch2' in original string are replaced by 'ch1'.
Assumption: String contains only lower-case alphabetical letters.
Note:

- Return null if string is null.
- If both characters are not present in string or both of them are same , then return the string unchanged.

Example:

- **Input:**
  - Str: apples

- ch1:a
- ch2:p

- **Output:**
  - paales

Explanation:

'A' in original string is replaced with 'p' and 'p' in original string is replaced with 'a', thus output is paales.

5. Problem Statement

You are required to implement the following function.

Int Operation Choices(int c, int n, int a , int b)

The function accepts 3 positive integers 'a' , 'b' and 'c ' as its arguments. Implement the function to return.

- (a+ b) , if c=1
- (a – b) , if c=2
- (a * b) , if c=3
- (a / b) , if c =4

Assumption: All operations will result in integer output. **CO's-CO3**

Example:

- **Input**
  - c :1
  - a:12
  - b:16
- **Output:**
  - Since 'c'=1 , (12+16) is performed which is equal to 28 , hence 28 is returned.

Sample Input

c : 2
a : 16
b : 20

Sample Output -4

Text Books:

1. Data structures Using C Second Edition,Reema Thareja.
2. Programming Problem Solving, Reema Thareja..

Reference Books:

1. Lets Us C,Yeswanth Kanethkar.
2. Data Structures,S.Chand And Company Limited,Dr.KV Sambasivarao.

Chairperson
Board of Studies (CSE)

R24HS04 **Logical Reasoning and Corporate Skills** **0 0 2 1**
(Common to all UG programmes)

Course Objectives:

1. **Develop Logical thinking skills:** Students will be able to analyze information, identify patterns, and make informed decisions.
2. **Enhance analytical skills:** Students will be able to break down complex information into its component parts, analyze each part, and draw conclusions.
3. **Understand corporate culture and etiquette:** Students will be able to understand and demonstrate corporate culture and etiquette, including professional behaviour and networking.
4. **Develop effective communication skills:** Students will be able to communicate effectively in a corporate setting, including verbal and written communication.
5. **Develop negotiation and conflict resolution skills:** Students will be able to negotiate effectively and resolve conflicts in a corporate setting.
6. **Improve teamwork and collaboration skills:** Students will be able to work effectively in teams, build strong relationships, and manage conflicts.

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

Course Code	Course Outcome	PO1	PO7	PO9	P011	Dok
R24HS04.1	Use their logical thinking and analytical abilities to solve reasoning questions from number analogy and series and letter and coding and decoding based aptitude questions company specific and other competitive tests.	2	---	---	---	L4,L5
R24HS04.2	Solve questions related to Blood Relations clock and calendar, etc. From company specific and other competitive tests.	1	---	---	---	L4,L5
R24HS04.3	Enforce corporate etiquette, and precise usage of English grammar to enhance their professional communication.	---	2	3	1	L1,L3
R24HS04.4	Master negotiation skills and telephone etiquette with emotional intelligence for corporate interactions.	---	2	3	1	L3
R24HS04.5	Enhance email writing skills by incorporating vocabulary acquired from storytelling, situational dialogues and reading activities by using various digital tools.	2	---	3	1	L2,L3

SYLLABUS

UNIT I **15 Hours**

Number Series, Letter Series, Number analogy, letter analogy, word analogy. Coding Decoding-Letter to letter, letter to digit, letter to number and symbol, Word to word coding, odd man out. Directions-Finding distance, Direction and Shadow based problem, Blood Relations-Mixed Blood Relations, Puzzle-Based Blood Relation, Single-Person Blood Relation, Symbol based Blood Relations.

Self Learning Topic: Number Puzzles

UNIT II **15 Hours**

Clocks–finding Angle, Time, Mirror image, Faulty clock, Calendars – Finding day of the week, Number of odd days, Repetition of same calendar, Seating Arrangement-Circular arrangement, linear arrangement, Order Sequence and Ranking

Self Learning Topic: Arrangement puzzles

UNIT III **10 Hours**

Corporate Etiquette – Work Place Etiquette and Conflict Resolution – Grammar Revision, Leadership and Management skills. Verbal Ability: Prepositions, Articles, tenses and conjunction

Self Learning Topic: Successful Team Leadership

UNIT IV **10 Hours**

EQ – Negotiation Skills – Telephone Etiquette – MNCs Paper Model Introduction, Situational Dialogue Practice – Team Activities Related to Spoken
English Verbal Ability: Fill in the blanks (Based on the given appropriate words)

Self Learning Topic: Group Discussion Skills

UNIT V **10 Hours**

E Mail Writing–Vocabulary, Story Telling Activity, Functional English–IELTS Vocabulary News Paper Reading.
Verbal Ability: Sentence arrangements

Self Learning Topic: Sentence Construction

Board of Studies: MBA
Approved in BOS No: 02, 13th, April, 2025
Approved in ACM No: 02

Text Books:

1. A Modern Approach to Logical Reasoning R.S Aggarwal – S.chand publications.
2. Personality Development and Soft Skills by Barun K.mitra

Reference Books:

1. Shortcuts in Reasoning (Verbal, Non-Verbal, Analytical & Critical) for Competitive Exams Disha's publications
2. Communication by C.S.G Krishnamacharyulu & Lalitha Ramakrishnan–Himalaya publishing house

Web References:

1. https://faceprep.in/ logical reasoning
2. www.sawaal.com
3. http://nptel.ac.in/courses
4. www.prepinsta.com

Model Questions of Logical Reasoning & Corporate Skills

L1: Remember

1. What is the proper way to greet a client or colleague in a professional setting?
2. The book is _____ the table.
3. I'm going _____ the store to buy some milk.
4. If I _____ (know) the answer, I would tell you.
5. By next year, I _____ (study) English for five years.
6. If it _____ (rain), we would have stayed home.
7. I _____ (finish) my homework before I went to bed.

L2: Understand

1. What is your favorite childhood story? Why do you enjoy it?
2. Tell a story about a memorable experience from your life.
3. If you could tell a story to inspire others, what would it be about?
4. Rearrange the following sentences to form a coherent paragraph:
   A. The sun was setting over the ocean.
   B. The sound of the waves was soothing.
   C. We walked along the beach, enjoying the peaceful atmosphere.
   D. The smell of saltwater filled the air.
5. Put the following sentences in the correct order to tell a story:
   A. She packed her bags and said goodbye to her family.
   B. After a few months, she returned home with new experiences and stories.
   C. Emily had always wanted to travel abroad.
   D. She boarded a plane and took off for a new adventure.
6. Rearrange the following sentences to form a logical argument:
   A. Therefore, we should prioritize renewable energy sources.
   B. Fossil fuels are a finite resource and contribute to climate change.
   C. In conclusion, our reliance on fossil fuels is unsustainable.
   D. Renewable energy sources, on the other hand, are sustainable and environmentally friendly.

L3: Apply

1. What qualities do you think are essential for a good leader?
2. How would you motivate a team member who is struggling with their work?
3. Describe a time when you had to make a difficult decision as a leader.
4. The new policy aims to _____ the gap between the rich and the poor.
5. The company's _____ in the market has increased significantly over the past year.
6. The teacher asked the students to _____ their essays before submitting them.
7. The _____ of the new smart phone is its advanced camera system.
8. The company will _____ a new product line next quarter.

9. By the time I arrived, they _____ (eat) dinner.

L4: Analyzing

1. Complete the series: 2, 4, 8, and 16?
2. Find the next number: 1, 2, 4, 7, 11,?
3. Identify the pattern: 3, 6, 9, 12, ?
4. Complete the sequence: 5, 10, 15, 20, ?
5. Determine the next number: 2, 6, 12, 20, ?
6. Identify the pattern: B, D, F, H, ?
7. Complete the sequence: M, O, Q, S, ?
8. Determine the next letter: T, S, R, Q, ?
9. Complete the series: Monday, Tuesday, Wednesday, ?
10. Find the next word: January, February, March, ?
11. Determine the next word: Book, Magazine, Newspaper, ?
12. Find the odd one out: Apple, Banana, Carrot, Mango
13. Identify the odd one out: Football, Basketball, Tennis, Piano
14. Determine the odd one out: Car, Bus, Train, Book
15. Find the odd one out: Red, Blue, Green, Chair
16. Identify the odd one out: Dog, Cat, Elephant, House
17. What is the angle between the hour and minute hands of a clock at 3:15?
18. 1. What is the mirror image of the time 3:45?
19. 2. A person sees their mirror image and notices that their watch shows 9:30. What is the actual time?

L5: Evaluating

1. Five friends - A, B, C, D, and E - are sitting in a row. If A is at one end, B is next to A, and C is in the middle, who is sitting at the other end?
2. Seven people - A, B, C, D, E, F, and G - are sitting in a circle. If A is between B and C, and D is opposite A, who is sitting next to D?
3. If today is Monday, what day of the week will it be 30 days from now?
4. A meeting is scheduled for the 15th of March, which falls on a Wednesday. What day of the week will the 22nd of March be?
5. If you are facing north and turn 90 degrees to your right, which direction are you facing?
6. A person walks 5 km east and then 3 km west. How far is he from his starting point?
7. If you are facing south and walk 2 km, then turn left and walk 1 km, which direction are you facing?
8. A is the brother of B. C is the sister of A. How is B related to C?
9. A woman introduces a man as the son of her brother's father. How is the man related to the woman?
10. A man points to a woman and says, "She is the daughter of my mother's only child." How is the woman related to the man?

R24 MC03 **Environmental Science** **2 0 0 0**

(Common to all branches)

Course Objectives:

1. To make the students to get awareness on environment.
2. To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
3. To save earth from the inventions by the engineers.

SYLLABUS

UNIT I **6 Hours**

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems , Energy resources:

Self-Learning Topics: Food resources, World Food Problems.

UNIT II **7 Hours**

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem. b. Aquatic ecosystem

Biodiversity and its Conservation : Introduction ,Definition, Values of biodiversity– India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity, Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Self-Learning Topics: Desert Ecosystem, Bio-Geographical Classification of India.

UNIT III **6 Hours**

Environmental Pollution: Definition, Cause, effects and control measures of:

a. Air Pollution.
b. Water pollution
c. Soil pollution

Solid Waste Management: Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Self-Learning Topics : Cause, effects and control measures of :Marine Pollution,Thermal Pollution.

UNIT IV **6 Hours**

Social Issues and the Environment: From Unsustainable to Sustainable development Water conservation, rain water harvesting, – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate Changes: global warming, acid rain, ozone layer depletion. Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Wildlife Protection Act – Forest Conservation Act .

Self-Learning Topics: Water Shed Management, Water (Prevention and control of Pollution) Act

UNIT V **7 Hours**

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information

Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

Board of Studies : Basic Science and Humanities Chemistry
Approved in BOS No: 05th, August, 2024
Approved in ACM No: 01

Text Books:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education
3. S.Azeem Unnisa, "Environmental Studies" Academic Publishing Company
4. K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

References:

1. Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.
2. M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice Hall of India Private limited
5. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice Hall of India Private limited.

Sample Questions

Unit –I

1. Environmental Science is Multidisciplinary in nature .Justify?
2. Explain the difference between renewable and non-renewable resources.
3. Why forests are considered a critical natural resource?
4. Discuss the positive & negative impacts of Big Dams.
5. Explain the Scope and importance of Environmental Science.
6. Apply the idea of conservation to suggest ways a community can reduce its reliance on fossil fuels.

Unit-II

1. Explain how energy flows through an ecosystem.
2. Describe the role of producers, consumers, and decomposers in an ecosystem
3. Apply the concept of ecological succession to explain how a forest might develop after a wildfire.
4. Explain the Values of Bio-Diversity
5. Evaluate the effectiveness of protected areas in conserving biodiversity.

Unit-III

1. Explain how air pollution can impact human health.
2. Examine how deforestation contributes to both air and water pollution.
3. Explain how agricultural runoff contributes to water pollution.
4. Compare the effects of chemical pollutants versus biological pollutants on freshwater

ecosystems.

5. How can a municipality implement a successful recycling program to reduce the amount of waste sent to landfills?
6. What steps should a local government take to enhance resilience against floods in an urban area?

Unit-IV

1. Describe how sustainable development aims to balance economic growth, environmental protection, and social equity.
2. Explain how a rainwater harvesting system works from collection to storage.
3. How can a government design a resettlement program that minimizes disruption to affected communities?
4. What steps can individuals take to lower their personal contribution to global warming?
5. Discuss (i) Air (Prevention and Control of Pollution) Act (ii) Wildlife Protection Act

Unit-V

1. Explain how rapid population growth can impact natural resources.
2. Examine how population growth trends influence energy consumption and
3. Discuss possible solutions for sustainable energy use.
4. Evaluate the effectiveness of population control measures in addressing environmental issues in a specific country or region.
5. How can healthcare providers ensure that people at high risk for HIV are tested and receive appropriate prevention and care services?
6. Explain the concept of gender equality and its importance in women and child welfare.

7 Discuss the Role of information Technology in Environment and human health

Chairperson
Board of Studies (Chemistry)

R24BS09 COMPLEX VARIABLES AND STATISTICAL METHODS 3 0 0 3

(Common to MECH and EEE)

Course Objectives:

1. To familiarize the complex variables.
2. To familiarize the students with the foundations of probability and statistical methods.
3. To equip the students to solve application problems in their disciplines.

At the end of the course student will be able to:

Course Code	Course Outcomes	Mapping with POs			Dok
		PO1	PO2	PO12	
R24BS09.1	To obtain an analytic function for a given harmonic function using C-R equations.	2	2	1	L1, L2
R24BS09.2	Make use of the Cauchy residue theorem to evaluate certain integrals.	2	2	1	L1,L2
R24BS09.3	Apply the theoretical probability distributions like Binomial, Poisson, and normal in the relevant application areas.	2	2	1	L1,L2,L3
R24BS09.4	Analyze to test various hypotheses included in theory and types of errors for large samples.	2	2	1	L4
R24BS09.5	Apply the different testing tools like t-test, F-test, chi-square test to analyze the relevant real-life problems.	2	2	1	L4,L5

SYLLABUS

UNIT- I: Functions of a complex variable and Complex integration: 10 hours

Introduction – Continuity – Differentiability – Analyticity –Cauchy-Riemann equations in Cartesian and polar coordinates –Harmonic and conjugate harmonic functions – Milne –Thompson method. Complex integration: Line integral– Cauchy's integral theorem–Cauchy's integral formula.

COs-CO1

Self- learning Topics: Evaluating contour integrals, Integration along a smooth path

UNIT- II: Series expansions and Residue Theorem: 10 hours

Radius of convergence –Expansion in Taylor's series, Maclaurin's series and Laurent series. Types of Singularities: Isolated –Essential – Pole of order m –Residues–Residue theorem (without proof) and evaluation of real integrals of the form $\int_{-\infty}^{\infty} f(x)\,dx$, **COs-CO2**

Self- learning Topics: Approximating a function or data using a series of function is a fundamental tool for data analysis.

UNIT- III: Probability and Distributions: 10 hours

Review of probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution functions – Probability mass function, Probability Density function and Cumulative distribution functions – Mathematical Expectation and Variance –Binomial, Poisson,

Uniform and Normal distributions. **COs-CO3**

Self -learning Topics: To understand risk and return on investment.

UNIT-IV: **Sampling Theory:** **10 hours**

Introduction –Population and Samples–Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Representation of the normal theory distributions– Introduction to t, χ^2 and F-distributions–Point and Interval estimations –Maximum error of estimate. **COs-CO4**

Self- learning Topics: Estimate health outcomes, behaviors and attitudes within a population.

UNIT- V: Tests of Hypothesis: **10 hours**

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors –Level of significance – One tail and two-tail tests – Tests concerning one mean and two means (Large and Small samples)–Tests on proportions. **COs-CO5**

Self- learning Topics: Hypothesis Testing is employed to ensure product quality and process efficiency.

Textbooks:

1. **B.S.Grewal,** Higher Engineering Mathematics, Khanna Publishers, 44thEdition, 2017.
2. **Miller and Freund's,** Probability and Statistics for Engineers, Pearson, 7thedition, 2008.

Approved in BOS No: 01, 02 August, 2024 Mathematics

Approved in ACM No: 01

Internal Assessment Pattern

Cognitive Level	InternalAssessment#1(%)	InternalAssessment#2(%)
L1	30	10
L2	30	10
L3	40	30
L4	-	25
L5	-	25
Total(%)	**100**	**100**

Sample Questions based on cognitive levels

Unit 1

1) Show that $u(x,y)$ is harmonic in some domain and find a harmonic conjugate $v(x,y)$ When $u(x,y)=2x-x^3+3xy^2$. (L1)

2) Show that the function $f(z)=\sqrt{|xy|}$ is not analytic at the origin even though CR equations are satisfied. (L 1, L2)

3) 3) Find the analytic function $f(z)=u+iv$ if $u+v=\dfrac{2\sin 2x}{e^{2y}-e^{-2y}-2\cos 2x}$ (L 1)

4) If $f(z)=\begin{cases}\dfrac{x^3y(y-ix)}{x^6+y^2}, & z\neq 0\\ 0, & z=0\end{cases}$ prove that $\dfrac{f(z)-f(0)}{z}\to 0$ as $z\to 0$ along any radius vector but not as $z\to 0$ along the curve $y=ax^3$. (L1, L2)

Unit 2

Cauchy Integral formula

1) Use Cauchy's integral formula to calculate $\oint_C \dfrac{\sin\pi z+\cos\pi z}{(z-1)(z-2)}dz$ where C is $|z|=4$. (L 3)

2) Evaluate $\int_C \dfrac{\sin^2 z}{\left(z-\frac{\pi}{6}\right)^3}dz$ where C is the circle $|z|=1$. (L 5)

3) Use Cauchy Integral formula to evaluate

4) $\int_C \dfrac{\cos\pi z^2}{(z-1)(z-2)}dz$ Where C is the curve $|z|=3$. (L 3)

Laurent series expansion

1) 1)Expand $f(z)=\dfrac{1}{[(z-1)(z-2)]}$ in the region:

(i) $|z|<1$ (ii) $1<|z|<2$ (iii) $|z|>2$ (L2)

2) Evaluate $\oint_C \dfrac{z-3}{z^2+2z+5}dz$ where C is the circle

(i) $|z|=1$ (ii) $|z+1-i|=2$ (iii) $|z+1+i|=2$ (L2)

Unit 3

1) Define: (i) Binomial (ii) Poisson (iii) Uniform and (iv) Normal distributions. (L1)
2) State and prove Chebyshevs Inequality. (L3)
3) Fit the Poisson distribution for the following data (L3)

X	0	1	2	3	4	5
Y	147	147	74	25	6	1

Unit 4

1) Explain point and interval estimations. (L2)

2) Explain the types of errors in sampling. (L2)
3) A random sample of 125 teachers in a large metropolitan area revealed a mean weekly salary of Rs. 527 with a standard deviation Rs. 45. With what degree of confidence can we assert that the average weekly salary of all teachers in the metropolitan area is between 495 to 532? (L3)

Unit 5

1) Define: t, F and chai square test. (L1)

2) Write the test statistic for (L3)
   (i) The test of significance for single mean for the test of significance for single proportion and difference of means
3) Find the maximum difference that we can expect with probability 0.95 between the means of sample sizes 10 and 12 from normal population if their standard deviations are found to be 2 and 3 respectively. (L5)

Chairperson
Board of Studies (Mathematics)
Chairperson

R24EEPC08 Electric Power Generation, Transmission and Distribution 3 0 0 3

(Electrical and Electronics Engineering)

Course Objectives:

The main objectives of the course is to

1. Analyze different types of power generation methods, including thermal, hydroelectric, nuclear, solar, and wind
2. To Calculate Resistance, Inductance and Capacitance of Transmission Lines.
3. To Find the Regulation and Efficiency of the Transmission Lines
4. To find the Capacitance of Design of Transmission Lines.
5. To study DC and AC Distributions.

Course Code	Course Outcomes	Mapping with POs and PSOs							DoK
		PO1	PO2	PO3	PO4	PO6	PSO1	PSO2	
R24EEPC08.1	Illustrate the working principles of various power generating stations.	3	2	1	1	3	2	1	L1, L2,
R24EEPC08.2	Interpret the parameters for various overhead conductor configurations.	-	3	1	2	-	2	2	L2, L3,
R24EEPC08.3	Analyze the performance of short, medium and long transmission line models.	-	3	2	1	1	2	1	L3, L4
R24EEPC08.4	Develop the mechanical design parameters of transmission line. Illustrate the construction and working of cables and insulators.	-	1	3	2	2	3	1	L4, L5
R24EEPC08.5	Compare the operation of AC and DC distribution systems.	-	1	1	2	-	2	1	L5, L6

SYLLABUS

UNIT-I: Power Generating Stations **12 Hours**

Hydel Power Stations- classification-construction and working of hydroelectric power station, thermal power Stations-single line diagram highlighting major components and working, nuclear power stations- nuclear fission and chain reaction-working of nuclear reactors-BWR, PWR

Self-Learning Topics: site selection criteria for power plants, environmental impacts of different power generation methods, safety measures and protocols in nuclear power stations. **CO's: CO1**

UNIT-II: Transmission Line parameters **14 Hours**

Transmission Line Parameters: Transmission line components, GMR and GMD, Numerical problems on resistance, inductance and capacitance for single phase and three phase single circuit symmetrical and asymmetrical configurations (no derivation). **CO's: CO2**

Self-Learning Topics: skin and proximity effects, corona discharge phenomena.

UNIT-III: Transmission Line Performance **14 Hours**

Performance of Short, Medium and Long Transmission Lines: Model description with phasor diagram for Short, Nominal-T, Nominal-π and long transmission lines respectively. ABCD parameter interpretation and calculation of transmission efficiency and voltage regulation, Corona loss and its effects, Ferranti, Skin and Proximity effects, surge impedance loading. **CO's: CO3**

Self-Learning Topics: tuned power lines, constant voltage transmission**.**

UNIT – IV: Underground cables and Mechanical Design of Overhead Lines **14 Hours**

Underground Cables: Construction, Types of Cables, Types of Insulating materials, Calculation of Insulation resistance and stress in insulation, Capacitance of single and 3-core belted cables, Grading of cables -capacitance grading and Inter-sheath grading. Insulators-types-calculation of string efficiency Sag and Tension calculations with equal & unequal heights of towers- effect of wind & ice loading, Grading of Insulators. **CO's: CO4**

Self-Learning Topics: electrical and mechanical fault detection in underground cables.

UNIT–V: DC & AC Distribution Systems **12 Hours**

Distribution System-Components, connection schemes, classification and comparison; Voltage Drop Calculations in DC Distributors for the following cases: Radial DC Distributor fed one end and at both the ends (equal/unequal Voltages) and Ring Main Distributor. Voltage Drop Calculations in AC Distribution System- Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages. **CO's: CO5**

Self-Learning Topics: optimization of voltage profiles using reactive power compensation

Board of Studies:	Electrical & Electronics Engineering
Approved in BOS No:	02, 21st, May 2025
Approved in ACM No:	02

Text books:

1. C.L. Wadhawa, "Generation, Distribution and Utilization of Electric Energy", New Age International (P) Limited, 4th Edition, 2017.
2. C.L. Wadhawa, "Electric Power Systems", New Age International (P) Limited, 7th Edition, 2017.
3. TuranGonen, Electric Power Distribution system, Engineering, McGraw-hill Book Company, 4th edition,2016.

Reference Books:

1. A Chakrabarti, ML Soni, PV Gupta, US Bhatnagar, "A text book on Power System Engineering," Dhanpat Rai & Co., 2008.
2. Hadi Saadat, Power System Analysis, TMH, 3rd edition, 2010.
3. VK Mehta and R Mehta, "Principles of power system," S. Chand, New Delhi, 4th edition, 2005.
4. S.N.Singh, "Electric Power Generation, Transmission and Distribution", PHI, 2nd edition, 2008.

Web Resources:

1. . https://nptel.ac.in/courses/108102047

Internal Assessment Pattern:

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2 (%)
L1	30	---
L2	40	---
L3	30	---
L4	---	40
L5	---	40
L6	---	20
Total (%)	100	100

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. Illustrate the single line diagram of a power system
2. Define GMD
3. List any two effects of corona
4. Define Skin effect in the long transmission

L2: Understand

1. Classify hydroelectric power plants based on water flow, head, power generated and load
2. Explain any four differences between short and medium transmission line models
3. Outline the construction of an underground cable
4. Summarize any four benefits of bundle Conductors over single conductor.

L3: Apply

1. Develop the model of a Nominal-T transmission line to transfer a power of 100MW for a distance of 80km. Assume any other parameters required.
2. A certain amount of power has to be transmitted from the generating station to a load centre passing through a densely populated urban area extending a distance of 50km. The site engineer has the choice of selecting overhead or underground cables for transmission. Help the engineer choose the type of transmission based on economy, safety and technical superiority.
3. 1000 MW of power has to be transmitted for a distance of 500km over a 400kV double circuit long transmission line. Select a suitable spacing pattern between conductors and calculate the inductance. Justify your selection.
4. Suppose you are a maintenance engineer working at load end and observe the distribution side parameters. At some instant, you observe abnormalities due to light load condition. To solve that issue you have checked with the state load dispatch centre, and figured out that

the voltage at the generating station is less as compared to the voltage at your end. Make use of this information and identify the possible impacts at your end with the help of a suitable phasor diagram. Suggest remedies to overcome this situation and obtain a voltage balance in a system.

L4: Analyzing

1. Compare the AC and DC distribution systems for distribution of power in an urban area.
2. A certain amount of power has to be transmitted over a distance of 100km at 66kV. Develop and compare the T and Pi models and suggest which is more preferable for transmitting the power keeping in view the complexity of solving the network for parameter analysis.
3. Compare the different compounding methods and suggest which is the best method for super thermal power plants employing two stage steam turbines.
4. A cyclone named Titili with wind gusts around 170 km/hr hit the north costal region of Andhra Pradesh. Your locality was within five kilo meters from the epicentre of the cyclone. As a result, transmission lines and towers got damaged. The load end requires 100MVA load at power factor of 0.8 lagging for daily smooth operation. As an electrical engineer, design the conductor configuration based on the following:
    - choice of voltage level
    - choice of conductors
    - Type of circuits
    - spacing of the conductor

L5: Evaluating

1. A 3 phase 100km line has the following constants. Resistance/phase /km =0.153ohm, inductance/phase /km=1.21mH, Capacitance/phase /km= 0.00958μF. If the line supplies a load of 20MW at 0.9 pf lagging at 110kV at the receiving end calculate sending end current, sending end power factor, and regulation and transmission efficiency using nominal T method.
2. A three- phase overhead line has resistance and reactance per phase as 5 ohm and 20ohm respectively. The load at the receiving end is 25MW, 33kV at 0.8pf lagging. By drawing receiving end power circle find the voltage at the sending end.
3. What are the various properties of insulators? Also briefly explain about suspension type and pin type insulators. Draw the schematic diagram.
4. Derive the expression for touch potential and step potential.
5. A 3 phase 4 wire distributor supplies a balanced voltage of 400/230 V to a load consisting of 100A at 0.84 power factor lagging and 60A at unity power factor on phases R, Y, B respectively. The resistance of each core is 0.3Ω. Determine the voltage at the supply end of R-phase relative to the load voltage.

L6: Create

1. Design a radial DC distribution system for a residential area, ensuring voltage drops remain within permissible limits. Specify the conductor sizes, load distribution, and calculate voltage drops at various points.
2. Develop a ring main AC distribution network for an industrial complex with multiple load centers. Incorporate provisions for load balancing and fault tolerance. Provide detailed calculations for voltage drops and power factors.
3. Formulate a method to calculate voltage drops in an AC distributor with loads at different power factors referred to their respective load voltages. Apply this method to a hypothetical distribution system and present your findings.

Chairperson
Board of Studies (EEE)

R24EEPC09 **Induction and Synchronous Machines** **3 0 0 3**

(Electrical and Electronics Engineering)

Course Objectives:

The main objectives of the course is to

1. Ability to understand the principle of operation and performance of three-phase induction motor.
2. To provide knowledge on torque vs slip characteristics, Phasor Diagrams and Equivalent Circuits for induction motor and synchronous machines.
3. To discuss the concept of double revolving field theory and torque producing mechanism for single phase induction motor.
4. To discuss the principle of operation, voltage regulation of synchronous Generators.
5. To analyze the construction and performance of synchronous machines and its applications.

Course Code	Course Outcomes	Mapping with POs and PSOs							DoK
		PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	
R24EEPC09.1	Describe the construction and operation of three-phase induction motor.	3	1	-	2	1	2	2	L1, L2,
R24EEPC09.2	Identify the speed control, testing and performance characteristics of three phase induction motor	-	2	-	2	1	2	2	L2, L3,
R24EEPC09.3	Describe the principle of operation of single-phase induction motors.	3	1	-	2	-	2	3	L3, L4
R24EEPC09.4	Test for Performance and synchronization of synchronous generator	-	3	3	1	2	3	2	L4, L5
R24EEPC09.5	Analyze the performance characteristics of synchronous motor	-	3	2	2	1	2	2	L5, L6

SYLLABUS

UNIT-I: Introduction to 3-Phase Induction Motors **12 Hours**

Introduction, Construction- Stator, Types of rotors, Comparison of rotors, production of rotating magnetic field, principle of operation, Synchronous Speed, Slip, Effect of slip on rotor parameters - rotor emf , rotor frequency, rotor current and power factor at standstill and during running conditions, equivalent circuit , phasor diagram, Losses in an induction motor, Power flow diagram,

Synchronous watt, Relation between rotor input, rotor copper losses and mechanical power developed, Efficiency, Applications. **CO's: CO1**

Self-Learning Topics: design considerations for high-efficiency motors

UNIT-II: Performance of 3-Phase Induction Motors **12 Hours**

Characteristics of **3-phase induction motors:** Torque equation, expressions for maximum torque and starting torque, torque-slip and torque-speed Characteristics, Effect of rotor resistance on T-S Curve.

Testing and starting methods of induction motors: No load & blocked rotor tests, circle diagram –Theory, construction, computation of performance. Starters for induction motors, speed control of induction motor– from stator side, from rotor side, crawling and cogging- Induction Generator.

CO's: CO2

Self-Learning Topics: impact of harmonics and power quality issues on motor performance.

UNIT – III: Single- Phase Motors **12 Hours**

Single phase induction motors: construction, double revolving field theory, Cross field theory , Types of Single phase induction motors : Resistance split phase, capacitor start, capacitor start capacitor run, comparison of Single phase induction motors, Applications.

Single phase Commutator motors: Principle of operation of A.C Series motor, Universal motor, BLDC motor. **CO's: CO3**

Self-Learning Topics: integration of variable frequency drives (VFDs) for speed control

UNIT–IV: Three – Phase Alternators **12 Hours**

Construction, Types of rotors, armature windings, Winding Coefficients, E.M.F equation, Equivalent circuit and phasor diagram, armature reaction and its effects, O.C and S.C tests, voltage regulation by synchronous impedance method, MMF method and Potier triangle method ,two reaction analysis of salient pole machines, Slip test, Applications.

Parallel operation of Alternators: Necessity, Conditions, synchronization methods - two bright and one dark lamp, synchroscope method, parallel operation-with single alternator and infinite bus.

CO's: CO4

Self-Learning Topics: Constructing and interpreting equivalent circuits and phasor diagrams

UNIT–V: Synchronous Motor **12 Hours**

Construction, Magnetic locking, theory of operation, characteristic features of synchronous motor, Behaviour of synchronous motor on loading, Phasor diagram, Effect of varying field current at different loads ,Power transfer stages, Power equations, Solved problems. V and inverted V curves, synchronous condenser, Power factor improvement, solved problems, hunting and its suppression, Applications. **CO's: CO5**

Self-Learning Topics: understanding the construction and magnetic locking principle of synchronous motors

Board of Studies:	Electrical & Electronics Engineering
Approved in BOS No:	02, 21st, May 2025
Approved in ACM No:	02

Text books:

1. Electrical Machinery, Dr. P.S. Bhimbra, Khanna Publishing, New Delhi, Fully Revised Edition, 2021.
2. Electrical Machines by D. P.Kothari, I .J .Nagarth, McGraw Hill Publications, 5th edition, 2017.

Reference Books:

1. Theory & Performance of Electrical Machines by J.B.Gupta, S.K.Kataria & Sons,2013.
2. Electric Machinery, A.E.Fitzgerald, Charles kingsley, Stephen D.Umans, McGraw-Hill, 2020, Seventh edition.
3. Performance and analysis of AC machines by M.G. Say, CBS, 2002.

Web Resources:

1. nptel.ac.in/courses/108/105/108105131
2. https://nptel.ac.in/courses/108106072

Internal Assessment Pattern:

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2 (%)
L1	40	---
L2	30	---
L3	30	---
L4	---	40
L5	---	30
L6	---	20
Total (%)	100	100

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. Define the term ‘slip’ in the context of a three-phase induction motor.
2. What is the basic torque equation for a three-phase induction motor?
3. Define armature windings in the context of a synchronous generator.
4. Define the term ‘synchronization’ in the context of synchronous generators.

L2: Understand

1. Describe the effect of rotor EMF at standstill and during running conditions.
2. Explain how the torque-slip curve of a three-phase induction motor varies with rotor speed.
3. Explain how the double revolving field theory helps to understand the operation of a single-phase induction motor.
4. Explain why it is necessary to synchronize a synchronous generator before paralleling it with another generator or an infinite bus.
5. Describe the working principle of a synchronous condenser and its application in improving power factor.

L3: Apply

1. If a motor's stator resistance and rotor resistance are known, calculate the rotor power input using the equivalent circuit model.
2. Given the parameters of a single-phase induction motor, calculate the starting current using the equivalent circuit
3. Draw a phasor diagram for a synchronous generator and explain how it changes with load variations.
4. Demonstrate how to apply the synchronization process for paralleling a synchronous generator to a running infinite bus, considering voltage and phase angle matching.
5. Using the power equation for a synchronous motor, calculate the mechanical power developed by the motor under given conditions.

L4: Analyzing

1. Analyze how the rotor current and power factor change as the motor approaches synchronous speed.
2. Analyze the effect of changing the value of the capacitor on the starting torque of a capacitor-start single-phase induction motor.
3. Given a salient pole synchronous generator, analyze how the two-reaction theory influences the machine's behavior under various load conditions.
4. Design a synchronization system that uses both the synchroscope and the two bright and one dark lamp methods to ensure the safe connection of multiple synchronous generators to an infinite bus.
5. Analyze how different starting methods (e.g., DOL, autotransformer, and damper winding) affect the performance and current drawn during the startup of a synchronous motor.

L5: Evaluating

1. Evaluate the impact of rotor frequency on the overall efficiency of a three-phase induction motor at various operating conditions.
2. Evaluate the effect of using a soft starter versus direct-on-line (DOL) starting for a three-phase induction motor in a high-torque application
3. Evaluate the suitability of a single-phase induction motor for a specific application, considering its speed control, efficiency, and torque characteristics
4. Assess the efficiency of a three-phase alternator when loaded with a three-phase induction motor, considering the impact of power losses and load conditions.
5. Critically assess the performance of a synchronous motor under different excitation conditions (over-excitation, under-excitation, and normal excitation) with respect to power

factor and efficiency

L6: Create

1. Propose a method to start a large synchronous motor that is not inherently self-starting, ensuring minimal impact on the power system.
2. Design a power factor correction scheme using synchronous condensers for a manufacturing facility experiencing low power factor issues.
3. Develop an innovative starting mechanism for a large synchronous motor that minimizes inrush current and mechanical stress during startup.

Chairperson
Board of Studies (EEE)

R24EEPC10 **CONTROL SYSTEMS** **3 0 0 3**

(Electrical and Electronics Engineering)

Course Objectives:

The main objectives of the course is to

1. To describe the feedback controls with basic components of control systems.
2. To formulate mathematical models of physical systems and block diagram representation..
3. To analyze stability of the system from transfer function approach.
4. To describe and analyze various time domain and frequency domain tools for analysis and design of linear control system
5. To obtain the mathematical models of physical systems using state space approach and determine the response.

Course Code	Course Outcomes	Mapping with POs and PSOs							DoK
		PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	
R24EEPC10.1	Able to understand basic components of feedback control systems; formulate mathematical models of physical systems and represent them in block diagrams and signal flow graphs.	3	3	2	3	2	2	1	L1, L2
R24EEPC10.2	Able to understand the time- domain specifications; Analyze first and second order control systems in time domain	3	3	3	1	2	2	3	L2, L3,
R24EEPC10.3	Able to understand the concepts of stability; Analyze stability of the system from transfer functions approach and graphical methods.	3	1	3	1	2	1	3	L3, L4
R24EEPC10.4	Able to understand frequency response analysis and understand compensation techniques	3	1	3	1	2	1	2	L4, L5
R24EEPC10.5	Able to Represent physical systems in state space form and analyze them,	-	3	3	1	1	-	3	L5, L6

SYLLABUS

UNIT I: Mathematical Modelling of Electrical and Mechanical Systems **14 Hours**

Classification of control systems - open loop and closed loop control systems and their differences - Feedback characteristics - transfer function of linear system, Transfer function of Field and armature control DC Motor, translational and rotational mechanical systems- Force-Voltage- Force-Current Analogies- block diagram reduction techniques – representation by signal flow graph –

reduction using Mason's gain formula. **CO's: CO1**

Self-Learning Topics: deriving and analyzing transfer functions for linear systems

UNIT II: Transfer Function of Elements of Control Systems 14 Hours

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver.

Time Response Analysis: Standard test signals, Time response of first and second order systems, time domain specifications, characteristic Equation, Static error constants, Effects of P, PI, PD and PID controllers. **CO's: CO2**

Self-Learning Topics: deriving transfer functions for DC and AC servo motors, understanding the operation of synchro transmitters and receivers.

UNIT III: Stability and Root-Locus Techniques 14 Hours

Concept of stability: The concept of stability – Routh's stability criterion – qualitative stability and conditional stability

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci. **CO's: CO3**

Self-Learning Topics: Applying Routh's stability criterion to assess system stability.

UNIT IV: Frequency Response Analysis 14 Hours

Introduction, Frequency domain specifications-Bode plots, Determination of Frequency domain specifications and transfer function from the Bode plot, Phase margin and Gain margin-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots, Stability Analysis. Concept of Compensation techniques **CO's: CO4**

Self-Learning Topics: constructing and interpreting Bode plots

UNIT V: State Space Analysis of LTI Systems 12 Hours

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from transfer function and vice versa - State Transition Matrix, properties of state transition matrix, Eigen Values and Eigen Vectors, controllability, observability. Stability Analysis of Linear Systems . **CO's: CO5**

Self-Learning Topics: understanding the concepts of state, state variables, and state models.

Board of Studies: Electrical & Electronics Engineering
Approved in BOS No: 02, 21st, May 2025
Approved in ACM No: 02

Text books:

1. Modern Control Engineering by Kotsuhiko Ogata, Prentice Hall of India, 5th edition, 2015.
2. Automatic control systems by Benjamin C.Kuo, Prentice Hall of India, 9th Edition, 2014.

Reference Books:

1. Control Systems principles and design by M.Gopal, Tata Mc Graw Hill education Pvt Ltd., 4th Edition.
2. Control Systems Engineering by I.J.Nagarath and M.Gopal, Newage International Publications, 5th Edition.

Web Resources:

1. https://archive.nptel.ac.in/courses/107/106/107106081/
2. https://archive.nptel.ac.in/courses/108/106/108106098/
3. https://nptelvideos.com/video.php?id=1423&c=14

Internal Assessment Pattern:

Cognitive Level	Internal Assessment # 1 (%)	Internal Assessment # 2 (%)
L1	30	---
L2	40	---
L3	30	---
L4	---	50
L5	---	30
L6	---	20
Total (%)	100	100

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. Define closed loop control system
2. What are the components of feedback control system?
3. What is an order of a system
4. Define Delay time
5. Define Gain and Phase margin
6. What is the use of lag compensator?
7. What are the main significances of root locus?

L2: Understand

1. Write Masons Gain formula
2. What are the properties of signal flow graphs?
3. Write the force balance equation of ideal dashpot element.
4. How do you find the type of a system?
5. What is the effect of PI controller on the system performance
6. What are the frequency domain specifications?
7. How will you find root locus on real axis?
8. How the roots of characteristic equation are related to stability?

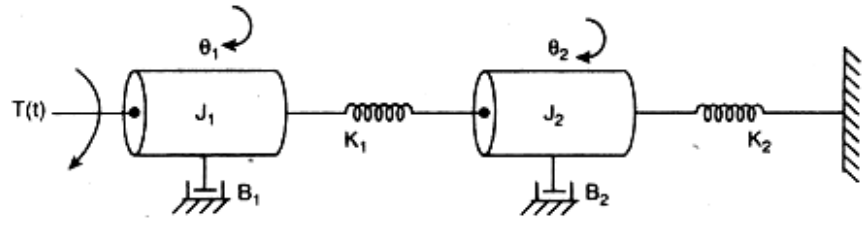
L3: Apply

1. Give some examples of control system

2. What are the two situations in which compensation is required?
3. Define Stability. With an example explain the steps to be followed for Routh - Hurwitz criterion.
4. What are the uses of sampled-data control systems?
5. Give the concept of controllability.

L4: Analyzing

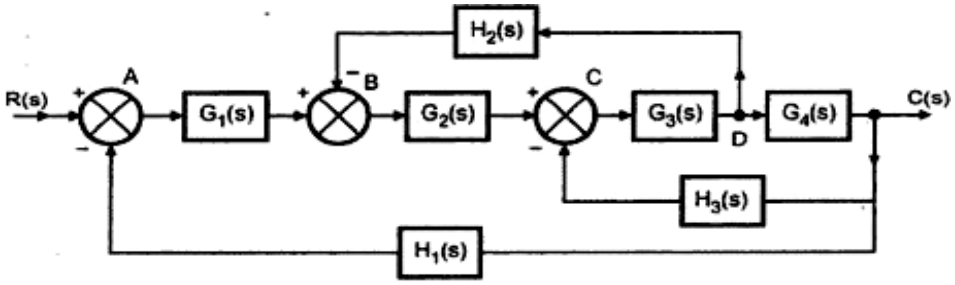
1. Give the comparison between open loop and closed loop system
2. Write the differential equation governing the mechanical rotational system shown in fig below .Draw the Electrical equivalent analogy circuits and derive its transfer function

3. 

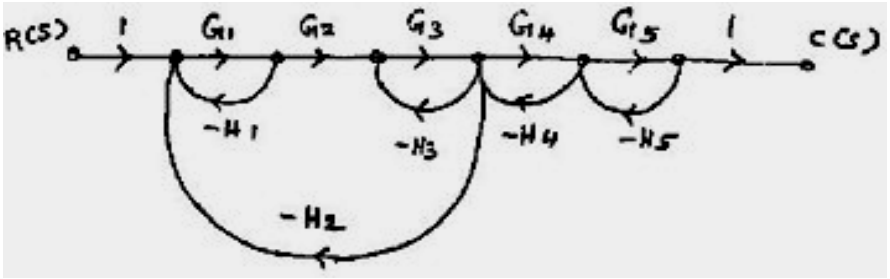
4. Derive the time domain specification of a second order
5. Analyze on Lead, Lag and Lag-Lead compensators with a neat diagram also explain their importance.
6. Draw the State model of a linear single input Single output and obtain its corresponding Equations.

L5: Evaluating

1. Reduce the block diagram shown in figure below and determine the transfer function



2. Obtain the closed loop transfer function of the systems , by using Mason's gain formula.



3. A unity feedback control system is characterized by the following open loop transfer function $G(S) = k / s(s+10)$. Determine the gain K so that the system

will have a damping ration of 0.5 for this value of K. Determine settling time ,peak overshoot and peak time for a unit step input.

4. A discrete time system is described by the difference equation y(k+2)+5y(k+1)+6yk=u(k). Y(0)=y(1)=0. and T=1 sec. determine (i) state model in canonical form. (ii) State transition matrix.

L6: Create

1. Design a state feedback controller that places the closed-loop poles of the given system at desired locations to achieve specified performance criteria.

2. Design a control system for a real-world application (e.g. temperature control in a room) using state-space analysis technique.

3. Develop a state observer for a system where not all states are measurable, ensuring accurate estimation of the unmeasured states.

Chairperson
Board of Studies (EEE)

R24ES10 ANALOG ELECTRONIC CIRCUITS DESIGN 3 0 0 3

(Common to ECE & EEE)

Course Objectives:

- Understand the characteristics of multi stage, differential amplifiers, feedback, power and tuned amplifiers.
- Analyze the performance parameters of various amplifier circuits.
- Analyze different oscillator circuits based on the frequency of operation.
- Study and analyze the various pulse electronic circuits.

Course Outcomes:

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

Course Code	Course Outcomes (COs)	Mapping with POs								Do K
		PO1	PO2	PO3	PO4	PO5	PO11	PSO1	PSO2	
R24ES10.1	Understand the characteristics of differential amplifiers, feedback and power amplifiers.	3	3	1	2	-	-	2	1	L1, L2
R24ES10.2	Examine the frequency response of multistage and differential amplifier circuits using BJT & FETs at low and high frequencies.	3	3	1	2	-	-	2	2	L2, L3
R24ES10.3	Investigate different feedback and power amplifier circuits based on the application.	3	3	1	2	-	-	2	2	L3, L4
R24ES10.4	Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillator circuit.	3	2	-	2	1	-	2	2	L4, L5
R24ES10.5	Analyze and design tuned amplifiers, including small signal and large signal amplifiers.	3	3	1	2	-	-	2	-	L3, L6

SYLLABUS

UNIT-I: 16 Hours

Multistage Amplifiers: Classification of amplifiers, distortion in amplifiers, frequency response of an amplifier, step response of an amplifier, methods of coupling, band pass of cascaded stages, Miller's theorem, analysis of n-stages cascaded transistor amplifier, two stage RC coupled amplifier using BJT & FET analysis, Darlington pair amplifier, Boot-strap emitter follower, Cascode amplifier, differential amplifier, Multi stage Amplifiers Using FET, Illustrative Problems.

COs – CO1

Self Learning Topics:

1. Input and Output Impedance: Understanding how multistage amplifiers impact input and output impedance, and how to match impedances for optimal performance.

2. Frequency Response: Studying the frequency response of multistage amplifiers, including the effects of coupling capacitors and bypass capacitors.

UNIT -II **12 Hours**

Feedback Amplifiers:: Classification of basic amplifiers, Feedback concept, types of feedback, feedback topologies, characteristics of negative feedback amplifiers, Effect of Negative feedback upon output and input resistance, generalized analysis of feedback amplifiers, performance comparison of feedback amplifiers, method of analysis of feedback amplifiers. Illustrative Problems. **COs–CO2**

Self Learning Topics:

1. Gain and Bandwidth: Analyzing how feedback affects gain and bandwidth, including the trade-offs between the two.
2. Stability and Oscillation: Understanding how feedback can lead to instability and oscillation, and how to prevent these issues.

UNIT-III **14 Hours**

Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wein bridge oscillators using BJT and FET, generalized analysis of LC oscillators using BJT, Hartley and Colpitt's oscillators using BJT and FET, crystal oscillator, frequency stability of oscillators, Illustrative Problems. **COs–CO3**

Self Learning Topics:

1. Oscillator Circuit Design: Learning how to design oscillator circuits, including selecting components and calculating values.
2. Frequency Stability: Understanding the factors that affect frequency stability, and how to improve it.

UNIT-IV **14 Hours**

Power Amplifiers: Classification of amplifiers, Class A power Amplifiers (Series fed and transformer coupled), harmonic distortions, Class B amplifier, Push-pull amplifier, Complementary symmetry push pull amplifier, Class AB amplifier, Class-C amplifier, thermal stability and heat sink, distortion in power amplifiers. **COs–CO4**

Self Learning Topics:

1. Power Amplifier Efficiency: Understanding the factors that affect power amplifier efficiency, and how to improve it.
2. Distortion and Linearity: Studying the causes of distortion in power amplifiers, and how to minimize it.

UNIT-V **14 Hours**

Tuned Amplifiers: Introduction, Q-Factor, small signal tuned amplifiers, effect of cascading single tuned and doubled tuned amplifiers on band width, stagger tuned amplifiers, comparison of tuned amplifiers, large signal tuned amplifiers, stability of tuned amplifiers. **COs–CO5**

Self Learning Topics:

1. Noise and Interference: Understanding how to minimize noise and interference in tuned amplifiers, including techniques like noise matching and shielding.
2. Modern Tuned Amplifier Designs: Studying modern designs and techniques for tuned amplifiers, including the use of active devices and feedback.

Board of Studies: Electronics and Communication Engineering
Approved in BOS No: 02,30th May, 2025

Approved in ACM No: 02

Text Books:

1. Electronic Devices and Circuits - J.Millman, C.C. Halkias & S.Jit, TMH, 4thEdition, 2015.
2. Pulse and Digital Circuits- A.Anand Kumar, PHI Learning Private Limited, 2012.

References:

1. Integrated Electronics- Jacob Millman, C. Halkies&C.D.Parikh, TMH, 2nd Edition, 2010.
2. Electronic Devices and Circuits- S.Salivahanan & N.Suressh Kumar,TMH,3rd Edition,
3. 2012.
4. Electronic Devices and Circuits – A.K.Maini & V.Agarawal, Wiley India Pvt.Ltd., First Edition, 2009.

Internal Assessment Pattern

Cognitive Level	Internal Assessment # 1 (%)	Internal Assessment # 2 (%)
L1	30	--
L2	40	--
L3	30	30
L4	--	40
L5	--	30
Total (%)	100	100

Questions on Various Cognitive Levels

L1: Remember

1. What is a multistage amplifier, and why is it used?
2. What are the benefits and drawbacks of using feedback in amplifiers?
3. What are the conditions required for sustained oscillation in an oscillator?
4. Do power amplifiers differ from voltage amplifiers?
5. What are the different classes of power amplifiers (e.g., Class A, Class B, Class AB)?
6. What is the purpose of tuning in amplifiers, and how is it achieved?
7. What are the applications of tuned amplifiers in electronic systems?

L2: Understand

1. How do you calculate the overall gain of a multistage amplifier?
2. What is the effect of cascading multiple amplifier stages on the bandwidth and gain of the overall amplifier?
3. What is the difference between voltage feedback and current feedback in amplifiers?
4. How do you design a feedback amplifier to achieve a specific gain and stability?
5. How do you design an oscillator to produce a specific frequency and amplitude?
6. What are the factors that affect the stability and accuracy of an oscillator?
7. How do you calculate the efficiency of a power amplifier?
8. What are the differences between Class A, Class B, and Class AB power amplifiers?
9. What is the effect of Q-factor on the selectivity and bandwidth of a tuned amplifier?
10. How do you use tuned amplifiers in radio frequency (RF) applications?

L3: Apply

1. How do you analyze the noise performance of a multistage amplifier, and what are the techniques to minimize noise?

2. How do you design a multistage amplifier for high-frequency applications, considering factors like parasitic capacitances and inductances?
3. Apply the stability of a feedback amplifier using techniques like Nyquist plots and Bode plots?
4. Apply the feedback concepts and design a feedback amplifier with a specific gain-bandwidth product and stability margin?
5. Describe the design procedure of phase-locked loop (PLL) oscillator, and what are its applications?
6. What are the effects of phase noise and jitter on oscillator performance, and how can they be minimized?
7. Write the principle of oscillator design an oscillator for high-frequency applications, such as microwave or millimeter-wave frequencies?
8. What are the effects of thermal management and heat sinking on power amplifier performance and reliability?
9. Explain the concepts of power amplifiers and apply these concepts for linearity and low distortion, using techniques like linearization and predistortion?
10. How do you use tuned amplifiers in applications like radio frequency identification (RFID) or wireless communication systems?

L4: Analysing

1. How can you optimize the noise figure and gain of a multistage amplifier using advanced techniques like noise matching and gain shaping?
2. Analyse the multistage amplifiers and design for high-speed applications, such as fiber-optic communication systems or high-speed data acquisition?
3. Analyze the stability and robustness of a feedback amplifier using advanced techniques like μ-analysis or singular value decomposition?
4. How do you design a feedback amplifier with optimal performance and robustness using advanced control theory techniques?
5. How do you design an ultra-low-phase-noise oscillator using advanced techniques like crystal oscillators or optoelectronic oscillators?
6. Explain the design Procedure of an oscillator for extreme environments, such as high-temperature or high-radiation applications?
7. How do you design a high-power amplifier for applications like radar or microwave heating, considering factors like thermal management and electrical breakdown?
8. What are the effects of load mismatch and VSWR on power amplifier performance, and how can they be mitigated?
9. Analyse design a tunable filter or amplifier using advanced techniques like varactor diodes or MEMS devices?
10. What are the effects of component aging and drift on tuned amplifier performance, and how can they be compensated?

L5 Evaluating:

1. What are the fundamental limits on the noise figure and gain of multistage amplifiers, and how can they be approached?
2. What are the implications of emerging technologies like graphene or nanotubes on the design and performance of multistage amplifiers?

3. Evaluate and analyze the stability and performance of feedback amplifiers with nonlinear and time-varying components using advanced mathematical tools like Lyapunov theory?
4. What is the trade-offs between feedback and feed forward control in amplifiers, and how can they be optimized?
5. What are the fundamental limits on the phase noise and stability of oscillators, and how can they be approached?
6. How can you design an oscillator with optimal performance and minimal power consumption using advanced techniques like injection locking or frequency division?
7. What is the trade-offs between different power amplifier architectures, such as Doherty or Chireix, and how can they be optimized?
8. Evaluate power amplifier for emerging applications like 5G or IoT, requiring high efficiency and linearity?
9. What are the implications of emerging technologies like met materials or graphene on the design and performance of tuned amplifiers?
10. Evaluate and design a tuned amplifier for applications like spectrum sensing or cognitive radio, requiring high selectivity and adaptability?

Chairperson
Board of Studies (ECE)

R24ES13 **Design Thinking & Innovation** **0 1 2 2**

(Common to All Branches)

Course Objectives:

1. The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation.
2. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Code	Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO9	PO10	PO11	PSO1	PSO2	DOK
R24ES13.1	Define the concepts related to design thinking. Explain the fundamentals of Design Thinking and innovation	3	3	2	2	2	-	1	2	2	2	L1, L2
R24ES13.2	Apply the design thinking techniques for solving problems in various sectors.	3	3	3	2	3	-	1	2	3	3	L3
R24ES13.3	Analyse to work in a multidisciplinary environment	3	3	3	2	3	-	-	2	3	3	L4
R24ES13.4	Evaluate the value of creativity	3	2	3	2	3	1	1	3	3	3	L5
R24ES13.5	Formulate specific problem statements of real time issues	3	2	3	2	3	1	1	3	3	3	L3, L6

SYLLABUS

UNIT-I **10 Hours**

Introduction to Design Thinking: Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry. **CO's: CO1**

UNIT-II **10 Hours**

Design Thinking Process: Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development. **CO's: CO2**

UNIT-III **10 Hours**

Innovation: Art of innovation, Difference between innovation and creativity, role of creativity and

innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation. **CO's: CO3**

UNIT IV **10 Hours**

Product Design: Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies.

Activity: Importance of modeling, how to set specifications, Explaining their own product design.

CO's: CO4

UNIT V **10 Hours**

Design Thinking in Business Processes: Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for startup.

CO's: CO5

Board of Studies: Mechanical Engineering

Approved in BOS No: 02,13th May, 2025

Approved in ACM No: 02

Text Books:

1. Tim Brown,Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons..

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press
2. Shrutin N Shetty, Design the Future, Norton Press
3. William Lidwell, Universal Principles of Design- Kritinaholden, Jill Butter.
4. Chesbrough. H, The Era of Open Innovation – 2013

Online Learning Resources:

- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1 (%)	Internal Assessment #2 (%)

L1	10	--
L2	30	--
L3	30	20
L4	30	30
L5	--	30
L6	--	20
Total (%)	**100**	**100**

Chairperson
Board of Studies (ME)

R24EEPC11 **Control Systems Lab** **0 0 3 1.5**

(Electrical and Electronics Engineering)

Course Objectives:

The main objectives of the course is to

1. To impart hands on experience to understand the performance of basic control system components such as magnetic amplifiers, D.C. servo motors, A.C. Servo motors and Synchros.
2. To understand time and frequency responses of control system with and without controllers and compensators.
3. To know the different logic gates and Boolean expressions using PLC

Course Code	Course Outcomes	Mapping with POs and PSOs								DoK
		PO1	PO2	PO3	PO5	PO6	PO9	PO11	PSO1	PSO2	
R24EEPC11.1	Analyze the time response of system (first order and second order system).	-	3	2	2	1	1	1	3	1	L1 L2
R24EEPC11.2	Analyze PID controllers and compensators	-	3	2	3	1	2	2	3	1	L1 L2
R24EEPC11.3	Determine the transfer function of D.C Motor	-	2	3	2	1	1	1	3	1	L2 L3

Board of Studies : Electrical & Electronics Engineering

Approved in BOS No : 02, 21st, May 2025

Approved in ACM No: 02

List of Experiments

(Any 10 of the following experiments are to be conducted)

1. Analysis of First order system in time domain (For Step, Ramp Inputs) COs: CO1
2. Analysis of Second order system in time domain (For Step, Ramp Inputs) COs: CO1
3. Effect of P, PD, PI, PID Controller on a second order systems COs: CO1
4. Lag Compensation - Magnitude and phase plot. COs: CO1
5. Lead Compensation - Magnitude and phase plot COs: CO2
6. Transfer function of DC Motor COs: CO2
7. Stability analysis of Linear Time Invariant system using Root Locus Technique (MAT LAB) COs: CO2
8. Stability analysis of Linear Time Invariant system using Bode Plot Technique (MAT LAB)

COs: CO2

9. Stability analysis of Linear Time Invariant system using Nyquist Plot Technique (MAT LAB) COs: CO2
10. Kalman's test of controllability and Observability using MATLAB COs: CO3
11. Characteristics of AC Servomotor COs: CO3
12. State space model for classical transfer function using MATLAB COs: CO3
13. Characteristics of Magnetic Amplifiers COs: CO3
14. Implementation of different logic gates using PLC COs: CO3
15. Characteristics of synchro transmitter and receiver COs: CO3
16. Temperature Control using PID COs: CO3

Hardware Requirements:

Control System Kits

Software Requirements:

MATLAB simulation software tool, Computer Systems with required specifications

SAMPLE QUESTIONS

L1-Remember

1. What is a time constant?
2. Define rise time and settling time.
3. Define each type of controller.
4. What is a compensator?
5. What is a transfer function?
6. What is the Nyquist criterion?
7. Define controllability and observability.
8. What is the state variable form of a system?

L2 -Understand

1. Explain the difference between under damped and over damped systems.
2. How does a PID controller improve system performance compared to a P controller?
3. Differentiate between lead and lag compensators.
4. Explain the relationship between input voltage and speed of the motor.
5. Why is stability analysis important in control systems?
6. What is the significance of state-space representation in control?
7. Explain how transfer functions can be converted to state-space.

L3-Apply

1. Calculate damping ratio from a given response curve.

2. Tune a PID controller for a given system.
3. Use MATLAB to convert a second-order system into state-space.
4. Sketch the Bode plot of a lead compensator.
5. Derive the transfer function from experimental data.

Chairperson
Board of Studies (EEE)

R24EEPC12 **Induction and Synchronous Machines Lab** **0 0 3 1.5**

(Electrical and Electronics Engineering)

Course Objectives:

The main objectives of the course is to

1. Speed control methods of three-phase induction motors.
2. Performance characteristics of three-phase and single-phase induction motors
3. Voltage regulation calculations of three–phase alternator by various methods.

Course Code	Course Outcomes	Mapping with POs and PSOs									DOK
		PO1	PO2	PO3	PO4	PO5	PO9	PO11	PSO1	PSO2	
R24EEPC12.1	Assess the performance of single phase and three phase induction motors	2	2	2	3	2	2	2	3	2	L2, L3
R24EEPC12.2	Control the speed of three phase induction motor	2	2	1	3	1	3	2	3	3	L1, L2,
R24EEPC12.3	Predetermine the regulation of three–phase alternator by various methods	2	2	2	3	2	2	2	3	3	L2, L3

Board of Studies : Electrical & Electronics Engineering

Approved in BOS No : 02, 21st, May 2025

Approved in ACM No: 02

List of Experiments

1. Brake test on three phase induction motor. COs: CO1
2. Circle Diagram of three phase induction motor. COs: CO1
3. Speed control of three phase induction motor by V/f method. COs: CO1
4. No-load & Blocked Rotor tests of single-phase induction motor. COs: CO1
5. Power factor improvement of single-phase induction motor by using capacitors. COs: CO1
6. Brake test on single phase induction motor. COs: CO2
7. Load test on Universal Motor. COs: CO2
8. Brake test on A.C Series motor. COs: CO2
9. Regulation of a three -phase alternator by synchronous impedance. COs: CO2
10. Regulation of a three -phase alternator by MMF method. COs: CO2
11. Regulation of three-phase alternator by Potier triangle method. COs: CO3
12. V and Inverted V curves of a three-phase synchronous motor. COs: CO3
13. Determination of Xd, Xq & Regulation of a salient pole synchronous generator. COs: CO3
14. Determination of efficiency of three phase alternator by loading with three phase induction motor. COs: CO3

NOTE: Any 10 experiments are to be conducted.

SAMPLE QUESTIONS

L1-Remember:

Brake Test on Three-Phase Induction Motor

Problem:

A 10 HP, 415 V, 50 Hz, 4-pole, three-phase induction motor is running at 1440 RPM. During the brake test, the mechanical power required to brake the motor at full load is 700 W. The slip at full load is 0.04.

Calculate:

a. The full load torque of the motor.

b. The efficiency of the motor at full load.

c. The mechanical losses of the motor at full load.

No-load & Blocked Rotor tests of Three-Phase Induction Motor

Problem:

A three-phase induction motor has the following no-load and full-load parameters:

- No-load current = 15 A, power factor = 0.2, voltage = 415 V.
- Full-load current = 35 A, power factor = 0.8, voltage = 415 V.

  Task:

  Plot the circle diagram for the induction motor.

  Hint: Use the given parameters to determine the no-load and full-load power components and draw the corresponding circle diagram.

L2 –Understand:

Speed Control of Three-Phase Induction Motor by V/f Method

Problem:

A three-phase induction motor operates at a base speed of 1440 RPM at a rated voltage of 415 V.

Calculate:

a. The frequency required to run the motor at 1200 RPM using the V/f control method.

b. The new voltage required for the motor to operate at the reduced speed.

No-load & Blocked Rotor tests of Single-Phase Induction Motor

Problem:

The following parameters are given for a single-phase induction motor:

- Rated voltage = 230 V
- Rated current = 4 A
- Power factor = 0.85

- Input power = 900 W

Task:

Draw the equivalent circuit of a single-phase induction motor and calculate:

a. The resistance and reactance of the motor.

b. The efficiency of the motor.

L3-Apply:

Power Factor Improvement of Single-Phase Induction Motor by Using Capacitors

Problem:

A 2 HP, 230 V, 50 Hz single-phase induction motor operates at a power factor of 0.6. The current drawn by the motor is 8 A.

Calculate:

a. The apparent power drawn by the motor.

b. The reactive power required to improve the power factor to 0.9.

c. The value of the capacitor needed to improve the power factor.

Load Test on Single-Phase Induction Motor

Problem:

A 1 HP, 230 V, single-phase induction motor is tested under load conditions. The input power to the motor at full load is 750 W, and the output power is 600 W.

Calculate:

a. The efficiency of the motor.

b. The losses in the motor.

Regulation of a Three-Phase Alternator by Synchronous Impedance Method

Problem:

A 3-phase alternator has the following parameters:

- Rated voltage = 11 kV
- Rated current = 150 A
- Synchronous reactance = 10 Ω
- Resistance = 0.5 Ω

The alternator is operating at a lagging power factor of 0.85 with a load current of 130 A.

Calculate:

a. The synchronous impedance (Z_s)

b. The voltage regulation of the alternator.

Regulation of a Three-Phase Alternator by MMF Method

Problem:

A 3-phase alternator has a synchronous reactance of 12 Ω and a resistance of 0.5 Ω. The rated

output voltage is 415 V, and the load current is 120 A at a power factor of 0.8 lagging.

Calculate:

a. The voltage regulation using the MMF method.

Chairperson
Board of Studies (EEE)

R24CSSC05 **Python Programming** **0 0 3 1.5**

(Common to EEE)

Course Objectives:

- Introduce core-programming concepts of Python programming language.
- Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
- Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

Course Outcomes

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

Course Code	Course Outcomes	Mapping with POs and PSOs			
		PO1	PO2	PO3	Dok
R24CSSC01.1	Introduce core-programming concepts of Python programming language.	3	3	3	L1
R24CSSC01.2	Develop, run and manipulate Python programs using Functions, Core data structures like Lists, Dictionaries, and use of Strings Handling methods	3	3	3	L2
R24CSSC01.3	Demonstrate about Python data structures like Tuples, Sets and dictionaries	3	3	3	L2
R24CSSC01.4	Develop, run and manipulate Python programs using File Operations and concepts of object-oriented programming	3	3	3	L3
R24CSSC01.5	Understand Data Science, Numpy, Pandas and working with XML, JSON and other file formats.	3	3	3	L3

Board of Studies : Computer Science and Engineering
Approved in BOS No: 02, 9th May, 2025
Approved in ACM No: 02

Developing the following programs:

UNIT-I: **CO's:CO1**

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook, Features, Limitations, advantages, and applications of python.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Demonstrate the following Operators in Python with suitable examples.
    i. Arithmetic Operators
    ii. Relational Operators
    iii. Assignment Operators
    iv. Logical Operators
    v. Bit wise Operators
    vi. Ternary Operator
    vii. Membership Operators
    viii. Identity Operators
5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.
7. Write how to Handle specific exceptions – like division of a number by zero

UNIT-II: **CO's:CO2**

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments, Lambda Functions: Syntax and usage of lambda functions..

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, Regular Expressions (Regex)

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:

1. Write a Python program to square each element in a list using a lambda function.
2. Write a program to define a function with multiple return values.
3. Write a program to define a function using default arguments.
4. Write a program to find the length of the string without using any library functions.
5. Write a program to check if the substring is present in a given string or not.

6. Write a program to perform the given operations on a list:
    i. Addition
    ii. Insertion
    iii. Slicing
7. Write a program to perform any 5 built-in functions by taking any list.

UNIT-III: CO's:CO3

Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement. Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset, Defaultdict and OrderedDict (from collections).

Sample Experiments:

1. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
2. Write a program to count the number of vowels in a string (No control flow allowed).
3. Write a program to check if a given key exists in a dictionary or not.
4. Write a program to add a new key-value pair to an existing dictionary.
5. Write a program to sum all the items in a given dictionary.
6. Write a program using defaultdict to count the frequency of each fruit in the given list:['apple', 'banana', 'apple', 'orange', 'banana', 'apple']

UNIT-IV: CO's:CO4

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Sample Experiments:

1. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
2. Python program to print each line of a file in reverse order.
3. Python program to compute the number of characters, words and lines in a file.
4. Write a program to create, display, append, insert and reverse the order of the items in the array.

5. Write a program to add, transpose and multiply two matrices.
6. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

UNIT-V: **CO's:CO5**

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Board of Studies: Computer Science and Engineering

Approved in BoS No: 02,--April, 2025

Approved in ACM No: 02

Sample Experiments:

1. Python program to check whether a JSON string contains complex object or not.
2. Python Program to demonstrate NumPy arrays creation using array () function.
3. Python program to demonstrate use of ndim, shape, size, dtype.
4. Python program to demonstrate basic slicing, integer and Boolean indexing.
5. Python program to find min, max, sum, cumulative sum of array
6. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
    a) Apply head () function to the pandas data frame
    b) Perform various data selection operations on Data Frame
7. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

Reference Books:

1. Gowri shankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson

Online Learning Resources Links:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus

Web References:

1. https://www.geeksforgeeks.org/python-programming-language-tutorial/
2. https://www.python.org/about/gettingstarted/
3. https://www.w3schools.com/python/

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. Define identifiers and give two examples.
2. List any three features of Python.
3. What is the use of the type() function.
4. Define a function. What is a lambda function?
5. What are default and keyword arguments?
6. List any four string methods in Python.
7. Define a dictionary. How is it different from a list?
8. What is a frozenset?
9. What is the syntax of zip()?
10. What is a constructor in Python?
11. List any three file handling functions.
12. Define encapsulation.
13. What is a NumPy array?
14. Define a DataFrame in pandas.
15. Mention any two data visualization functions from matplotlib.

L2: Understand

1. Explain the significance of indentation in Python.
2. Differentiate between is and == with examples.
3. Explain the flow of execution for the if...elif...else structure.
4. Differentiate between *args and **kwargs.
5. Explain string slicing and joining with examples.
6. Explain the scope and lifetime of a variable in Python
7. Explain the relation between tuples and dictionaries.
8. Describe the purpose of defaultdict and OrderedDict.
9. Differentiate between class and object.
10. Explain the difference between class attributes and instance attributes.
11. Explain the difference between .ndim, .shape, and .size in NumPy.
12. Describe the process of reading JSON data in Python.

L3: Apply

1. Write a Python program to swap two variables without a temporary variable.
2. Write a program to print the largest of three numbers using conditional statements.
3. Write a Python program using a lambda function to square each element of a list.
4. Write a function that returns both sum and product of two numbers.

5. Write a program to check if a substring exists in a string.
6. Write a program to count vowels in a string using only string and set operations.
7. Write a program to check if a given key exists in a dictionary.
8. Write a program to concatenate two tuples.
9. Write a Python program to read from a file and print its contents in reverse line order.
10. Write a class representing a rectangle with methods to calculate area and perimeter.
11. Write a Python program to create a NumPy array and perform slicing.
12. Create a dictionary with lists and convert it into a pandas DataFrame.

L4: Analysing

1. Compare the use of for and while loops with scenarios.
2. Analyze how operator precedence affects the outcome of expressions in Python.
3. Analyze how positional arguments differ from keyword arguments in function calls.
4. Compare string formatting methods: %, .format(), and f-strings.
5. Compare the use of sets and dictionaries in Python.
6. Analyze the output when applying slicing on a tuple with an example.
7. Compare inheritance and polymorphism with suitable class examples.
8. Analyze the structure and behavior of a file object during read and write operations.
9. Analyze how data is structured differently in NumPy and pandas.
10. Compare JSON and XML data formats with Python parsing tools.

L5: Evaluating

1. Evaluate the use of dynamic typing in Python. What are its pros and cons?
2. Assess the effectiveness of Anaconda and Jupyter Notebook for beginner programmers
3. Evaluate the usefulness of using regular expressions for string validation.
4. Justify the use of built-in functions over writing manual logic
5. Evaluate the use of immutable data types (tuples, frozensets) in large applications.
6. Assess the performance difference between regular dict and defaultdict when counting frequencies.
7. Evaluate the usefulness of OOP in Python compared to procedural programming.
8. Judge whether using binary files or text files is better for storing structured data.
9. Evaluate the benefits of using pandas over lists/dictionaries for data manipulation.
10. Assess the effectiveness of functional programming in handling large-scale data pipelines.

Chairperson
Board of Studies (CSE)

R24HS05 Numerical Ability & Professional Communication skills 0 0 2 1
(Common to all UG Programmes)

Course Objectives:

1. **Develop problem-solving skills**: Students will be able to apply numerical concepts and techniques to solve problems in various contexts.
2. **Enhance data analysis skills**: Students will be able to collect, analyze, and interpret numerical data to inform decision-making.
3. **Develop effective communication skills**: Students will be able to communicate effectively in various professional settings, including verbal and non-verbal communication.
4. **Improve presentation skills**: Students will be able to deliver clear, concise, and engaging presentations to different audiences.
5. **Enhance writing skills**: Students will be able to write clear, concise, and well-structured professional documents, such as reports, emails, and memos.
6. **Develop interpersonal skills**: Students will be able to build and maintain effective relationships with colleagues, clients, and stakeholders.

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

Course Code	Course Outcomes	PO1	PO7	PO9	P011	Dok
R24HS05.1	Use their logical thinking and analytical abilities to solve Quantitative aptitude questions from company specific and other competitive tests..	2	---	---	---	L4
R24HS05.2	Solve questions related to time and distance and time and work etc. from company specific and other competitive tests.	1	---	---	---	L5
R24HS05.3	Comprehend the essentiality of LSRW skills in paper presentations, seminars, workshops, conferences etc. with teams and to solve different types of questions based on vocabulary, structure, grammar and verbal reasoning.	2	2	3	1	L1, L2
R24HS05.4	Attain the knowledge of soft skills in various conditions, Solve questions based on sentence completion and fill in the blanks	---	1	3	---	L2, L3
R24HS05.5	Explore diverse fields through English , To solve different types of questions based on vocabulary, structure, grammar and verbal reasoning	---	---	3	---	L4

SYLLABUS

UNIT-I: Numerical computation **15 Hours**

Application based on Numbers –Classification of Number System, Prime and Composite, Even and Odd Numbers, Divisibility Rule, BODMAS Rule, Unit digit, fractions, LCM &HCF**.** Percentages and its Applications, Profit Loss and Discount, Simple interest and Compound interest. Averages, Ratio Proportion, Application of Ratios**,** Partnerships, Shares and dividends.

Self Learning Topic: Problems on Ages

UNIT-II: Numerical Estimation **15 Hours**

Time and work, Application of Time-work (pipes and cisterns) , Time and Distance, circular Tracking, concept of Boats & steams. Mixtures and allegations, application of percentage and Ratios and Averages in Mixtures

Self Learning Topic: Problems on Trains

UNIT-III **5 Hours**

Abstract Preparation – Noticing Key Words –Literature Survey – Using Academic Verbs Verbal Ability: Sentence correction, Resume Writing and Cover letter

Self Learning Topic: Project Report

UNIT-IV **5 Hours**

Organizational Skills – Time Management – IELTS Test Papers Exercises Verbal Ability: sentence completion

Self Learning Topic: Jumbled Sentences

UNIT-V **5 Hours**

Analogy, origin of Words, Idioms and phrases, MNC's question papers Verbal Ability: Error Identification

Self Learning Topic: Speaking and writing diction (Choice of Words)

Board of Studies: MBA
Approved in BOS No: 02, 13th May, 2025
Approved in ACM No: 02

Text Books:

1. Quantitative Aptitude for competitive examinations by R.S.Agrawal - S.Chand publications.
2. Business Communication by C.S.G Krishnamacharyulu & Lalitha Ramakrishna – Himalaya publishing house

Reference Books:

1. Numerical Aptitude and Reasoning Ability tests in Competitive exams by Prof.A.Balasubramanian.
2. Numerical Ability and Mathematical Aptitude by Dr.A.B.Rao
3. Communication skills and soft skills by E.Suresh Kumar , p.sreehari & j.savithri

Web References:

1. https://faceprep.in/ logical reasoning

2. www.sawaal.com
3. http://nptel.ac.in/courses
4. www.prepinsta.com

Model Questions from Numerical Ability

1. What is the unit digit of 2^10?
2. Find the unit digit of 17^5.
3. What is the unit digit of 3 × 7 × 9 × 11?
4. Determine the unit digit of 123^4.
5. Find the unit digit of 2^20 + 3^15.
6. Is 432 divisible by 3?
7. Check if 756 is divisible by 9.
8. Determine if 1240 is divisible by 8.
9. Is 531 divisible by 11?
10. Check if 2700 is divisible by 15.
11. Simplify: 2 × 3 + 12 ÷ 4 - 5
12. Evaluate: 18 - 3 × 2 + 12 ÷ 4
13. Simplify: 9 + 8 ÷ 2 × 3 - 1
14. Evaluate: 15 - 2 × 3 + 8 ÷ 2
15. Simplify: 24 ÷ 4 × 2 + 10 – 3
16. Find the HCF of 12 and 18.
17. Determine the HCF of 24 and 30.
18. The HCF of two numbers is 6 and their LCM is 72. What are the two numbers?
19. The LCM of two numbers is 120 and their HCF is 10. If one of the numbers is 24, what is the other number?
20. A shirt is marked at $80 and sold at a 20% discount. What is the selling price?
21. A student scored 75% marks in an exam. If the total marks were 200, how many marks did the student score?
22. A number is increased by 25% and then decreased by 10%. What is the net percentage change?
23. A book is bought for $50 and sold for $60. What is the profit percentage?
24. A shopkeeper sells an item at a 15% loss. If the cost price is $100, what is the selling price?
25. A person buys a product for $80 and sells it for $100. What is the profit percentage?
26. Find the simple interest on $1000 at 5% per annum for 2 years.
27. A sum of money amounts to $1200 in 3 years at 8% per annum simple interest. What is the principal amount?
28. What is the rate of interest if a sum of $500 amounts to $600 in 4 years at simple interest?

Model Questions from professional communication skills

1. You're working with a team member who has a different work style. How would you adapt your communication approach?
2. A client is unhappy with the project's progress. How would you handle the situation?
3. You're part of a team, and there's a conflict between two members. How would you facilitate a resolution?
4. How would you use body language to convey confidence during a presentation?
5. You're in a virtual meeting, and your internet connection is unstable. How would you

handle the situation?

6. You're meeting a client for the first time. What nonverbal cues would you use to build rapport?
7. You're presenting a project update to a client. How would you structure your presentation to ensure effective communication?
8. A colleague is not meeting their deadlines, affecting the team's project timeline. How would you approach the conversation?
9. You're in a meeting, and a team member is dominating the discussion. How would you politely intervene?
10. You're tasked with writing a report on a project's progress. How would you structure the report?

Chairperson
Board of Studies (MBA)