Course Structure

&

Detailed Syllabus

Computer Science and Engineering (Data Science)

Academic Regulations - R24

Applicable for the Batches Admitted from 2024-2025

AVANTHI

INSTITUTE OF ENGINEERING & TECHNOLOGY

(Autonomus)

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

NAAC "A+" Accredited Institute

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

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Structure

Program– B. Tech Computer Science and Engineering (Data Science)

Regulation-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

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Program: B. Tech Computer Science and Engineering (Data Science)   Regulation: R24

I Year I Semester- Course Structure

S.No	Category	Course Code	Course Title	Lecture	Tutorial	Practical	Credits
1	BS	R24BS01	Linear Algebra and Calculus	3	0	0	3
2	HS	R24HS01	Communicative English	2	0	0	2
3	BS	R24BS02	Engineering Physics	3	0	0	3
4	ES	R24ES01	Basic Civil & Mechanical Engineering	3	0	0	3
5	ES	R24ES02	Problem Solving and Programming with C	3	0	0	3
6	BS	R24BS03	Engineering Physics Lab	0	0	2	1
7	HM	R24HS02	Communicative English Lab	0	0	2	1
8	ES	R24ES03	Problem Solving and Programming with C Lab	0	0	3	1.5
9	ES	R24ES04	IT Workshop	0	0	2	1
10	MC	R24MC01	Health and Wellness, Yoga, and Sports	0	0	1	0.5
			Total	14	00	10	19

Category	Courses	Credits
BS-Basic Sciences Course	3	7
ES-Engineering Science Course	4	8.5
HM-Humanity Science and Management Courses	2	3
MC-Mandatory Course	1	0.5
Total	10	19

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Program: B. Tech Computer Science and Engineering (Data Science)   Regulation: R24

I Year II Semester- Course Structure

S.No	Category	Course Code	Course Title	Lecture	Tutorial	Practical	Credits
				Hours per Week			
1	BS	R24BS04	Differential Equations and Vector Calculus	3	0	0	3
2	BS	R24BS05	Applied Chemistry	3	0	0	3
3	ES	R24ES06	Engineering Graphics	1	0	4	3
4	ES	R24ES05	Basic Electrical and Electronics Engineering	3	0	0	3
5	PC	R24CSPC01	Data Structures through C	3	0	0	3
6	BS	R24BS06	Applied Chemistry Lab	0	0	2	1
7	ES	R24ES07	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
8	PC	R24CSPC02	Data Structures through C Lab	0	0	3	1.5
9	ES	R24ES08	Engineering Workshop	0	0	3	1.5
10	MC	R24MC02	NSS/NCC/Scouts &Guides/Community Service	0	0	1	0.5
			Total	13	00	16	21

Category	Courses	Credits
BS- Basic Sciences Course	3	7
ES-Engineering Science Course	4	9
PC-Professional Core Course	2	4.5
MC-Mandatory Course	1	0.5
Total	10	21

Chairperson
Board of Studies (CSE)

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course Structure

Program– B. Tech Computer Science and Engineering (Data Science)

Regulation-R24

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

Program: **B.Tech Computer Science and Engineering (Data Science)**　　　　Regulation: R24

II Year I Semester-Course Structure

S. No	Category	Course Code	Course Title	Hours per Week			Credits
				Lecture	Tutorial	Practical	
1	PC	R24CDPC05	Mathematical Foundations of Data Science	3	0	0	3
2	PC	R24CSPC04	Object Oriented Programming using JAVA	3	0	0	3
3	PC	R24CDPC01	Introduction of Data Science Using Python	3	0	0	3
4	PC	R24CMPC02	Computer Networks	3	0	0	3
5	HS	R24HS03	Universal Human Values-Understanding Harmony & Human Ethical Conduct	2	0	0	2
6	PC	R24CSPC06	Object Oriented Programming using JAVA Lab	0	0	3	1.5
7	PC	R24CDPC02	Data Science Using Python Lab	0	0	3	1.5
8	SC	R24CDSC01	Skill Oriented Course-I Power BI	0	1	2	2
9	HS	R24HS04	Logical reasoning and Corporate Skills	0	0	2	1
10	MC	R24MC03	Environmental Science	2	0	0	0
			Total Credits	16	1	10	20

Category	Courses	Credits
PC-Professional Core Course	6	15
SC-Skill Oriented Course	1	2
HS-Humanity Sciences and Management Course	2	3
MC-Mandatory Course	1	--
Total	10	20

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Program: B.Tech Computer Science and Engineering (Data Science)   **Regulation: R24**

II Year-II Semester- Course Structure

S. No	Category	Course Code	Course Title	Lecture	Tutorial	Practical	Credits
1	BS	R24BS11	Probability & Statistics	3	0	0	3
2	PC	R24CSPC08	Formal Languages and Automata Theory	3	0	0	3
3	PC	R24CDPC03	Exploratory Data Analysis	3	0	0	3
4	ES	R24ES09	Design and Analysis of Algorithms	3	0	0	3
5	PC	R24CSPC09	Database Management Systems	3	0	0	3
6	PC	R24CDPC04	Exploratory Data Analysis Lab	0	0	3	1.5
7	ES	R24ES12	Design and Analysis of Algorithms Lab	0	0	3	1.5
8	PC	R24CSPC12	Database Management Systems Lab	0	0	3	1.5
9	SC	R24CSSC02	Skill Oriented Course-II Full Stack Development	0	0	3	1.5
10	HS	R24HS05	Numerical Ability and Professional Communication Skills	0	0	2	1
11	MC	R24MC04	Intellectual Property Rights	2	0	0	0
			Total Credits	17	00	14	22
Mandatory Community Service Project Internship of 08 weeks duration during summer vacation							

Category	Courses	Credits
BS-Basic Sciences Course	1	3
ES-Engineering Sciences Course	2	4.5
PC-Professional Core Course	5	12
HS- Humanities & Social Science Course	1	1
SC-Skill Oriented Course	1	1.5
MC-Mandatory Course	1	0
Total	11	22

Chairperson
Board of Studies (CSE)

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 $\dfrac{\partial(x, y, z)}{\partial(u, v, w)} = u^2 v$ (L4)

3. In plane triangle, finds the maximum value of $\cos A \cos B \cos C$ (L4)

UNIT-V

1. $\displaystyle\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dxdy$ (L5)

2. Evaluate $\displaystyle\iint (x^2 + y^2) dxdy$ over the area bounded by the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ (L5)

Chairperson
Board of Studies (Mathematics)

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,
   1st Edition,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)

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)

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)

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)

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)

| 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)

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)

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)

| 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**   3   0   0   3
(Common to all Branches)

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 $\left(1+x^2\right)\dfrac{dy}{dx}+2xy=4x^2$ (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 $\dfrac{d^2y}{dx^2}-6\dfrac{dy}{dx}+13y=8e^{3x}\sin 2x$ (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 $\dfrac{\partial^3 z}{\partial x^3}-2\dfrac{\partial^3 z}{\partial x^2\partial y}=2e^{3x}+3x^2 y$ (L2)
4. Solve $\left(mz-ny\right)\dfrac{\partial z}{\partial x}+\left(nx-lz\right)\dfrac{\partial z}{\partial y}=ly-mx$ (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 $\iiint\limits_{v}\nabla.\vec{F}dV$, where $\vec{F}=4x\hat{i}-2y^2 j+z^2 k$ and V is bounded by $x^2+y^2=4, z=0$ and $z=3$ (L4)
2. Evaluate $\oiint\limits_{C}\left(3x^2-8y^2\right)dx+\left(4y-6xy\right)dy$ where C is the curve bounded by $y=\sqrt{x}$ and $y=x^2$ (L5)

Chairperson
Board of Studies (Mathematics)

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 $\Psi2$, LCAO theory, molecular orbital theory – bonding in homo and hetero nuclear diatomic molecules – energy level diagrams of O_2, N_2 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 ,5[th]Edition,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)

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, 31stJuly, 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)

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 flipflops using respective ICs.	L1,L3,L4

Note: Minimum Six Experiments to be performed.

Chairperson
Board of Studies (EEE&ECE)

| 24CSPC01 | **Data Structures through C** | 3 | 0 | 0 | 3 |

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

Course Objectives:

1. Understanding of fundamental data structures and algorithms.
2. To understand importance of data structure in context of writing efficient program.
3. Create and manage linked lists to efficiently organize and manipulate data, emphasizing memory efficiency.
4. Implement and apply stacks to manage program flow and solve problems involving expression evaluation and backtracking.
5. Explore basic concepts of hashing and apply it to solve problems requiring fast data retrieval and management.
6. To solve problems using data structures such as binary trees, binary search trees, and graphs.

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	
R24CSPC01.1	Explain the role of linear data structures in organizing and accessing data efficiently in algorithms	3	3	2	3	2	L1
R24CSPC01.2	Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.	3	3	3	3	2	L1, L2
R24CSPC01.3	Apply queue-based algorithms for distinguish between deques and priority queues, and apply them appropriately to solve data management challenges, and apply Hash based solutions for specific problems.	3	3	3	3	2	L2, L3
R24CSPC01.4	Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.	3	3	2	3	2	L3, L4
R24CSPC01.5	Implement operations on Binary tree, Demonstrate the representation and traversal techniques of graphs and their applications.	3	3	3	3	2	L4, L5

Syllabus

UNIT-I: Introduction to Linear Data Structures, Searching, and Sorting   10 Hours

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures.

Searching Techniques: Linear & Binary Search.

Sorting Techniques: Insertion Sort, Selection Sort, Bubble Sort, Quick Sort, Merge Sort. **COs–CO1**

Self-Learning Topics: Analyse Time complexity of searching and sorting techniques

UNIT–II: Stacks and its Operations   10 Hours

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation (Prefix, Postfix, Infix), backtracking, reversing list etc.   **COs–CO2**

Self-Learning Topics: Types of Stacks

UNIT-III: Queues and its Operations   12 Hours

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications, Circular Queues, Priority Queues, Multiple Queues.

Hash Tables: Hash table implementation, Hashing Techniques   **COs–CO3**

Self-Learning Topics: Different types of Queues

UNIT- IV Linked List   14 Hours

Linked Lists: Singly linked lists, representation and operations, Applications on Single Linked List- Polynomial Expressions, Sparse Matrix Expressions, Advantages and disadvantages of Single Linked list, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.   `   **COs–CO4**

Self-Learning Topics: Swap nodes in a single linked list (without swapping data).

UNIT-V: Introduction to Trees and Graphs   14 Hours

Trees: Introduction to Trees, Properties of Binary Tree, Representation of Binary Tree using Arrays and Linked List, Binary Search Tree – Insertion, Deletion & Traversals, BTrees, B+ Trees.AVL Trees,

Graphs: Basic Concepts, Representations of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (DFS&BFS), Graph Applications.   **COs–CO5**

Self-Learning Topics: Red-Black Trees

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. Graphs Algorithm	CO5	PO1,PO2,PO3

TEXT BOOKS:

1. 'Data Structures and Algorithm Analysis in C' by Mark Allen Weiss, Pearson.
2. 'Introduction to Algorithms' by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, MIT Press.
3. 'Data Structures Using C' by Reema Thareja, Oxford University Press.

REFERENCE BOOKS:

1. Algorithms, Part I and II' by Robert Sedgewick and Kevin Wayne, Addison-Wesley.

2. Data Structures and Algorithms Made Easy' by Narasimha Karumanchi, CareerMonk Publications

Web References:

1. http://www.hackerrank.com/domains/datastructures
2. http://www.github.com/topics/data_structures_c
3. http://nptel.ac.in/courses
4. http://www.cslibrary.stanford.edu

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 operations on single linked list?
2. What are the principles of stack?
3. What are the operations on Queue?
4. Describe the types of data structures?
5. What is a disadvantage of linked list over an array?

L2: Understand

1. Explain Bubble sort, Insertion sort algorithm with examples?
2. Explain the Stack, Queue ADT's with example?
3. Write a algorithm to delete node from a list.
4. Describe Quick sort algorithm, with example and find total no of comparisons made?
5. Describe the Insertion sort Algorithm with example?

L3: Apply

1. Convert infix to prefix and postfix expression with example?
2. Write an algorithm for evaluating a postfix expression to prefix expression?
3. Illustrate the given infix expression (A+B ^C+(D*E)^(F+G)) into post fix and evaluate the same using stack?
4. A=3, B=4, C=2, D=6, E=4, F=1, G=8
5. Search an element in a Tree Recursively.
6. Write a C program to count the number of nodes in a Binary tree.

L4: Analyze

1. Write an algorithm to construct Binary Search Tree with no duplicate values.
2. Inspect Single Linked List operations to maintain student marks obtained for various subjects.
3. Write a C program to implement Hash Table.

L5: Evaluating

1. C program to solve the magic squares puzzle without using Recursion.
2. C program to represent Graph using incidence matrix.
3. Write a C program to implement Vector.

Chairperson
Board of Studies (CSE)

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

APPLIED CHEMISTRY LAB

(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)

| 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 both Hardware 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 flipflops using respective ICs.	L1,L3,L4

Note: Minimum Six Experiments to be performed.

Chairperson
Board of Studies (EEE&ECE)

R24CSPC02   **Data Structures through C Lab**   0   0   3   1.5
(Common to CSE, CSE (DS) & CSE (AI&ML))

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
R24CSPC02.1	Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.	3	3	3	L1, L2
R24CSPC02.2	Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems& Queues.	3	3	3	L2, L3, L4
R24CSPC02.3	Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation, Graphs & Trees.	3	3	3	L4, L5, L6

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

Developing the following programs

Week 1:
1. Choose an array and perform operations such as insertion, deletion, and traversal.   CO1
2. Given an M*N integer matrix, if an element is 0, show its entire row and column to 0's.
                                                                                          CO1
3. Write a program that uses both recursive and non-recursive functions to perform linear search operations for a key value in the given list of integers.   CO1

Week 2:
4. Develop a program to perform quick sort, merge sort.   CO2
5. Create a program to perform bubble sort and selection sort.   CO2
6. Given an unsorted array of integers, find the length of the longest consecutive elements sequence.   CO2

Week 3:
7. Implement a stack using arrays.   CO3
8. Develop a program Delete middle element of a stack.   CO3
9. Develop a program to evaluate a postfix expression using stack.   CO3
10. Convert the prefix expression to postfix expression using the Stacks.   CO3

Week 4:
11. Implement Queue operations using Arrays.   CO3
12. Create a circular queue and perform operations like insertion and deletion.   CO5

Week 5:
13. Develop a scenario-based program to simulate a ticket booking system using queues.   CO3

14. Implement a linked list and perform operations such as insertion, deletion, and traversal.
CO3

15. Detect the cycle in the given linked list. CO4

Week 6:

16. Given two singly linked lists, determine if they intersect and return the intersecting node.
CO5

17. Implement operations on Circular Linked List. CO3

18. Remove Nth Node from end of List. CO4

Week 7:

19. Write a program that uses functions to perform the operations on Doubly Linked List. CO3

20. Write a program that reverse the given linked list without utilize new list or array. CO3

21. Delete last occurrence of an item from linked list. CO4

Week 8:

22. Implement a queue using arrays and linked lists. CO3

Week 9:

23. Create a scenario-based program to manage a library system using linked lists. CO5

Week 10:

24. Create a program to find the height of a binary tree. CO5

25. Create a program to find sub tree of another tree. CO5

Week 11:

26. Develop a program to check if two binary trees are identical. CO6

Week 12:

27. Develop a binary tree and perform in-order, pre-order, and post-order traversal. CO6

Week 13:

28. Implement a binary search tree (BST) and perform operations such as insertion, deletion, and searching. CO3

Week 14:

29. Implement graph data structure and perform depth-first search (DFS) and breadth-first search (BFS). CO3

Week 15:

30. Implement a scenario-based program for a social network using graph data structures. CO3

Textbooks:

1. Data Structures and Algorithm Analysis in C' by Mark Allen Weiss, Pearson.
2. 'Introduction to Algorithms' by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, MIT Press.
3. 'Data Structures Using C' by Reema Thareja, Oxford University Press.

Reference Books:

1. Algorithms, Part I and II' by Robert Sedgewick and Kevin Wayne, Addison-Wesley.

2. Data Structures and Algorithms Made Easy' by Narasimha Karumanchi, Career Monk Publications.

Chairperson
Board of Studies(CSE)

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.; AtulPrakashan 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)

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)

R24CDPC05 **Mathematical foundations of Data Science** 3 0 0 3
(Computer Science and Engineering (DS))

Course Objectives:

1. To introduce fundamental mathematical and statistical concepts such as vectors, matrices, probability, and optimization techniques essential for understanding data science methodologies.

2. To develop structured problem-solving skills in data science by exploring various problem typologies, graph models, information theory, and their applications in real-world data analysis and machine learning

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

| Course Code | Course Outcomes | Mapping with POs and PSOs | | | | | | | | Dok |
		PO1	PO2	PO3	PO4	PO5	PS01	PS02	PS03	
R24CDPC05.1	Understand the basics of vectors, linear equations, and their significance in data science	3	2	-	3	-	2	-	3	L1, L2
R24CDPC05.2	Comprehend set theory, eigenvalues, eigenvectors, and matrix factorizations	-	3	2	-	2	2	-	3	L2, L3
R24CDPC05.3	Grasp the fundamentals of probability, statistical measures	2	3	-	3	2	-	2	3	L3, L4
R24CDPC05.4	Apply and analyze unconstrained and constrained optimization methods	-	3	3	2	-	-	-	2	L3, L4
R24CDPC05.5	Understand core concepts of information theory such as entropy and divergence.	3	3	-	2	-	1	2	1	L4, L5

SYLLABUS

UNIT-I: Introduction to Data Science **14 Hours**

Introduction; Typology of problems; Importance of linear algebra, statistics and optimization from a data science perspective; Structured thinking for solving data science problems. **CO's–CO**

Self-Learning Topics: Typology of Data Science Problems

UNIT–II: Matrix Theory and Applications in Data Science **12 Hours**

Matrices and their properties (determinants, traces, rank, nullity, etc.); Eigenvalues and eigenvectors; QR Decomposition; Singular Value Decomposition; Inner products; Distance measures; Projections; Notion of hyperplanes. **CO's–CO2**

Self-Learning Topics: K- Nearest Neighbors (KNN) Algorithm

UNIT-III: Probability, Statistics and Random Processes **12 Hours**

Probability theory and axioms; Random variables; Probability distributions and density functions (univariate and multivariate); Expectations and moments; Covariance and correlation. **CO's-CO3**

Self-Learning Topics: Correlation functions; White-noise process

UNIT- IV Unconstrained and Constrained Optimization Methods   14 Hours

Unconstrained optimization; Necessary and sufficient conditions for optima; Gradient descent methods; Constrained optimization, KKT conditions; Introduction to non-gradient techniques; Introduction to least squares optimization; Optimization view of machine learning. Introduction to Data Science Methods: Linear regression as an exemplar function approximation problem.

CO's–CO4

Self-Learning Topics: Linear classification problems

UNIT-V: Information Theory   18 Hours

Entropy, Cross-entropy, Kullback-Leibler divergence, Mutual information, Applications in data compression and model evaluation **CO's–CO5**

Self-Learning Topics: Machine learning loss functions

Board of Studies   : Computer Science and Engineering

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

Approved in ACM No: 02

Expert Talk (To be delivered by SMEs from Industries)

	COs	POs / PSOs
1. Linear classification problems	CO4	PO2, PO3, PO4, PSO3.

Text Books:

1. G. Strang . Introduction to Linear Algebra, Wellesley-Cambridge Press, Fifth edition, USA, 2016
2. Bendat, J. S. and A. G. Piersol. Random Data: Analysis and Measurement Procedures. 4th Edition. John Wiley & Sons, Inc., NY, USA, 2010

Reference Books:

1. Montgomery, D. C. and G. C. Runger. Applied Statistics and Probability for Engineers. 5th Edition. John Wiley & Sons, Inc., NY, USA, 2011.

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	35	-
L2	30	-
L3	25	40
L4	10	30
L5	-	30
TOTAL(%)	**100**	**100**

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. What the primary objectives of data science are as introduced in the course?
2. Define eigenvalues and eigenvectors in the context of linear algebra.

3. List three properties of matrices that are important in data analysis.
4. Define Covariance
5. Name two key concepts in information theory relevant to data compression.

L2: Understand

1. Explain how linear algebra is used to solve complex data science problems such as dimensionality reduction.
2. Describe the significance of eigenvalues and eigenvectors in principal component analysis (PCA).
3. Illustrate the role of probability distributions in modelling real-world data.
4. Discuss how graphs can represent relationships and dependencies in data.
5. Explain the importance of entropy and mutual information in understanding data variability and information content.

L3: Apply

1. Given a matrix, compute its determinant and explain what this indicates about the matrix.
2. Use eigenvalues and eigenvectors to perform PCA on a small dataset and reduce its dimensions.
3. Classify different types of data science problems with examples
4. Compute expectation, variance and covariance.
5. Calculate the entropy of a binary random variable with specified probabilities.

L4: Analyze

1. Analyze how the properties of matrices (like rank and nullity) influence the solvability of systems of linear equations.
2. Examine the effect of eigenvalues on the stability and variance explained in PCA.
3. Investigate how correlation and covariance measures can be used to detect relationships between variables.
4. Compare unconstrained and constrained optimization methods with suitable examples.
5. Explore the impact of different probability distributions on modelling data in real-world scenarios.

L5: Evaluating

1. Critique the effectiveness of linear algebra techniques like matrix factorizations in handling high-dimensional data.
2. Assess the suitability of various optimization methods (gradient descent, KKT conditions) for training machine learning models.
3. Evaluate the use of entropy and Kullback-Leibler divergence in model selection and evaluation.
4. Evaluate the role of structured thinking in approaching complex data science projects.
5. Propose improvements or alternative approaches to current data science methodologies based on the concepts of structured thinking and problem typology.

Chairperson
Board of Studies (CSE)

| R24CSPC04 | Object Oriented Programming using JAVA | 3 | 0 | 0 | 3 |

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

Course Objectives:

The main objectives of the course is to

- Understand the basic ideas of Object-Oriented Programming (OOP) and implement them using Java through classes, objects, inheritance, and polymorphism.

- Understand and implement basic Java programming using data types, operators, control statements, and arrays to solve simple problems.

- Implement programs using Java features like constructors, method overloading, exception handling, and multithreading for better program design.

- Understand and use Java's built-in libraries like collections, file handling, and interfaces to create useful and organized programs.

- Implement graphical programs using JavaFX and understand how to create simple network-based applications using Java networking.

Course Outcomes

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

Course Code	Course Outcomes	Mapping with POs and PSOs							Dok
		PO 1	PO 2	PO 3	PO 5	PO 11	PS0 1	PS0 2	
R24CSPC04.01	Implement object orientated programming strategies and Contrast classes and objects.	3	2	2	3	2	3	3	L2, L3
R24CSPC04.02	Analyze Inheritance and Dynamic Method Dispatch	3	3	2	2	2	2	3	L2, L3, L4
R24CSPC04.03	Demonstrate various classes in different packages and can design own packages	3	2	3	3	2	2	3	L2, L3
R24CSPC04.04	Manage Exceptions and Apply Threads	3	3	3	3	2	2	3	L3, L4
R24CSPC04.05	Create GUI screens along with event handling and write network programs	3	2	3	3	3	2	3	L5, L6

SYLLABUS

UNIT-I: **15 Hours**

INTRODUCTION TO OBJECTS & CLASSES: What is Object Oriented Programming? Object Orientation as a New Paradigm, An Overview of Java: Process Oriented Vs Object Oriented

Programming, OOP Principles, Java BuzzWords, The Byte Code, A First Simple Program. Class Fundamentals with Variables and Methods, Declaring objects for accessing variables and methods. Data Types and Variables, Operators and Expressions, Control Statements, Type Conversion and Casting, Lexical Issues in Java, command line arguments,

ARRAYS: Introduction, Declaration and Initialization of Arrays, Single Dimension, Operations on Array Elements, Sorting of Arrays, Search for Values in Arrays, Multi Dimension.   **CO's-CO1**

Self-learning topics:

- Difference between JDK, JRE, and JVM

- History and evolution of Java

- Best practices for writing Java code (naming conventions, comments, code formatting)

- Enhanced for-loop and foreach in Java

UNIT-II: **13 Hours**

CONSTRUCTORS: Default and Parameterized, this keyword and Garbage Collection, Final and Static Keywords, Overloading Methods, Overloading Constructors, Using objects as Parameters, Returning objects, Strings, String methods, String Buffer and String Builder.

INHERITANCE: Inheritance Basics, Types of Inheritance, Using Super keyword for constructors, Super to call variables and methods, Method Overriding, Dynamic Method Dispatch.   **CO's-CO2**

Self-learning topics:

- Constructor chaining and private constructors

- Immutable classes and the final keyword usage in depth

- StringBuilder vs StringBuffer: performance comparison

UNIT-III: **15 Hours**

PACKAGES AND INTERFACES: Defining a Package, importing a package, Package Example, Access Protection, An Access Example, Abstract classes, Interfaces: Defining and Implementing Interfaces

EXPLORING java.lang: Wrapper classes, Object, Math, Runtime

EXPLORING java.util: The collection framework: Array List, HashSet HashMap, StringTokenizer, Calendar, Random, and Scanner

EXPLORING java.io: File class, Byte Streams, Character Streams, File Input Stream, File Output Stream, File Reader and File Writer classes.   **CO's-CO3**

Self-learning topics:

- Creating custom packages and JAR files

- Interface vs Abstract class: When to use what?

- Iterators and ListI terator in Java Collections

- Serialization and Deserialization using java.io

UNIT-IV: 14 Hours

EXCEPTION HANDLING: Exception Handling Fundamentals, Exception Types, throw, throws and finally, Creating your own exceptions, Chained Exceptions.

MULTITHREADED PROGRAMMING: Java Thread Model, The Main thread, Two ways of Creating a Thread, Creating Multiple Threads, is Alive(), join(), Thread Priority, Synchronization, Inter Thread Communication.   **COs-CO4**

Self-learning topics:

- Try-with-resources statement in exception handling

- Uncaught exceptions and the default handler

- Daemon threads and thread groups

UNIT-V: 12 Hours

JAVA FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events

EXPLORING JAVA.NET: Socket, Server Socket, Inet Address, Data Gram Socket, URL, Client Server Program using Sockets.   **COs-CO5**

Self-learning topics:

- Creating custom controls in JavaFX

- Building forms and handling validation in JavaFX

- Introduction to Java NIO (New I/O)

- Understanding protocols (TCP vs UDP) in Java networking

Board of Studies   : Computer Science and Engineering
Approved in BoS No : 02, 9th May, 2025
Approved in ACM No: 02

Text Books:

1. Herbert Schildt, Java The complete reference, 11th Edition, McGrawHill, 2019

2. Timothy budd, An introduction to object-oriented programming, 3rd Edition, Pearson, 2009.

3. JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

Reference Books:

1. Cay S. Horstmann, Core Java Volume I–Fundamentals, 11th Edition, Pearson 2019

2. Y. Daniel Liang Introduction to Java Programming Comprehensive Version, 10th Edition, Pearson, 2015.

3. Bruce Eckel, Thinking in Java, 4th Edition, Prentice Hall, 2006

Reference Links:

1. http://en.wikibooks.org/wiki/Java_Programming - Java Learning Wiki Book

2. http://www.javabeginner.com - Java Beginner Tutorial

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	35%	--
L2	40%	--
L3	25%	35%
L4	--	35%
L5	--	20%
L6	--	10%
Total (%)	**100%**	**100%**

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. Define Object-Oriented Programming.

2. List different types of inheritance supported by Java.

3. What is an exception in Java?

4. What is the Java thread model?

5. What is JavaFX?

6. Compare and contrast Process-Oriented Programming with Object-Oriented Programming. Provide examples.

7. What is bytecode in Java? Describe how Java achieves platform independence using bytecode and JVM.

8. What are multi-dimensional arrays? How are they declared and used in Java? Provide an example of a 2D array.

9. What is a constructor in Java? Explain constructor overloading with an example.

10. What is garbage collection in Java? How does Java handle memory management and object destruction?

11. Explain the different types of inheritance in Java. Why is multiple inheritance not supported through classes?

12. What are wrapper classes in Java? Why are they needed? Explain auto boxing and unboxing with examples.

13. Discuss the ArrayList class. How does it differ from arrays? Provide examples of adding, removing, and accessing elements.

14. What are File Reader and File Writer classes? How do they work with character data? Write a program to demonstrate file reading/writing.

15. Write a Java program to demonstrate client-server communication using Socket and Server Socket**.** Explain how data is sent and received.

L2: Understand

1. Explain the concept of encapsulation with an example.

2. What is a constructor? How is it different from a method?

3. What is a package? How is it created in Java?

4. What is an exception? How is it different from an error?

5. What is JavaFX? How does it differ from AWT and Swing?

6. Explain the key principles of Object-Oriented Programming (OOP). Compare process-oriented programming with object-oriented programming using suitable examples.

7. Discuss the various data types available in Java. Also explain type conversion and casting with examples.

8. Define constructors in Java. Differentiate between default and parameterized constructors. Illustrate with example

9. What is method overloading and constructor overloading in Java? How are they useful? Give examples for both.

10. What are packages in Java? How do you define and import packages? Explain access protection in Java with an example.

11. Define interfaces. How are they implemented in Java? Compare abstract classes and interfaces with code examples

12. What is exception handling in Java? Explain the types of exceptions and the role of try, catch, throw, throws, and finally blocks with examples.

13. Explain the Java thread model. How can threads be created in Java? Illustrate both approaches with code examples.

14. What is JavaFX? Describe the structure of a JavaFX application window. How are text and images displayed in JavaFX?

15. Explain JavaFX event handling mechanism. How can mouse events be handled in JavaFX?

Give a suitable code example.

L3: Apply

1. Write a Java program to demonstrate type casting from double to int

2. Write a Java method that accepts an object as a parameter and prints one of its attributes.

3. Write a Java program that uses the Math class to find the square root of 25.

4. Write a Java program to handle divide-by-zero exception using try-catch.

5. Write JavaFX code to handle a mouse click event on a rectangle.

6. Develop a Java program that takes user input via command line arguments, performs basic arithmetic operations using operators, and displays the results.

7. Write a Java program to demonstrate use of various control statements (if, switch, for, while) in calculating factorial of a number, checking for even/odd, and printing a pattern.

8. Write a Java program that demonstrates the use of default and parameterized constructors in a Book class. Display book details using methods.

9. Write a Java program that overrides a method from a superclass and uses dynamic method dispatch to invoke overridden methods during runtime.

10. Create a custom package shapes with classes Circle and Rectangle. Use them in another Java program by importing the package and calculating area of shapes.

11. Define an interface Vehicle with methods start() and stop(). Create classes Car and Bike that implement this interface. Demonstrate polymorphism using the interface reference.

12. Write a Java program that demonstrates exception handling using multiple catch blocks. Include finally block and handle exceptions like division by zero and array index out of bounds.

13. Write a multithreaded Java program where multiple threads update a shared counter variable. Use synchronization to avoid data inconsistency.

14. Write a JavaFX application using Scene Builder or code that includes text input, a dropdown, and a button. Display selected values in a label upon button click.

15. Design a JavaFX application with a label, two text fields, and a button. When the user enters two numbers and clicks the button, display their sum using an event handler.

L4: Analysing

1. Differentiate between type conversion and type casting with an example.

2. Identify differences between method overloading and constructor overloading

3. Analyze the role of access modifiers in package-level protection.

4. Compare checked and unchecked exceptions with examples?

5. Compare JavaFX with Swing in terms of GUI design and performance.

6. Explain with examples how Java's data types, type casting, and operators interact during

expression evaluation.

7. Compare single, multilevel, and hierarchical inheritance with examples. What are the implications of using inheritance in software design?

8. Analyze the memory handling in Java with garbage collection. How does object creation and destruction differ from other languages like C++?

9. Compare and analyze abstract classes and interfaces in Java. In what situations would you use one over the other? Give code examples.

10. Analyze the role of Java packages in access protection and modularity. Provide a detailed example of defining and importing custom packages.

11. Create a custom exception class. Analyze the impact of creating user-defined exceptions in large-scale applications.

12. Analyze the architecture of a JavaFX application. Explain how the Scene Graph and layout panes are used to build a responsive GUI.

13. Compare event handling in traditional Java AWT/Swing with JavaFX. How are mouse events handled in JavaFX with code examples?

L5: Evaluating

1. Evaluate the significance of bytecode in Java's platform independence.

2. Evaluate the use of the final keyword for security and immutability in Java.

3. Evaluate the use of access modifiers in packages for building secure APIs.

4. Evaluate the role of event handling in improving GUI interactivity.

5. Evaluate the role of constructors (default and parameterized) in initializing objects. How does constructor overloading enhance object creation flexibility?

6. Evaluate the use of final and static keywords. How do they influence the design and behavior of Java programs?

7. Evaluate the importance of the Java Collection Framework. How do ArrayList, HashSet, and HashMap differ in usage and performance?

8. Evaluate Java's approach to exception handling. How does it improve code reliability compared to traditional error handling mechanisms?

9. Compare TCP (using Socket) and UDP (using DatagramSocket) for client-server communication. Which protocol is preferable in real-time applications and why?

10. Evaluate the role of Java networking classes (Socket, ServerSocket, InetAddress, URL) in building distributed applications.

L6: Create

1. Construct a Java collection-based application (using ArrayList, HashMap, and HashSet) for managing student records with operations like insert, search, and delete.

2. Design and implement a multithreaded ticket booking system that demonstrates thread synchronization to prevent overbooking.

3. Construct a banking application where multiple threads represent clients depositing and withdrawing money. Use synchronization to ensure account balance consistency.

4. Create a JavaFX GUI-based calculator using scene graph layout. Implement features like number input, arithmetic operations, and keyboard/mouse interaction.

5. Design a Client-Server chat application in Java using Socket and Server Socket. Include features like timestamp, sender name, and simple UI for message display.

Chairperson
Board of Studies (CSE)

R24CDPC01	**Introduction of Data Science Using Python**	3 0 0 3
	(Computer science and Engineering (Data Science))	

Course Objectives:

1. To understand the concept of Real Time data representations
2. To learn the various Excel Function to solve Data Science Problems
3. To understand the Mathematical Basics of Data Science
4. To gain Knowledge in data science Tools.
5. To highlight different data science opportunities in industry

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

Course Code	Course Outcomes	Mapping with POs and PSOs							Dok
		PO1	PO2	PO3	PO4	PS01	PS02	PS03	
R24CDPC01.1	Comprehend the Fundamentals and Evolution of Data Science	3	2	3	2	3	3	3	L1,L2
R24CDPC01.2	Use different techniques and tools to prepare and represent the data	3	3	3	3	3	2	3	L2,L3
R24CDPC01.3	Demonstrate Proficiency in Spreadsheet Tools for Data Science	3	3	3	1	3	2	2	L3,L4
R24CDPC01.4	Utilize Data Science Tools for Cleaning, Modeling, and Visualization	3	3	3	3	2	2	-	L4,L5
R24CDPC01.5	Apply Data Analytics Methodologies and Ethical Considerations in Diverse Applications	3	2	2	2	3	3	-	L4,L5

SYLLABUS

UNIT I: Introduction to Data Science **15 Hours**

Introduction to Data Science – History of Data Science – Relationship between Data Warehouse – Big Data and Data Science –Scope of Data Science – Data Science with other fields – Relationship between Data Science and Information Science. Data: Data Types-Structured Vs. Unstructured data – Quantitative vs. Qualitative data-The four Levels of Data-Data Collection-Data Pre-Processing- Roles and responsibilities of data scientist-Data science concerns**.**

Self-Learning Topics: The Evolution of Data Science: From Statistics to Big Data**,** Data Types and Their Role in Data Science **CO's-CO1**

UNIT II: Data Representation **13 Hours**

Data Acquisition: Data Preparation-Data Formats-Data quality - High dimensionality of data-Principal Component Analysis

Data representation: Matrices, Vectors- Libraries of graphs, matrices, and vectors - Data Frames - Lists - Graphs and Networks-Data Models.

Self-Learning Topics: Data Acquisition and Preparation: Foundations of Effective Data Analysis **CO's–CO2**

UNIT-III: Science in Spreadsheet: **14 Hours**

Introduction To Basic Functions of Spreadsheet– Data Collection and Preparation – Importing Data into Spreadsheet from Different Data Sources – Data Cleaning and Preliminary Data Analysis

– Correlation and importance of variables technical requirements- Data Visualization in Spread sheet –Pivot tables and charts- VLOOKUP-Dashboard in spreadsheet.

Self-Learning Topics: Mastering Data Collection, Preparation, and Importing in Spreadsheets.

COs–CO3

UNIT IV: Data Science Tools & Data Visualization   13 Hours

Introduction to Data Science Tools – Data Cleaning Tools – Data Munging and Modelling Tools-Data Visualization Tools-Tools for Data Science- Need for visualization - Elementary visualization Means –box plots, charts, graphs - Advanced tools of visualization

Self-Learning Topics: Exploring Essential Data Science Tools.   **COs–CO4**

UNIT V: Data Analytics, Ethics and Applications   15 Hours

Data analytics – methodologies - CRISP-DM Methodology - SEMMA - Big data life cycle - SMAM - ASUM- DM- Ethical guidelines for Data Scientist - Data Science concerns - Data Privacy and Legal aspects - Rightful use of data science-Applications-Bioinformatics-Education-Engineering-Finance and Economy gaming.

Self-Learning Topics: Data Security   **COs–CO5**

Board of Studies: Computer Science and Engineering

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

Approved in ACM No: 02

Expert Talk (To be delivered by SMEs from Industries)

	COs	POs / PSOs
1. CRISP-DM Methodology	CO5	PO1,PO2,PO3,PO4,PSO1,PSO2

Text Books:

1. Chirag Shah, "A Hand s-on Introduction to Data Science", Cambridge University Press, 2020.
2. Sinan Ozdemir, "Principles of Data Science", Packt Publication, 2016. 3. Julio Cesar Rodriguez Martino, "Hands-on Machine Learning with Microsoft Excel", Packt Publications, 2019.

Reference Books:

1. Hector Guerrero, "Excel Data Analysis: Modelling and Simulation" Springer International Publishing, 2nd Edition, 2019.
2. Paul Curzon, Peter W McOwan, "The Power of Computational Thinking", World Scientific Publishing, 2017.
3. Steven S Skiena, "Data Science Design Manual", Spring International Publication, 2017.
4. Rajendra Akekar, Priti Srinivas Sajja, "Intelligence Techniques for Data Science", Spring International Publication, 2016.
5. Longbing Cao, "Data Science Thinking: The Next Scientific, Technological and economical revolution", Spring International Publications, 2018.

Web References:

1. https://www.coursera.org/learn/excel-data-analysis
2. **https://www.tutorialspoint.com/learn/excel_data_analysis/index.html**

Internal Assessment Pattern:

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	35	-
L2	30	-
L3	25	25
L4	10	35
L5	--	40
TOTAL (%)	**100**	**100**

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. What is the relationship between Data Warehouse, Big Data, and Data Science?
2. Define structured and unstructured data with examples.
3. What are the four levels of data in Data Science?
4. What is Principal Component Analysis (PCA), and why is it used in Data Science?
5. Name the common tools used for data cleaning and data visualization in Data Science.

L2: Understand

1. How does Data Science intersect with fields such as bioinformatics, engineering, and finance?
2. Explain the difference between quantitative and qualitative data.
3. Describe the process of data preprocessing and its importance in the data science lifecycle.
4. How does the use of data representation tools (such as matrices, vectors, and data frames) impact data analysis?
5. How do the CRISP-DM and SEMMA methodologies differ in their approach to data analytics?

L3: Apply

1. How would you apply Principal Component Analysis (PCA) to reduce the dimensionality of a dataset?
2. How would you use a pivot table in a spreadsheet to summarize sales data across different regions?
3. What steps would you follow to clean and prepare data from multiple sources for analysis in a spreadsheet?
4. How would you apply data visualization techniques, such as box plots or bar charts, to convey insights from data in a presentation?
5. How would you implement data privacy and ethical considerations when working with sensitive customer data in a data science project?

L4: Analyze

1. Analyze the relationship between structured and unstructured data and how they impact data science workflows.
2. Break down the stages of the CRISP-DM methodology and explain how each contributes to a successful data science project.

3. How would you analyze the effectiveness of using advanced data visualization tools (like Tableau or Power BI) versus basic tools (like Excel)?
4. Analyze the challenges involved in handling high-dimensional data and how PCA helps to address these issues.
5. How would you assess the role of data acquisition and preparation in ensuring the quality of data for analysis?

L5: Evaluating

1. Evaluate the importance of understanding both structured and unstructured data when working on a data science project.
2. How would you assess the value of using dimensionality reduction techniques, such as PCA, in improving machine learning model performance?
3. Evaluate the ethical guidelines a data scientist should follow when handling personal or sensitive data.
4. How would you evaluate the usefulness of a data model or representation method (e.g., matrices vs. data frames) in a specific data science project?
5. Evaluate the significance of data science applications in industries like finance, bioinformatics, and gaming. Which one shows the most potential for future growth?

Chairperson
Board of Studies (CSE)

R24CMPC02 **Computer Networks** **3 0 0 3**
(Common to CSE (DS), CSE (AI&ML))

Course Objectives:

1. Understand the basics of computer networks and protocol models.

2. Learn data link layer concepts and media access techniques.

3. Explore IP addressing, routing, and network layer protocols.

4. Study transport layer protocols and their services.

5. Get familiar with common application layer protocols and their uses.

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	PS02	PS03	DOK
R24CMPC02.1	Understand the basic layers and its functions in computer networks.	3	3	3	1	3	1	3	2	-	L1,L2
R24CMPC02.2	Demonstrate the performance of a network	3	3	2	-	-	-	2	1	-	L1,L2
R24CMPC02.3	Explain the basics of how data lows from one node to another.	3	3	3	-	1	1	3	1	-	L2,L3
R24CMPC02.4	Analyze and design routing algorithms	3	3	3	-	-	-	2	2	-	L3,L4
R24CMPC02.5	Describe the working of various transport and application layer protocols	3	3	3	-	1	1	3	2	-	L4,L5

SYLLABUS

UNIT I: INTRODUCTION AND PHYSICAL LAYER 12 Hours

Networks – Types – Protocol Layering –Network Topologies - TCP/IP Protocol suite – OSI Model – Physical Layer: Performance – Transmission media – Switching – Circuits witched Networks – Packet Switching.

Self-Learning Topic: The OSI Reference Model- the TCP/IP Reference Model **COs-CO1**

UNIT II: DATA LINK LAYER & MEDIA ACCESS 16 Hours

Introduction – Data Link Layer - Addressing – DLC Services -Design issues, – Data-Link Layer Protocols –Sliding window protocol: One bit, Go back N, Selective repeat-Stop and wait protocol.HDLC – PPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs – Introduction – IEEE 802.11.

Self-Learning Topics: Error detection and correction codes, CRC, Checksum: idea, one's complement internet checksum. **COs-CO2**

UNIT III: NETWORK LAYER   14 Hours

Network Layer Services – Packet switching – Performance – IPV4 Addresses – Forwarding of IP Packets - Network Layer Protocols: IP, ICMP v4 – IPV6 Addressing – IPV6 Protocol.

The Network Layer Design Issues:

Implementation of Connectionless Service-Implementation of Connection Oriented Service Traffic Control Algorithm-Leaky bucket & Token bucket **COs-CO3**
Self-Learning Topics: Multiplexing, Reservation, Polling, Token Passing, Channelization

UNIT- IV: TRANSPORT LAYER   16 Hours

Introduction – User datagram-UDP services-UDP applications**-**Transport Layer Protocols – TCP services– Port Numbers – User Datagram protocol – Transmission Control Protocol – SCTP.TCP-flow control-Error control, Congestion control in TCP.

Self-Learning Topics: Routing Algorithms-The Optimality principle-Shortest path, Flooding, Distance vector, Fragmentation **COs-CO4**

UNIT V: APPLICATION LAYER   12 Hours

Electronic mail-Architecture-WWW and HTTP – FTP – Email –Telnet –SSH – SNMP, DNS messages- Registrars-security of DNS Name Server

Self-Learning Topics: Resolution-Caching- email security **COs-CO5**

Board of Studies: Computer Science and Engineering
Approved in BOS No: 02, 9th May, 2025
Approved in ACM No: 02

Expert Talk (To be delivered by SMEs from Industrie

	COs	POs / PSOs
1. Traffic Control Algorithm	CO3	PO1,PO2,PO3,PSO1,PSO2

Text Books:

1   Behrouz A. Forouzan, "Data communications and networking with TCP/IP protocol suite", Sixth Edition, McGraw Hill, cop. 2022.

2   Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.

Reference Books:

1   William Stallings, "Data and Computer Communications", Tenth Edition, Pearson Education, 2014.

2   Nader F. Mir, "Computer and Communication Networks", Second Edition Prentice Hall, 2014.

3   Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill Publisher, 2011.

4   James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

5   Andrew S. Tanenbaum, David J. Wetherall,"Computer Networks ", 5th edition, Pearson Education,2011

Web References:

1. https://swayam.gov.in/nd2_cec19_cs07/preview
2. https://nptel.ac.in/courses/106105081/
3. https://www.isi.edu/nsnam/ns/

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	40	-
L2	30	-
L3	30	35
L4	-	25
L5	-	40
TOTAL(%)	**100**	**100**

Sample Short and Long Answers questions of Various Cognitive Levels
L1: Remember

1   Define protocol and give examples.

2   What is a MAC address?

3   What is the role of IP in network communication?

4   What is a port number in networking?

5   List any four application layer protocols.

L2: Understand

1   Explain the concept of protocol layering with an example.

2   Describe the purpose of the data link layer in communication.

3   Explain the difference between IPv4 and IPv6 addresses.

4   Explain the flow control mechanism in TCP.

5   Describe the architecture of Email.

L3: Apply

1   Identify a suitable network topology for a small office and justify it.

2   Apply the concept of Go-Back-N protocol in case of lost frames.

3   How would you assign IP addresses to a class C network with 5 subnets?

4   In which situations would you use UDP over TCP? Give examples.

5   How would you transfer a large file securely using FTP or SSH?

L4: Analyze

1   Differentiate between circuit switching and packet switching.

2   Compare Stop-and-Wait and Sliding Window protocols.

3   Analyze how packet forwarding differs from routing.

4   Analyze how congestion control in TCP avoids network overload.

5   Compare HTTP and FTP in terms of data transmission.

L5: Evaluating

1   Compare TCP/IP model and OSI model – which is more practical and why?

2   Which is better for a noisy channel: Selective Repeat or Go-Back-N? Justify.

3   Evaluate the efficiency of the leaky bucket vs. token bucket algorithm in traffic shaping.

4   Compare TCP, UDP, and SCTP – which would you recommend for video streaming and why?

5   How secure is DNS? What mechanisms improve its security?

Chairperson
Board of Studies (CSE)

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)

R24CSPC06   **Object Oriented Programming using JAVA Lab**   **0   0   3   1.5**

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

Course Objectives:

1. To develop skills to design and analyze the applications with respect to java programming.

2. To strengthen the ability to identify and apply the suitable object oriented concept for the given real world problem.

Course Outcomes

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

Course Code	Course Outcomes	Mapping with POs and PSOs						Dok
		PO1	**PO2**	**PO3**	**PO5**	**PS01**	**PS02**	
R24CSPC06.1	Write basic Java programs using arrays, control structures, and demonstrate the use of classes and objects.	3	2	2	1	3	2	L1, L3
R24CSPC06.2	Apply object-oriented concepts such as inheritance and packages, and implement applications using built-in and user-defined packages.	2	2	3	3	2	3	L3, L4
R24CSPC06. 3	Develop Java applications with exception handling, multithreading, graphical user interfaces, and basic networking.	2	2	3	3	1	3	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:

1. a) Implement the following programs using command line arguments and Scanner class

     i) Accept two strings from the user and print it on console with concatenation of "and" in the middle of the strings.   **CO's-CO1**

     ii) To find the perimeter and area of a circle given a value of radius.   **CO's-CO1**

     b) Write a program using classes and objects in java?   **CO's-CO1**

2. a) Write a program to call default constructor first and then any other constructor in the class?   **CO's-CO1**

     b) Write a program that accepts an array of integers and print those which are both odd and prime. If no such element in that array print "Not found".   **CO's-CO1**

c) Write a program to accept contents into an Integer Array and print the frequency of each number in the order of their number of occurrences. **CO's-CO1**

d) Write a program that accepts an 'm x n' double dimension array, where 'm' represents financial years and 'n' represents Ids of the items sold. Each element in the array represents number of items sold in a particular year. Identify the year and id of the item which has more demand. **CO's-CO2**

3. a) Create a class Box that uses a parameterized constructor to initialize the dimensions of abox. The dimensions of the Box are width, height, depth. The class should have a method that can return the volume of the box. Create an object of the Box class and test the functionalities. **CO's-CO2**

   b) Create a new class called Calculator with the following methods:

   A static method called power Int(int num1,int num2) This method should return num1 to the power num2.

   A static method called power Double (double num1,double num2). This method should returnnum1 to the power num2.

   Invoke both the methods and test the functionality. Also count the number of objects created. **CO's-CO2**

4. a) Accept a String and a number 'n' from user. Divide the given string into substrings each of size 'n' and sort them lexicographically. **CO's-CO1**

   b) Accept an array of strings and display the number of vowels and consonants occurred in each string. **CO's-CO1**

   c) Accept two strings from the user and determine if the strings are anagrams or not.

   CO's-CO1

5. a) Create a multilevel inheritance for classes vehicle, brand and cost. The vehicle class determines the type of vehicle which is inherited by the class brand which determines the brand of the vehicle. Brand class is inherited by cost class, which tells about the cost of the vehicle. Create another class which calls the constructor of cost class and method that displays the total vehicle information from the attributes available in the super classes.

   CO's-CO2

   b) Create an inheritance hierarchy of Figure_3D, Cylinder, Cone, Sphere etc. In the base class provides methods that are common to all Figure_3Ds and override these in the derived classes to perform different behaviors, depending on the specific type ofFigure_3D. Create an array of Figure_3D, fill it with different specific types ofFigure_3Ds and call your base class methods. **CO's-CO2**

6. a) Design a package to contain the class Student that contains data members such as name,

roll number and another package contains the interface Sports which contains some sports information. Import these two packages in a package called Report which process both Student and Sport and give the report. **CO's-CO2**

b) Write a program that accepts values of different data types and convert them to corresponding wrapper classes and display using the vector. **CO's-CO1**

7. a) Write a program to generate a set of random numbers between two numbers x1 and x2, and x1>0. **CO's-CO1**

b) Write a program to implement a new Array List class. It should contain add(), get(),remove(), size() methods. Use dynamic array logic. **CO's-CO2**

c) Create an employee class containing at least 3 details along with Id, setters, and getters. Insert the employee objects dynamically key as employee id and value as its corresponding object into a HashMap. Perform Id based search operation on the HashMap. **CO's-CO2**

8. a) Write a program that reads file name from the user then displays information about that file, also read the contents from the file in byte stream to count the number of alphabets, numeric values, and special symbols. Write these statistics into another file using byte streams **CO's-CO3**

b) Write a program that reads a CSV file containing a super market data containing product ID, Name, Cost and Quantity of sales and calculate the total revenue of the supermarket also sort the products in the order of their demand. **CO's-CO3**

c) Write a program that reads a text file containing some technical content and identify thetechnical terms and sort them alphabetically. **CO's-CO3**

Note: use a file containing stop words (general English and Grammar terms as many as possible)

9. a) Write a program that reads two numbers from the user to perform integer division into Num1 and Num2 variables. The division of Num1 and Num2 is displayed if they are integers. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception.

CO's-CO3

b) Create a user defined exception. **CO's-CO3**

10. a) Write a program that creates 3 threads by extending the Thread class. First thread displays "Good Morning" every 1 sec, the second thread displays "Hello" every 2seconds and the third displays Welcome" every 3 seconds. (Repeat the same by implementing Runnable). **CO's-CO3**

b) Write a program to illustrate Thread synchronization. **CO's-CO3**

11. a) Create a JApplet that displays a message which is scrolling from left to right. **CO's-CO3**

b) Write a program that displays a sample registration page using Swing controls use appropriate layout managers. **CO's-CO3**

c) Write a program for handling mouse events with adapter classes. **CO's-CO3**

12. a) Create an interface containing 3 radio buttons named line, rectangle, and oval. Based on the radio button selected, allow user to draw lines, rectangles, or ovals as per the locations selected by the user. **CO's-CO3**

b) Write a program to create a Table inside a JFrame. **CO's-CO3**

c) Create an interface that illustrates JFile Chooser class and read CSV file containing employee data of various departments and display the records department wise on the interface. **CO's-CO3**

13. a) Check all the fields filled or not, display success dialogue if all fields are filled with the help of Action Listener for program **CO's-CO3**

b) Display respective error dialogue if a field is empty. **CO's-CO3**

14. Write a program to create three JSliders where each represents colors RED, GREEN and BLUE. Each slider has a value from 0 to 255. The background color of the applet is set based on the values retrieved from each slider to form a color using the color class constructor. On sliding any slider, the background color of the applet changes. **CO's-CO3**

15. Complete the code to develop an ADVANCED CALCULATOR that emulates all the functions of the GUI Calculator as shown in the image. **CO's-CO3**

16. Write a program that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result, and then sends the result back to the client. The client displays the result on the console.

For ex: The data sent from the client is the radius of a circle, and the result produced by the server is the area of the circle. **CO's-CO3**

Case Studies:

1. Grading a Multiple-choice Test for students **CO's-CO1**

2. Create a Person class containing basic details like Name, Gender, Mobile and Email. Based on that create and manage the objects that are related to student and employee Classes

CO's-CO2

3. Create a package called Banking containing classes and interfaces related to various banking operations such as withdrawal, deposits, loans and insurance etc. Create two classes related to any two specific banks that uses this package. **CO's-CO2**

4. Write a program that implements simple chat application using GUI. **CO's-CO3**

Textbooks:

1. Herbert Schildt, Java The complete reference, 11th Edition, McGrawHill, 2019

2. Timothy budd, An introduction to object-oriented programming, 3rd Edition, Pearson Education, 2009.

Reference Books:

1. Cay S. Horstmann, Core Java Volume I–Fundamentals, 11th Edition, Pearson 2019

2. Y. Daniel Liang Introduction to Java Programming Comprehensive Version, 10thEdition, Pearson, 2015.

3. Bruce Eckel, Thinking in Java, 4th Edition, Prentice Hall, 2006

Web References:

1. https://onlinecourses.nptel.ac.in/noc19_cs84/preview

Chairperson
Board of Studies (CSE)

R24CDPC02   **DATA SCIENCE USING PYTHON Lab**   **0   0   3   1.5**
(Computer science and Engineering (Data Science))

Course Objectives:

The Course Aims To Give Students Hands – on Experience and train them to learn introduction of data science using python

To Understand Core Scientific Principles.

1. To Develop Python Programming Skills for Science:

2. To Solve Scientific Problems Using Computational Methods

3. Data Analysis and Visualization

4. Integrate Python with Scientific Simulations

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

Course Code	Course Outcomes	Mapping with POs and PSOs							Dok
		PO1	PO2	PO3	PO5	PSO 1	PSO 2	PSO 3	
R24CDPC01.1	Apply foundational Python programming and libraries for data analysis	3	2	3	2	3	-	3	L1, L2, L3
R24CDPC01.2	Perform data visualization, feature engineering, and exploratory data analysis (EDA)	3	3	3	-	3	2	-	L4, L3
R24CDPC01.3	Build, evaluate, and apply machine learning models for real-world datasets	3	3	3	2	2	2	-	L5, L6

Board of Studies: Computer Science and Engineering

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

Approved in ACM No: 02

Developing the following programs

Week 1: Introduction to Python for Data Science
1. Install Anaconda / Jupyter Notebook.
2. Explore Python Basics: Variables, Data Types, Loops, and Conditional Statements.
3. 3. Introduction to `NumPy`, `Pandas`, and their basic operations.   **CO's-CO1**

Week 2: Working with Pandas and NumPy

1. Creating and manipulating `Series` and `DataFrames`.
2. Reading CSV/Excel files using `pandas.read_csv()` and `read_excel()`.
3. Basic statistical operations: `mean()`, `median()`, `describe()`.   **CO's-CO1**

Week 3: Data Cleaning Techniques

1. Handling missing values: `isnull()`, `dropna()`, `fillna()`.
2. Detecting duplicates and outliers.
3. String operations and data formatting with Pandas.   **CO's-CO1**

Week 4: Data Manipulation

1. Filtering, sorting, and slicing DataFrames.
2. Grouping and aggregation (`groupby()`, `agg()`).
3. Merging and joining multiple DataFrames.   **CO's-CO1**

Week 5: Data Visualization with Matplotlib and Seaborn

1. Creating Line, Bar, Pie, and Histogram plots using `Matplotlib`.
2. Using `Seaborn` for advanced plots: scatter, box, violin, and pair plots.
3. Customizing plots: titles, labels, legends, and grid.   **CO's-CO1**

Week 6: Exploratory Data Analysis (EDA)

1. Perform EDA on the Iris dataset or Titanic dataset.
2. Compute correlation and visualize using `heatmap`.
3. Identify important features for predictive modeling.   **CO's-CO1**

Week 7: Data Import from External Sources

1. Read data from APIs using `requests`.
2. Load JSON or live data (e.g., weather, crypto currency into Pandas.
3. Clean and visualize imported data.   **CO's-CO2**

Week 8: Introduction to Data Modeling
1. Build a simple Linear Regression model using `sklearn`.
2. Evaluate model using MAE, RMSE, and R^2 score.
3. Split data using `train_test_split`.   **CO's-CO2**

Week 9: Classification Techniques
1. 25. Implement Logistic Regression on a real dataset.
2. 26. Use Confusion Matrix and ROC Curve to evaluate performance.
3. 27. Apply Decision Trees or KNN Classifier.   **CO's-CO2**

Week 10: Clustering and Unsupervised Learning
1. Perform K-Means clustering on a dataset.
2. Use `elbow method` to find optimal clusters.
3. Visualize clusters using 2D plots.   **CO's-CO2**

Week 11: Working with Time-Series Data
1. Parse time-series data using `pd.to_datetime()`.
2. Perform resampling and rolling statistics.
3. Plot trends and seasonal components.   **CO's-CO2**

Week 12: Feature Engineering
1. Encode categorical variables using OneHotEncoding and LabelEncoding.
2. Perform feature scaling (Standard Scaler, MinMaxScaler).
3. Create new features from existing ones (feature extraction).   **CO's-CO2**

Week 13: Introduction to Dashboards with Streamlit
1. Create a simple dashboard using Streamlit.
2. Add data filters and charts (e.g., line plot, bar chart).
3. Deploy dashboard locally.   **CO's-CO2**

Week 14: Real-Time Data Analysis Project
1. Choose a real-time dataset (e.g., COVID-19, stock data).
2. Perform EDA, cleaning, and visualization. **CO's-CO3**
3. Build a basic model (regression/classification) and interpret results.   **CO's-CO3**

Week 15: Capstone Mini Project
1. Students work in pairs or groups.
2. Choose a dataset, perform full workflow: cleaning → EDA → modeling → evaluation.
3. Present results with visualizations and insights.   **CO's-CO3**

Week 16: Lab Assessment / Viva
1. Final Lab Assessment (one hands-on problem).
2. Viva on concepts, techniques, and Python code.
3. Submission of lab report/documentation of all exercises.   **CO's-CO3**

Text Books:
1. "Data Science for Business" by Foster Provost and Tom Fawcett
2. "Python for Data Analysis" by Wes McKinney
3. "Practical Statistics for Data Scientists" by Peter Bruce and Andrew Bruce
4. "Data Visualization with Python and JavaScript" by Kyran Dale

Reference Books:
1. "Excel 2021 Bible" by John Walkenbach
2. "Data Science for Business" by Foster Provost and Tom Fawcett

Web References:
1. https://www.analyticsvidhya.com/blog/2020/04/the-ultimate-numpy-tutorial-for-data-sciencebeginners/
2. https://www.analyticsvidhya.com/blog/2021/07/data-science-with-pandas-2-minutes-guide-to-keyconcepts/
3. https://www.analyticsvidhya.com/blog/2020/04/how-to-read-common-file-formats-python/
4. https://www.analyticsvidhya.com/blog/2020/02/beginner-guide-matplotlib-data-visualizationexploration-python/

Chairperson
Board of Studies (CSE)

| R24CDSC01 | **Power BI Lab** | 0 | 1 | 2 | 2 |

(Common to CSE (DS) & CSE (AI&ML))

Course Objectives:

1. Compare Power BI Desktop and Power BI Service (create a comparison table)
2. Import the data using both Import and Direct Query modes
3. Use mobile layout view in Power BI Desktop to optimize design

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

Course Code	Course Outcomes	Mapping with POs and PSOs							Dok
		PO 1	PO 2	PO 3	PO 4	PS O1	PS O2	PS O3	
R24CDSC01.1	**Apply end-to-end Power BI skills** to connect, transform, and model data from various sources, and develop interactive reports and dashboards for data-driven decision-making	3	3	-	-	3	2	2	L1,L 2
R24CDSC01.2	**Utilize Power Query and DAX** to perform data transformation, aggregation, filtering, and time intelligence operations, enabling insightful and customized visual analytics.	2	3	3	-	2	3	3	L3,L 4
R24CDSC01.3	**Deploy and manage reports securely** using Power BI Service and Mobile platforms, incorporating features like Row-Level Security (RLS), scheduled refreshes, and responsive mobile views for effective sharing and accessibility.	3	3	-	3	3	2	2	L5,L 6

Board of Studies: Computer Science and Engineering
Approved in BOS No: 02,9th May, 2025
Approved in ACM No: 02

Developing the following programs

Week 1: Introduction to Power BI
1. Install Power BI Desktop on your system
2. Explore the Power BI interface and identify key sections
3. Compare Power BI Desktop and Power BI Service (create a comparison table)
4. Create a one-slide PowerPoint/report explaining Power BI architecture and components
5. List 3 real-world use cases of Power BI   **CO's-CO1**

Week 2: Getting Started with Power BI Desktop
6. Connect to an Excel dataset (e.g., Sales data)
7. Import the data using both Import and DirectQuery modes

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8. Create a report with bar chart, pie chart, and a basic table
9. Arrange visuals on the report canvas effectively **CO's-CO1**

Week 3 and Week 4: Data Loading and Transformation with Power Query Editor

10. Connect to Excel and Web data sources
11. Remove null values, split columns, and filter unnecessary rows
12. Create a custom column using M language
13. Append two regional sales data queries and merge with product info **CO's-CO1**

Week 5 and Week 6: Data Modeling

14. Create a Star Schema with one Fact and two Dimension tables
15. Define relationships between tables
16. Create one calculated column and one measure
17. Load a date table and mark it as the official date table
18. Optimize data model by removing unused columns **CO's-CO2**

Week 7 and Week 8: DAX (Data Analysis Expressions)

19. Create calculated columns and measures using SUM, AVERAGE, COUNTROWS
20. Implement IF and SWITCH functions for conditional logic
21. Use YTD, MTD, and DATEADD for time intelligence
22. Create conditional aggregations using CALCULATE and FILTER **CO's-CO2**

Week 9 and Week 10: Data Visualization and Reporting

23. Create a dashboard with bar, line, pie chart, and map
24. Add slicers and filters to make visuals interactive
25. Create a tooltip and set up a drill-through page
26. Use bookmarks to toggle between dashboard views **CO's-CO2**

Week 11 and Week 12: Power BI Service (Cloud)

27. Publish a report to Power BI Service
28. Create a dashboard using visuals from the report
29. Share the dashboard with your instructor
30. Explore workspaces and simulate scheduling a data refresh **CO's-CO3**

Week 13 and Week 14: Row-Level Security (RLS)

31. Define roles in Power BI Desktop for Region Manager and Department Head
32. Apply row-level filters for each role
33. Use 'View as Role' to test RLS setup
34. Publish the report and test RLS in Power BI Service **CO's-CO3**

Week 15 and Week 16: Power BI Mobile

35. Install Power BI Mobile App on your phone
36. Access a shared dashboard and interact with slicers/filters
37. Use mobile layout view in Power BI Desktop to optimize design
38. Compare experience of desktop vs mobile dashboards   **CO's-CO3**

Text Books:

1. Microsoft Power BI Complete Reference: Bring your data to life with the powerful features of Microsoft Power BI Kindle Edition by Devin Knight (Author), Brian Knight (Author), Mitchell Pearson (Author), & 2 More Format: Kindle Edition
2. Microsoft Power BI Quick Start Guide: Build dashboards and visualizations to make your data come to life Kindle Edition by Devin Knight (Author), Brian Knight (Author), Mitchell Pearson (Author), & 1 More Format: Kindle Edition
3. Knight's Microsoft Business Intelligence 24-Hour Trainer: Leveraging Microsoft SQL Server Integration, Analysis, and Reporting Services with Excel and SharePoint 1st Edition, Kindle Edition by Brian Knight (Author), Devin Knight (Author), Adam Jorgensen (Author), & 2 More Format: Kindle Edition

Reference Books:

1. Microsoft Power BI Complete Reference: Bring your data to life with the powerful features of Microsoft Power BI Kindle Edition by Devin Knight (Author), Brian Knight (Author), Mitchell Pearson (Author), & 2 More Format: Kindle Edition
2. Microsoft Power BI Quick Start Guide: Build dashboards and visualizations to make your data come to life Kindle Edition by Devin Knight (Author), Brian Knight (Author), Mitchell Pearson (Author), & 1 More Format: Kindle Edition
3. Knight's Microsoft Business Intelligence 24-Hour Trainer: Leveraging Microsoft SQL Server Integration, Analysis, and Reporting Services with Excel and SharePoint 1st Edition, Kindle Edition by Brian Knight (Author), Devin Knight (Author), Adam Jorgensen (Author), & 2 More Format: Kindle Edition

Web references:

1. **https://learn.microsoft.com/en-us/power-bi/**
2. **https://learn.microsoft.com/en-us/power-bi/connect-data/desktop-data-sources**
3. **https://learn.microsoft.com/en-us/power-bi/connect-data/service-get-data**
4. **https://www.mssqltips.com/sqlservertip/8088/power-bi-quick-reference-guide/**
5. **https://www.sqlbi.com/ref/power-bi-visuals-reference/**

Chairperson
Board of Studies (CSE-DS)

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)

R24BS11 **PROBABILITY & STATISTICS** 3 0 0 3
(Common to CSE, CSE (AI&ML), CSE (DS))

Course Objectives:
1. Understand the concepts of descriptive statistics and application of statistical measures.
2. Identify discrete and continuous random variables, apply probability distributions.
3. Understand the concepts of sampling distribution, estimation and construction of confidence interval.
4. Understand how to apply various statistical tests.
5. Understand how to find nature as well as the amount of relationship between the given variables.

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

Course Code	Course Outcomes	Mapping with POs			Dok
		PO1	PO2	PO12	
R24BS11.1	Acquire knowledge in finding the analysis of the data quantitatively or categorically and various statistical elementary tools	2	2	1	L1,L2
R24BS11.2	Develop skills in designing mathematical models involving probability, random variables and the critical thinking in the theory of probability and its applications in real life problems.	2	2	1	L2,L3
R24BS11.3	Apply the theoretical probability distributions like binomial, Poisson, and Normal in the relevant application areas.	2	2	1	L1,L2,L3
R24BS11.4	Analyze to test various hypotheses included in theory and types of errors for large samples.	2	2	1	L4
R24BS11.5	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: Descriptive statistics **10 hours**

Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Measures of Central tendency, Measures of Variability (spread or variance) Skewness, Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, method of least squares, regression lines. **COs-CO1**

Self-Learning Topic: Positive correlations are the relationship between the heights and weights of the individual persons.

UNIT II: Probability Concepts **10 hours**

Probability, probability axioms, addition law and multiplicative law of probability, conditional Probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation. **COs-CO2**

Self- Learning Topic: Analyzing patterns in health data, calculate the probability of certain health outcomes for individuals.

UNIT III: Probability distributions **10 hours**

Probability distributions: Binomial, Poisson, Normal and uniform -their properties, Chebyshev's inequality, Central Limit Theorem (without proof).   **COs-CO3**

Self- Learning Topic: Calculate the probability mass function and probability density function.

UNIT IV: Estimation and Testing of Hypothesis, Large sample tests   **12 hours**

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems of fit.   **COs-CO4**

Self- Learning Topic: List the conditions when we can use the normal approximation for a sample mean and a proportion.

UNIT V: Small sample tests: **8 hours**

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F- test), chi-square test for goodness of fit, chi-square test for independence of attributes.
                                                                  COs-CO5

Self- Learning Topic: Average online price of an item is less than the average price in retail stores

Textbooks

1. Miller and Friends, Probability and Statistics forEngineers,7/e,Pearson,2008.
2. S.C.GuptaandV.K.Kapoor,FundamentalsofMathematicalStatistics,11/e,SultanChand& Sons Publications, 2012.

Reference Books

1. B.V.Ramana , Highier Engineering Mathematics, Mc Graw Hill Education. Scientists, 8th Edition, Pearson 2007.
2. S.Ross,aFirstCourseinProbability,PearsonEducationIndia,2002.
3. W.Feller,anIntroductiontoProbabilityTheoryanditsApplications,1/e,Wiley,1968.

Online Learning Resources
1. https://onlinecourses.nptel.ac.in/noc21_ma74/preview
2. https://onlinecourses.nptel.ac.in/noc22_mg31/preview

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) Describe primary and secondary data with an example each. (L1)
2) Distinguish between positive and negative Skewness.. (L4)
3) What are the measures of variability and explain them. (L2)
4) Fit a second degree polynomial to the following data by the method of least squares. (L3)

X	0	1	2	3	4
Y	1	1.8	1.3	2.5	6.3

UNIT 2

1) List the properties of discrete and continuous random variables. (L1)
2) State and prove Baye's theorem. (L2)
3) A sample of 3 items is selected at random from a box containing 10 items of which 4 are defective. Find the excepted number of defective items. (L4)

UNIT 3

1) Define: (i) Binomial (ii) Poission (iii) Uniform and (iv) Normal distributions. (L1)

2) State and prove Chebyshevs Inequality. (L2)

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
   (i) The test of significance for single mean for the test of significance for single proportion and
   (ii) difference of means (L3)

4) 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. (L 5)

Chairperson
Board of Studies (Mathematics)

R24CSPC08	**Formal Languages and Automata Theory**	3 0 0 3

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

Course Objectives:

The course is designed with the objective to:

- Introduce languages, grammars, and computational models

- Understand the foundational principles of Automata Theory & Analyze and design Finite Automata (FA)

- Formulate Regular Expressions and Grammars and demonstrate their equivalence to Finite Automata

- Discussing regular expressions and regular languages

- Construct Context Free Grammars (CFG) to describe context-free languages, and simplify and normalize these grammars into CNF and GNF.

- Design and analyze Pushdown Automata (PDA) to recognize CFL'S and understand their relationship with CFG

- Explain the capabilities and limitations of Turing Machines & Demonstrate decidability and un decidability for NP Hard problems

Course out Comes

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

Course Code	Course Outcomes	Mapping with POs and PSOs						Dok
		PO 1	PO 2	PO 3	PO 4	PS0 1	PS0 2	
R24CSPC08.1	Comprehendible to understand the concept of abstract machine and their ability to recognize languages based on their computational power and the types of languages they can process	3	3	2	--	3	2	L1, L2
R24CSPC08.2	Understand regular expressions and finite automata	3	3	3	--	3	2	L1, L2
R24CSPC08.3	Develop context free grammars for formal languages.	3	3	3	--	2	3	L1, L3
R24CSPC08.4	Design pushdown automata for context free grammars	3	3	3	--	3	2	L4,L5
R24CSPC08.5	Design Turing machine and Formulate decidability and un-decidability problems and P&NP problems	3	3	3	2	3	3	L5,L6

SYLLABUS

UNIT-I: Finite Automata: **14 hours**
Need of Automata theory, Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with Є-Transitions, Minimization of Finite Automata, Finite Automata with output-Mealy and Moore Machines, Applications and Limitation of Finite Automata.

Self Learning Concepts: Research how DFAs/NFAs are used in lexical analyzer, Network protocol Design & Control system.   **CO's–CO1**

UNIT-II: Regular Expressions   **12 hours**
Regular Expressions, Regular Sets, Identity Rules, Equivalence of two RE**,** Inter Conversion, Equivalence between FA and RE, Pumping Lemma of Regular Sets, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Right and Left Linear Regular Grammars, Equivalence between RG and FA, Inter Conversion.   **CO's–CO2**

Self Learning Concepts: Closure properties of Regular set

UNIT-III: Context Free Grammar   **10 hours**
Formal Languages, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars, Normal Forms-CNF and GNF, Pumping Lemma CFG**,** Applications of Context Free Grammars.   **COs–CO3**

Self Learning Concepts: Elimination of left recursion & left factoring

UNIT-IV: **Pushdown Automata**   **12 hours**
Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description, Language Acceptance of Pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars, Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.
                                                                                     CO's–CO4
Self Learning Concepts: Investigate practical applications of PDAs in parsing such as in compiler & syntax analysis.

UNIT-V: Turning Machine   **14 hours**
Turning Machine: Definition, Model, Representation of TMs-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language Acceptance of a TM, Design of TMs, Types of TMs**,** Universal TM, Decidable and Un-decidable Problems, Halting Problem of TMs, Post's Correspondence Problem, Modified PCP, Classes of P and NP, NP-Hard and NP-Complete Problems.   **CO's–CO5**

Self Learning Concepts: Church's Thesis for turning machine.

Board of Studies: Computer Science and Engineering

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

Approved in ACM No: 02

Text Books:

1) Introduction to Automata Theory, Languages and Computation, J. E. Hopcroft, R. Motwani and J. D. Ullman, 3rdEdition, Pearson, 2008.

2) Theory of Computer Science-Automata, Languages and Computation, K. L. P. Mishra and N.Chandrasekharan, 3rdEdition, PHI, 2007.

Reference Books:

1) Elements of Theory of Computation, Lewis H.P. & Papadimition C.H., Pearson /PHI

2) Theory of Computation, V. Kulkarni, Oxford University Press, 2013.

3) Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014

Web References:

1) https://nptel.ac.in/courses/106103070

2) https://nptel.ac.in/courses/106106049

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	35%	--
L2	40%	--
L3	25%	15%
L4	--	35%
L5	--	35%
L6	--	15%
Total (%)	**100%**	**100%**

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1) What is Automata Theory and why is it needed?

2) What are Mealy and Moore Machines?

3) Define Regular Expressions and Regular Sets.

4) List the Identity Rules for Regular Expressions.

5) Define Chomsky Normal Form (CNF) and Greibach Normal Form (GNF).

6) State the Pumping Lemma for CFG.

7) What is an Instantaneous Description of a PDA?

8) Differentiate between Deterministic and Non-deterministic PDA.

9) Define a Turing Machine..

10) Define Decidable and Undecidable Problems

L2: Understand

1) Describe the differences between a DFA and an NFA.

2) Explain the significance of minimizing Finite Automata.

3) Explain the equivalence of two Regular Expressions.

4) Describe the inter-conversion between Finite Automata and Regular Expressions.

5) Explain how Parse Trees represent the derivation of a string.

6) Describe the steps involved in simplifying Context Free Grammars.

7) Describe the relationship between PDA and Context Free Grammars.

8) Explain the process of converting a CFG to a PDA and vice versa.

9) Describe the different types of Turing Machines.

10) Describe the classes of P and NP.

L3: Apply

1) Design a DFA to accept strings with a specific pattern (e.g., strings containing "ab").

2) Construct a Mealy Machine to perform a specific sequence transformation.

3) Convert a given Finite Automaton to a Regular Expression.

4) Use the Pumping Lemma to prove whether a given set is regular or not.

5) Convert a given CFG to CNF. And Convert a given CFG to GNF.

6) Use the Pumping Lemma to prove whether a language is Context Free or no

7) Design a PDA to accept a given Context Free Language.

8) Convert a given CFG to an equivalent PDA.

9) Design a Turing Machine to perform a specific computation (e.g., addition, subtraction).

10) Represent a Turing Machine using Instantaneous Descriptions.

L4: Analysing

1) Analyze the time and space complexity of DFA vs. NFA.

2) Differentiate between the capabilities and limitations of Finite Automata

3) Analyze the equivalence of different Regular Expressions.

4) Analyze the given grammar and classify it according to Chomsky Hierarchy.

5) Analyze a given grammar and determine if it is ambiguous.

6) Compare the advantages and disadvantages of CNF and GNF

7) Analyze the limitations of Pushdown Automata.

8) Compare the complexity of Deterministic and Non-deterministic PDA.

9) Design a Turing Machine to perform a specific computation (e.g., addition, subtraction).

10) Represent a Turing Machine using Instantaneous Descriptions.

11) Show that a given problem is decidable or undecidable.

L5: Evaluating

1) Evaluate whether a given language can be recognized by a Finite Automaton.

2) Compare different designs of Finite Automata for the same language in terms of efficiency.

3) Justify the need for NFA when DFA can recognize the same language.

4) Evaluate the limitations of Regular Expressions in expressing certain languages.

5) Determine whether a given language can be described by a Regular Expression.

6) Evaluate whether a given language can be generated by a Context Free Grammar.

7) Assess the impact of ambiguity in a grammar.

8) Evaluate whether a given language can be generated by a Context Free Grammar.

9) Assess the impact of ambiguity in a grammar.

10) Evaluate the impact of the Halting Problem on computation.

11) Assess the theoretical limits of computation.

12) Justify the importance of P vs. NP problem.

L6: Creating

1) Design a Context Free Grammar for a given language.

2) Develop a parser for a simple Context Free Grammar.

3) Design a Pushdown Automaton with additional features.

4) Develop an application using PDA for tasks like expression evaluation or syntax checking

Chairperson
Board of Studies (CSE)

| R24CDPC03 | **Exploratory Data Analysis** | 3 | 0 | 0 | 3 |

R24CDPC03   **Exploratory Data Analysis**   **3   0   0   3**
(Computer Science and Engineering (DS))

Course Objectives:

1. This course introduces the methods for data preparation and data understanding.

2. It covers essential exploratory techniques for understanding multivariate data by summarizing it through statistical methods and graphical methods.

3. Supports to summarize the insurers use of predictive analytics, data science and Data Visualization.

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

Course Code	Course Outcomes	Mapping with POs and PSOs							Dok
		PO1	PO2	PO3	PO4	PS01	PS02	PS03	
R24CDPC03.1	Handle missing data in the real-world data sets by choosing appropriate methods.	3	3	1	-	2	3	3	L1,L2,L3
R24CDPC03.2	Summarize the data using basic statistics. Visualize the data using basic graphs and plots.	3	3	1	-	2	3	3	L2,L3
R24CDPC03.3	Identify the outliers if any in the data set.	2	3	-	1	3	2	3	L2,L3
R24CDPC03.4	Choose appropriate feature selection and dimensionality reduction.	2	3	-	2	2	3	3	L2,L3
R24CDPC03.5	Handle techniques for multi-dimensional data.	1	2	-	1	2	3	3	L4,L5

SYLLABUS

UNIT I: Introduction to Exploratory Data Analysis: **15 Hours**

Data Analytics lifecycle, Exploratory Data Analysis(EDA)– Definition, Steps in data exploration, Comparing EDA with classical and Bayesian analysis – Software tools for EDA– Visual Aids for EDA – Data transformation techniques-merging database, reshaping and pivoting,.

Self learning Topic: Understanding Exploratory Data Analysis (EDA) and its role in the Data Analytics Lifecycle   **COs-CO1**

UNIT II: Preprocessing-Traditional Methods and Maximum Likelihood Estimation   **15 Hours**
Introduction to Missing data, Traditional methods for dealing with missing data, Maximum Likelihood Estimation–Basics, Missing data handling, improving the accuracy of analysis. Preprocessing Bayesian Estimation: Introduction to Bayesian Estimation, Multiple Imputation-imputation Phase, Analysis and Pooling Phase
Self learning Topic: Handling Missing Data through Traditional Methods and Maximum Likelihood Estimation   **COs-CO2**

UNIT-III: Data Summarization & Visualization: **10 Hours**
Statistical data elaboration, 1-D Statistical data analysis, 2-D Statistical data Analysis, N-D

Statistical data analysis.
Self learning Topic: Statistical Data Analysis across Dimensions   **COs-CO3**

UNIT - IV: Outlier Analysis: 15 hours

Introduction, Extreme Value Analysis, Clustering based, Distance Based and Density Based outlier analysis, Outlier Detection in Categorical Data. Feature Subset Selection: Feature selection algorithms: filter methods, wrapper methods and embedded methods, Forward selection backward elimination, Relief
Self learning Topic: Outlier Detection Techniques in Data Analysis   **COs-CO4**

UNIT –V: Dimensionality Reduction: 15 Hours

Introduction, Principal Component Analysis (PCA), Kernel PCA, Canonical Correlation Analysis, Factor Analysis, Multidimensional scaling..
Self learning Topic: Dimensionality Reduction and Data Interpretation Techniques   COs**-CO5**

Board of Studies: Computer Science and Engineering
Approved in BOS No: 02, 9th May, 2025
Approved in ACM No: 02

Expert Talk (To be delivered by SMEs from Industries)
 COs POs / PSOs
   1. Canonical Correlation Analysis CO5 PO1,PO2,PO4,PSO1,PSO2,PSO3

Text Books:

   1. Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, by Glenn J. Myatt.
   2. Michael Jambu, "Exploratory and multivariate data analysis", Academic Press Inc., 1990.
   3. Charu C. Aggarwal, "Data Classification Algorithms and Applications", CRC press, 2015.

Reference Books:

   1. Charu C. Aggarwal, "Data Mining The Text book", Springer, 2015.
   2. Craig K. Enders, "Applied Missing Data Analysis", The Guilford Press, 2010.
   3. Inge Koch, "Analysis of Multivariate and High dimensional data", Cambridge University Press, 2014.

Web References:

   1. https://www.ibm.com/think/topics/exploratory-data-analysis

Internal Assessment Pattern

Cognitive Level	Internal Assessment #1(%)	Internal Assessment #2(%)
L1	25	-
L2	35	10
L3	40	30
L4	-	30

L5	-	30
TOTAL(%)	**100**	**100**

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. Define Exploratory Data Analysis (EDA).
2. What is Maximum Likelihood Estimation?
3. What is 2-D statistical data analysis?
4. Define an outlier and mention two outlier detection methods.
5. What is Principal Component Analysis (PCA).

L2: Understand

1. Explain how EDA differs from classical and Bayesian data analysis.
2. Describe the traditional methods used for handling missing data.
3. Illustrate the difference between 1-D, 2-D, and N-D statistical data analysis with suitable examples.
4. Explain how clustering-based outlier analysis works.
5. Describe the difference between PCA and Kernel PCA.

L3: Apply

1. Demonstrate the use of any one data transformation technique on a sample dataset.
2. Use a simple dataset and show how multiple imputation can be applied to handle missing values.
3. Apply appropriate visualizations to summarize a multi-dimensional dataset.
4. Apply a filter method for feature selection on a dataset.
5. Use PCA to reduce the dimensions of a dataset and interpret the results.

L4: Analyze

1. Compare and contrast reshaping and pivoting techniques with examples.
2. Analyze the difference between the Imputation Phase and the Pooling Phase in Multiple Imputation.
3. Analyze how visualization enhances the interpretation of statistical summaries.
4. Analyze the pros and cons of wrapper vs. Embedded methods in feature selection.
5. Analyze how dimensionality reduction techniques affect data interpretation and visualization.

L5: Evaluating

1. Assess the usefulness of visual aids in uncovering patterns in EDA.
2. .Evaluate the effectiveness of Bayesian Estimation compared to traditional methods in dealing with missing data.
3. Critique the role of data summarization in the overall EDA process.
4. Evaluate the impact of outlier detection on the quality of feature selection.
5. Evaluate the suitability of Canonical Correlation Analysis versus Factor Analysis for a given problem scenario.

Chairperson
Board of Studies (CSE)

R24ES09	Design and Analysis of Algorithms	3	0	0	3

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

Course Objectives:

1. To understand and apply the algorithm analysis techniques
2. To critically analyze the efficiency of alternative algorithmic solutions for the same problem
3. To understand different algorithm design techniques
4. To understand the limitations of Algorithmic power

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

Course Code	Course Outcomes	Mapping with POs and PSOs							Dok
		PO1	PO2	PO3	PO4	PS01	PS02	PS03	
R24ES09.1	Review the fundamentals of algorithmic problem solving and analyzing efficiency of algorithms	3	3	1	0	2	3	3	L1,L2,L4
R24ES09.2	Apply mathematical formulation, complexity analysis and methodologies	3	3	1	0	2	3	3	L2,L3
R24ES09.3	Compare the time complexities of various algorithms	2	3	0	1	3	2	3	L3,L4
R24ES09.4	Critically analyze the different algorithm design techniques for a given problem	2	3	0	2	2	3	3	L3,L4
R24ES09.5	Illustrate NP class problems and formulate solutions using standard approach	1	2	0	1	2	3	3	L4,L5

SYLLABUS

UNIT-I: Introduction of an Algorithm   **15 Hours**

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving –Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency –Asymptotic Notations and their properties - Analysis Framework –Empirical analysis - Mathematical analysis for Recursive and Non-recursive algorithms –Visualization.

Self-Learning Topics: Amortized analysis   **COs–CO1**

UNIT–II: Brute Force and Divide-and-Conquer   **13 Hours**

Brute Force – Computing an – String Matching - Closest-Pair and Convex-Hull Problems - Exhaustive Search - Travelling Salesman Problem – Knapsack Problem - Assignment Problem.

Divide and Conquer Methodology – Binary Search – Merge sort – Quick sort –Heap Sort - Multiplication of Large Integers – Closest-Pair and Convex – Hull Problems.

Self-Learning Topics: Knuth-Morris-Pratt Algorithm   **COs–CO2**

UNIT-III: Dynamic Programming and Greedy Techniques   **14 Hours**

Dynamic programming – Principle of optimality - Coin Changing Problem -Computing a Binomial Coefficient – Floyd's Algorithm – Multi Stage Graph -Optimal Binary Search Trees – Knapsack Problem and Memory functions

Greedy Technique – Container Loading Problem - Prim's Algorithm and Kruskal's Algorithm – 0/1 Knapsack Problem - Optimal Merge pattern -Huffman Trees.

Self-Learning Topics: Travelling Sales Person Problem   **COs–CO3**

UNIT- IV Iterative Improvement   **14 Hours**

The Simplex Method - The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs - Stable Marriage problem `

Self-Learning Topics: Hill Climbing   **COs–CO4**

UNIT-V: Coping with the Limitations of Algorithm Power   **14 Hours**

Lower - Bound Arguments - P, NP, NP - Complete and NP-Hard Problems-Backtracking – n-Queen Problem - Hamiltonian Circuit Problem – Subset Sum Problem. Branch and Bound – LIFO Search and FIFO Search –Assignment Problem – Knapsack Problem – Travelling Salesman Problem.

Self-Learning Topics: Approximation Algorithms for NP-Hard Problems – Travelling Salesman Problem – Knapsack Problem   **COs–CO5**

 Board of Studies   : Computer Science and Engineering

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

Approved in ACM No: 02

Expert Talk (To be delivered by SMEs from Industries)

	COs	POs / PSOs
1. Branch and Bound Algorithmic Approach	CO5	PO1,PO2,PO4,PSO1,PSO2,PSO3

Text Books:

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Computer Algorithms/ C++", Second Edition, Universities Press, 2007

Reference Books:

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V.Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
3. Harsh Bhasin, "Algorithms Design and Analysis", Oxford university press,2016.
4. S. Sridhar, "Design and Analysis of Algorithms", Oxford university press,2014

Web References:

1. https://nptel.ac.in/courses/106101060
2. https://www.cse.iitm.ac.in/course_details.php?arg=OTI
3. https://swayam.gov.in/nd1_noc19_cs47/previ

Internal Assessment Pattern

Cognitive Level	**Internal Assessment #1(%)**	**Internal Assessment #2(%)**

L1	35	-
L2	30	-
L3	20	30
L4	15	40
L5	-	30
TOTAL (%)	**100**	**100**

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. What is an algorithm, and why is it important in computer science?
2. Name two examples of important problem types in algorithm design.
3. What does asymptotic notation analyze, and what are three common types of asymptotic notations?
4. Define dynamic programming and provide a short description of its principle of optimality.
5. What is the difference between NP and NP-Hard problems?

L2: Understand

1. Explain the purpose of empirical analysis versus mathematical analysis when evaluating algorithm efficiency.
2. Describe how the divide-and-conquer methodology works and provide an example of an algorithm that uses this approach.
3. Discuss the advantages and disadvantages of using a brute force approach versus a more efficient algorithm like quick sort.
4. What role does visualization play in understanding and analyzing algorithms?
5. How does the Simplex Method solve linear programming problems?

L3: Apply

1. Given an algorithm to sort a list of numbers, analyze its time complexity using asymptotic notation to demonstrate its efficiency.
2. Implement a brute-force solution for the string matching problem, and analyze the time complexity of your approach.
3. Use dynamic programming to solve the Coin Changing Problem and explain your solution step-by-step.
4. Apply the concept of the maximum-flow problem to a specific network example and demonstrate how to calculate the maximum flow.
5. Create a greedy algorithm to tackle the 0/1 Knapsack Problem and explain the logic behind your selection at each step.

L4: Analyze

1. Compare the performance of the naive recursive solution versus a dynamic programming solution for the Fibonacci sequence in terms of time and space.
2. Analyze why the Travelling Salesman Problem is categorized as NP-Complete and discuss its implications for algorithm design.
3. Evaluate the efficiency of various algorithms (like Merge Sort and Quick Sort) for sorting a

large dataset under different conditions.

4. Investigate the effectiveness of the branch-and-bound method compared to backtracking for solving combinatorial optimization problems.

5. Examine the potential trade-offs in solving an optimization problem using iterative improvement methods versus exact algorithms.

L5: Evaluating

1. Critically assess how well amortized analysis can predict the performance of data structures over time.

2. Evaluate the practical applications of approximation algorithms for NP-Hard problems, citing specific examples.

3. Discuss the implications of classifying problems into different categories (P, NP, NP-Complete, and NP-Hard) in the context of computer science and real-world applications.

4. Assess the effectiveness of dynamic programming techniques in practical scenarios compared to greedy algorithms.

5. Evaluate the significance of understanding algorithmic limitations in practical computing, particularly regarding the P vs NP debate.

Chairperson
Board of Studies (CSE)

R24CSPC09   **DATABASE MANAGEMENT SYSTEMS**   3   0   0   3
(Common to CSE, CSE (DS), CSE (AI&ML))

Course Objectives:

- Train in the fundamental concepts of database management systems, database modelling and design, SQL, PL/SQL, and System implementation techniques.

- Enable students to model ER diagram for any customized applications.

- Provide knowledge on concurrency techniques.

- Understand normalization theory and apply such knowledge to the normalization of a database.

- To learn the principles of systematically designing and using large scale Database Management Systems for various applications.

Course Outcomes

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

| Course Code | Course Outcomes (COs) | Mapping with POs and PSOs | | | | | | | | DoK |
		PO1	PO2	PO3	PO4	PO5	PO11	PSO1	PSO2	
R24CSPC09.1	Understand basic concepts of database systems and data models.	3	2	-	1	2	2	3	-	L 1, L2
R24CSPC09.2	Design ER diagrams and apply conceptual modeling for real-world problems like Railway & Hospital systems.	3	3	3	1	2	2	3	1	L1, L2, L3
R24CSPC09.3	Apply relational model concepts and SQL operations to implement simple databases.	3	2	2	1	3	2	3	1	L 2, L3
R24CSPC09.4	Perform schema refinement using normalization techniques.	3	2	2	2	3	2	3	-	L3, L4
R24CSPC09.5	Explain transaction management concepts and implement concurrency control and recovery methods. Understand indexing techniques like B+ Trees and Hash-based indexing for efficient data retrieval.	3	3	2	3	3	2	3	-	L4, L5,L6

SYLLABUS

UNIT I: **15 Hours**

Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; three tier schema architecture for

data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams   **CO's–CO1**

Self Learning Topics: Database Applications (Real-world applications: Banking, E-commerce, Healthcare, Education, and Social Media)

UNIT II: 15 Hours
Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus.
BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).   **CO's–CO2**

Self Learning Topics: Structure of a Relational Database

UNIT III: 15 Hours
SQL: Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions (Date and Time, Numeric, String conversion). Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view (updatable and non-updatable), relational set operations.   **CO's–CO3**

Self-Learning Topics: Advanced Grouping and Aggregation (GROUP BY with ROLLUP, CUBE, and GROUPING SETS, Filtering groups using HAVING)

UNIT IV: 10 Hours
Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce Codd-normal form (BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).
                                                                                             CO's–CO4
Self-Learning Topics: Decomposition Deep Dive (Comparing Lossless vs. Lossy Decomposition, Dependency-Preserving Decomposition: When to compromise)

UNIT V: 10 Hours
Transaction Concept: Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.
Introduction to Indexing Techniques: B+ Trees, operations on B+ Trees, Hash Based Indexing
                                                                                             CO's–CO5
Self-Learning Topics: Locking & Deadlock Handling – Strategies for handling concurrent transactions.

Board of Studies: Computer Science and Engineering

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

Approved in ACM No: 02

Text Books:

1. Introduction to Database Systems, CJ Date, Pearson.
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA Mc Graw Hill 3rd Edition.

Reference Books:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel7th Edition.

2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education.

3. Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom Pearson.

4. Data base System Concepts,5/e, Silberschatz, Korth, TMH.

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%	25%
L4	--	35%
L5	--	25%
L6		15%
Total (%)	100%	100%

Sample Short and Long Answers questions of Various Cognitive Levels

L1: Remember

1. What is a database system?

2. Define a schema and an instance.

3. List the types of database users.

4. What are the differences between a file system and a database system?

5. State the purpose of data independence.

6. Name any three data models used in databases.

7. What is an entity set in an ER model?

8. Explain how a database system differs from a file-based system in terms of data handling.

9. Describe the role of a Database Administrator (DBA).

10. llustrate the components of the three-tier schema architecture with an example.

11. Explain the importance of constraints in ER modeling.

12. Describe the relationship between entities and attributes in an ER diagram.

L2: Understand

1. What is a relation in the relational model?

2. Define the terms: domain, tuple, and attribute.

3. List different types of integrity constraints in relational databases.

4. What are the basic DML operations in SQL?

5. Name any four data types used in SQL.

6. Explain the importance of null values in relational databases.

7. Describe how key constraints help maintain data integrity.

8. Interpret a relational algebra expression involving selection and projection.

9. Differentiate between `CREATE` and `ALTER` table commands in SQL.

10. Explain the role of relational calculus in database querying.

11. Write an SQL query to insert data into a student table.

12. Create a table named `EMPLOYEE` with appropriate data types and constraints.

13. Apply the concept of domain constraints by defining a column with restricted values.

14. Use relational algebra to express: "Find names of all employees in department 10."

15. Use `DELETE` and `UPDATE` commands to modify data in a sample table.

L3: Apply

1. Explain the importance of null values in relational databases.

2. Describe how key constraints help maintain data integrity.

3. Interpret a relational algebra expression involving selection and projection.

4. Differentiate between CREATE and ALTER table commands in SQL.

5. Explain the role of relational calculus in database querying**.**

6. Write an SQL query to insert data into a student table.

7. Create a table named `EMPLOYEE` with appropriate data types and constraints.

8. Apply the concept of domain constraints by defining a column with restricted values.

9. Use relational algebra to express: "Find names of all employees in department 10."

10. Use `DELETE` and `UPDATE` commands to modify data in a sample table.

L4: Analysing

1. Convert the following unnormalized table to 1NF, 2NF, and 3NF step-by-step.

2. Apply the concept of functional dependency to identify keys in a relational schema.

3. Use a sample relation to demonstrate the process of decomposing a schema into BCNF.

4. Apply 4NF on a table containing multivalued dependencies.

5. Normalize a relation to 5NF using a suitable example

6. Compare and contrast BCNF and 3NF. In what scenario is BCNF preferred?

7. Analyze the importance of dependency preservation in database normalization.

8. Examine a given schema and identify all possible functional and multivalued dependencies.

9. Identify and explain the anomalies that can occur in an unnormalized database.

10. Distinguish between lossless decomposition and lossy decomposition with illustrations.

L5: Evaluating

1. Analyze a transaction schedule and determine if it is conflict-serializable

2. Identify and resolve a deadlock using wait-die or wound-wait protocol.

3. Compare lock-based and timestamp-based concurrency control protocols.

4. Examine failure classification and explain how each type affects recovery.

5. Analyze how optimistic concurrency control differs from pessimistic control**.**

6. Evaluate the trade-offs between optimistic and pessimistic concurrency control.

7. Justify the need for serializability in concurrent transaction execution.

8. Assess the efficiency of B+ Trees vs. Hash indexing for read-heavy applications.

9. Evaluate a given schedule for recoverability and cascading rollbacks.

10. Critique the limitations of timestamp ordering in high-concurrency environments.

L6: Creating

1. Design a concurrency control strategy for a banking application handling concurrent withdrawals.

2. Develop a custom recovery algorithm for a distributed database system.

3. Construct a complete B+ Tree from a given dataset and demonstrate insert/delete operations.

4. Design a system using optimistic concurrency control and simulate conflict resolution.

5. Create a detailed fault-recovery workflow that handles both system crash and transaction failure using logs and checkpoints.

Chairperson
Board of Studies (CSE)

R24CDPC04   **Exploratory Data Analysis Lab**   0   0   3   1.5
(Computer Science and Engineering (Data Science))

Course Objectives:

1. To familiarize students with fundamental techniques in exploratory data analysis using Python.
2. To develop proficiency in using visualization libraries for uncovering data patterns.
3. To enable transformation, summarization, and statistical interpretation of real-world datasets.
4. To apply EDA skills for generating hypotheses and preparing data for modeling.

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

Course Code	Course Outcomes	Mapping with POs and PSOs							Dok
		PO 1	PO 2	PO 3	PO 5	PS O1	PS O2	PS O3	
R24CDPC04. 1	Load, inspect, and preprocess datasets using Python libraries such as Pandas and NumPy.	3	2	-	-	3	2	-	L1,L 2
R24CDPC04. 2	Handle missing data, outliers, and perform data cleaning and preprocessing techniques.	3	2	2	-	3	2	-	L3,L 4
R24CDPC04. 3	Apply univariate, bivariate, and multivariate analysis techniques to uncover data patterns.	3	3	-	2	3	3	2	L5,L 6

Board of Studies: Computer Science and Engineering
Approved in BOS No: 02, 9th May, 2025
Approved in ACM No: 02

Developing the following programs

Week 1: Introduction to Python for Data Analysis

1. Install necessary libraries (NumPy, Pandas, Matplotlib, Seaborn); Load sample datasets

CO's-CO1

Week 2: Basic Data Loading and Inspection

2. Read datasets (CSV, Excel); Inspect data shape, types, and summaries   **CO's-CO1**

Week 3:Handling Missing Values

3. Detect and handle missing data using Pandas (drop, fill, interpolate)   **CO's-CO1**

Week 4:Data Type Conversion and Encoding

4. Convert data types; Apply label and one-hot encoding to categorical variables   **CO's-CO1**

Week 5:Univariate Analysis - Numerical Data

5. Analyze distribution using histograms, box plots, and descriptive stats   **CO's-CO2**

Week 6:Univariate Analysis - Categorical Data

6. Frequency plots, bar charts, and value counts for categorical columns   **CO's-CO2**

Week 7: Bivariate Analysis - Numerical vs Numerical

7. Scatter plots, correlation matrix, pair plots   **CO's-CO2**

Week 8:Bivariate Analysis - Categorical vs Numerical

   8. Box plots, groupby summaries, and violin plots CO's-CO1

Week 9:Multivariate Analysis with Seaborn/Plotly

   9. Use hue, size, style in scatter plots; Heatmaps and pairplots for multivariate insights

                                                         CO's-CO2

Week 10:Outlier Detection and Treatment

   10. Use IQR, Z-score to identify and treat outliers   **CO's-CO2**

Week 11:Feature Engineering and Transformation

   11. Apply log, sqrt, and binning transformations   **CO's-CO3**

Week 12:Data Scaling and Normalization

   12. Apply Min-Max, StandardScaler, and RobustScaler techniques   **CO's-CO3**

Week 13:Time-Series Data Exploration

   13. Load time-series data, parse datetime, plot trends   **CO's-CO3**

Week 14 and Week 15:Case Study 1: Cars4U Dataset Analysis

   14. Perform complete EDA cycle: cleaning, visualization, insights   **CO's-CO3**

Week 16:Case Study 2: Iris or Titanic Dataset Analysis

   15. End-to-end EDA with conclusion: hypothesis generation and documentation   **CO's-CO3**

Text Books:

   1. "Python for Data Analysis" by Wes McKinney

Reference Books:

   1. "Data Science from Scratch: First Principles with Python" by Joel Grus
   2. "Practical Statistics for Data Scientists" by Peter Bruce, Andrew Bruce, and Peter Gedeck
   3. "Hands-On Exploratory Data Analysis with Python" by Suresh Kumar Mukhiya and Usman Qamar

Web References:

   1. https://www.ibm.com/think/topics/exploratory-data-analysis

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Board of Studies (CSE)

R24ES12   **Design and Analysis of Algorithms Lab**   0   0   3   1.5
(Common to CSE, CSE (DS) & CSE (AI&ML))

Course Objectives:

The course aims to give students hands – on experience and train them to learn Design and Analysis Algorithm

1. To learn Prolog Program.
2. To Implement in prolog and its working environment
3. To Implement N-Queen problem and puzzle problem using Prolog
4. To Analyze the problem using BFS and DFS algorithm

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

Course Code	Course Outcomes	Mapping with POs and PSOs							Dok
		PO 1	PO 2	PO 3	PO 5	PS O1	PS O2	PS O3	
R24ES12.1	Understand of algorithm design techniques applicable across various tasks and ensuring foundational knowledge in problem-solving.	3	3	3	3	3	3	3	L3
R24ES12.2	Implement of the algorithms in both sequential and parallel paradigms, relevant for weeks involving sorting and graph traversals.	3	3	3	1	3	3	3	L4
R24ES12.3	Handle real-world computational problems.	3	3	3	1	3	3	3	L5

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Approved in ACM No: 02

Developing the following programs

Week 1:

1. Sort a given set of elements using the Quick sort method and analyze time.   **CO's-CO1**

Week 2:

2. Implement a parallelized Merge Sort algorithm using Open MPI   **CO's-CO1**

Week 3:

3. Implement binary tree traversal techniques using recursion and non-recursion.   **CO's-CO1**

Week 4:

4. Print reachable nodes in a digraph using BFS; check connectivity using DFS.   **CO's-CO2**

Week 5:

5. Determine articulation points and biconnected components in a graph.   **CO's-CO2**

Week 6:

6. Implement algorithms for minimum cost spanning trees (Prim's and Kruskal's). **CO's-CO2**

Week 7:

7. Find shortest paths in a graph using Dijkstra's algorithm; study of Prolog.   **CO's-CO2**

Week 8:

8. Write simple fact for the statements using prolog   **CO's-CO2**

Week 9:

9. Write predicates one convert's centigrade temperature to Fahrenheit, other checks if a temperature is below freezing.   **CO's-CO2**

Week 10:

10. Write a program to solve 4-Queen problem.   **CO's-CO3**

Week 11:

11. Write a program to solve 8-puzzle problem.   **CO's-CO3**

Week 12:

12. Write a program to solve any problem using Breadth First Search.   **CO's-CO3**

Week 13:

13. Write a program to solve any problem Depth First Search   **CO's-CO3**

Week 14:

14. Write a program to solve Travelling salesman Problem   **CO's-CO3**

Week 15 and Week 16:

15. Develop a tool to analyze social networks using graph algorithms (e.g., finding the shortest path, clustering, and connectivity). Input social network data and visualize the connections.

                CO's-CO3

Text Books:

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Computer Algorithms/ C++", Second Edition, Universities Press, 2007

Reference Books:

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and CliffordStein, "Introduction to Algorithms", Third Edition, PHI Learning PrivateLimited, 2012.
2. S. Sridhar, "Design and Analysis of Algorithms", Oxford university press,2014

Web References:

1. https://nptel.ac.in/courses/106101060
2. https://www.cse.iitm.ac.in/course_details.php?arg=OTI
3. https://swayam.gov.in/nd1_noc19_cs47/previ

Chairperson
Board of Studies (CSE)

R24CSPC12   **DATABASE MANAGEMENT SYSTEMS LAB**   0   0   3   1.5

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

Course Objectives:

1. Populate and query a database using SQL DDL/DML Commands

2. Declare and enforce integrity constraints on a database

3. Writing Queries using advanced concepts of SQL

4. Programming PL/SQL including procedures, functions, cursors and triggers

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	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	DoK
R24CSPC 12.1	Utilizing Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) commands effectively within a database environment	3	2	2	1	3	1	1	1	2	1	2	3	1	L1, L2
R24CSPC 12.2	Constructing and execute queries to manipulate and retrieve data from databases	3	3	2	2	3	1	1	1	2	1	2	3	1	L2, L3
R24CSPC 12.3	Develop application programs using PL/SQL. Establish database connectivity through JDBC (Java Database Connectivity)	2	2	3	2	3	1	1	2	2	2	2	2	3	L3

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Developing the following programs:

Week 1:   **CO's:CO1**

1. Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

Week 2:   **CO's:CO1**

2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION,

INTERSECT, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.

Week 3:   **CO's:CO1**

3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

Week 4:   **CO's:CO1**

4. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

Week 5:   **CO's:CO1**

5. **i.** Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)

ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

Week 6:   **CO's:CO2**

6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

Week 7:   **CO's:CO2**

7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exception RAISEAPPLICATION ERROR.

Week 8:   **CO's:CO2**

8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

Week 9:   **CO's:CO2**

9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

Week 10:   **CO's:CO2**

10. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

Week 11:   **CO's:CO3**

11. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and

INSTEAD OF Triggers

Week 12:   **CO's:CO3**

   12. Create a table and perform the search operation on table using indexing and no indexing techniques.

Week 13:   **CO's:CO3**

   13. Write a Java program that connects to a database using JDBC

Week 14:   **CO's:CO3**

   14. Write a Java program to connect to a database using JDBC and insert values into it

Week 15:   **CO's:CO3**

   15. Write a Java program to connect to a database using JDBC and delete values from it

Reference Books:

1. Oracle: The Complete Reference by Oracle Press

2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007

3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007

4. RamezElmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th

5. Edition, 2013.

6. Database Principles Fundamentals of Design Implementation and Management, 10th

7. edition, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning, 2022

Online Learning Resources:

1. http://www.scoopworld.in

2. http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php

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Board of Studies (CSE)

R24CSSC02	**Full Stack Development**	0	0	3	1.5

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

Course Objectives:

1. To implement the client side of the web application using java-script.

2. To understand Java script on the desktop using NodeJS.

3. To develop a web application using NodeJS and Express.

4. To implement a SPA using React.

5. To develop a full stack single page application using React,ode JS, and a Database (MongoDB or SQL).

Course Outcomes

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

Mapping with POs and PSOs															
Course Code	**Course Outcomes (COs)**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	DoK
24SC02.1	Implement the client side of the web application.	2	1	2	1	3	1	0	2	3	2	1	-	2	1	L1, L2
24SC02.2	Deploy server side applications using NodeJS. Use express framework in web development	2	2	3	2	3	1	0	2	2	2	3	-	3	2	L2, L3
24SC02.3	Implement and architect database systems. Develop a full stack single page applications	3	2	3	2	3	2	1	3	3	3	3	-	3	2	L2, L3

Board of Studies: Computer Science and Engineering

Approved in BOS No: 02, 09th May, 2025

Approved in ACM No: 02

Experiments covering the Topics:

- Lists, Links and Images

- HTML Tables, Forms and Frames

- HTML 5 and Cascading Style Sheets, Types of CSS

- Selector forms

- CSS with Color, Background, Font, Text and CSS Box Model

- Applying JavaScript - internal and external, I/O, Type Conversion

- JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects

- JavaScript Functions and Events

Developing the following programs:

Week-1:

1. Write a HTML program, to explain the working of lists. **CO's:CO1**
2. Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target attributes. **CO's:CO1**
3. Create a HTML document that has your image and your friend's image with a specific height and width. Also when clicked on the images it should navigate to their respective profiles. **CO's:CO1**
4. To create Form validation using JavaScript. **CO's:CO1**

Week-2:

1. Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan) **CO's:CO2**
2. Write a HTML program, to explain the working of forms by designing Registration form. **CO's:CO2**
3. Get data using Fetch API from an open-source endpoint and display the contents in the form of a card. **CO's:CO2**

Week-3:

1. Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>, <footer>, <header>, <main>, <nav>, <section>, <div>, <span> tags. **CO's:CO2**
2. Write a HTML program, to embed audio and video into HTML web page. **CO's:CO2**
3. Write a program to apply different types (or levels of styles or style specification formats) inline, internal, external styles to HTML elements. (Identify selector, property and value).**CO's:CO2**

Week-4:

1. Write a program to apply different types of selector forms

    i. Simple selector (element, id, class, group, universal)

    ii. Combinator selector (descendant, child, adjacent sibling, general sibling)

    iii. Pseudo-class selector

    iv. Pseudo-element selector

    v. Attribute selector **CO's:CO2**

Week-5:

1. Write a program to demonstrate the various ways you can reference a color in CSS. **CO's:CO2**
2. Write a CSS rule that places a background image halfway down the page, tilting it horizontally. The image should remain in place when the user scrolls up or down. **CO's:CO2**
3. Write a program using the following terms related to CSS font and text:

    i. Font-size   ii. Font-weight   iii. font-style

iv. text-decoration v. text-transformation   VI. Text-alignment   **CO's:CO2**

4. Write a program, to explain the importance of CSS Box model using

    i.   Content ii. Border   iii. Margin   iv. Padding   **CO's:CO2**

Week-6:

1. Write a program to embed internal and external JavaScript in a web page.   **CO's:CO3**

2. Write a program to explain the different ways for taking input & displaying output..

     CO's:CO3

3. Create a webpage which uses prompt dialogue box to ask a voter for his name and age. Display the information in table format along with either the voter can vote or not

     CO's:CO3

Week-7:

1. Write a program using document object properties and methods.

2. Write a program using window object properties and methods.

3. Write a program using array object properties and methods.

4. Write a program using math object properties and methods.

5. Write a program using string object properties and methods.   **CO's:CO3**

Week-8:

1. Write a program to display week days using switch case.

2. Write a program to print 1 to 10 numbers using for, while and do-while loops.

3. Write a program to print data in object using for-in, for-each and for-of loops Develop a program to determine whether a given number is an 'ARMSTRONG NUMBER' or not.

4. Write a program to display the denomination of the amount deposited in the bank in terms of 100's, 50's, 20's, 10's, 5's, 2's & 1's. (Eg: If deposited amount is Rs.163, the output should be 1-100's, 1-50's, 1- 10's, 1-2's & 1-1's)

    CO's:CO3

Week-9:

1. Design a appropriate function should be called to display

I. Factorial of that number

    II. Fibonacci series up to that number

    III. Prime numbers up to that number

    IV. Is it palindrome or not   **CO's:CO3**

Week-10:

1. Design a HTML having a text box and four buttons named Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate function should be called to display

      I.   Factorial of that number

     II.   Fibonacci series up to that number

    III.   Prime numbers up to that number

    IV.   Is it palindrome or not   **CO's:CO3**

Week-11:

1. Write a program to validate the following fields in a registration page

      I.   Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters)

     II.   Mobile (only numbers and length 10 digits)

    III.   E-mail (should contain format like xxxxxxx@xxxxxx.xxx).   **CO's:CO3**

Week-12:

1. Create a form and validate the contents of the form using JavaScript.   **CO's: CO3**

2. Get data using Fetch API from an open-source endpoint and display the contents in the form of a card.   **CO's: CO3**

3. Create a Node JS server that serves static HTML and CSS files to the user without using express.   **CO's: CO3**

Week-13:

1. Create a NodeJS server using Express that stores data from a form as a JSON file and displays it in another page. The redirect page should be prepared using Handlebars.

                               CO's:CO3

2. Create a NodeJS server using Express that creates, reads, updates and deletes students' details and stores them in MongoDB database. The information about the user should be obtained from a HTML form. Conversion of Fahrenheit to Celsius and vice versa.

                               CO's:CO3

Week-14:

1. Create a NodeJS server that creates, reads, updates and deletes event details and stores them in a MySQL database. The information about the user should be obtained from a HTML form.   **CO's:CO3**

2. Create a counter using ReactJS   **CO's:CO3**

3. Create a Todo application using ReactJS. Store the data to a JSON file using a simple Node JS server and retrieve the information from the same during page reloads.   **CO's:CO3**

Week-15:

1. Create a simple Sign up and Login mechanism and authenticate the user using cookies. The user information can be stored in either MongoDB or MySQL and the server should be built

using NodeJS and Express Framework.   **CO's:CO3**

2. Create and deploy a virtual machine using a virtual box that can be accessed from the host computer using SSH.Write a C program to print last n characters of a given file.

                                                   CO's:CO3

3. Create a docker container that will deploy a NodeJS ping server using the NodeJS image.

                                                   CO's:CO3

Textbooks:

1. John Dean, Web Programming with HTML5, CSS and JavaScript, Jones & Bartlett Learning, 2019.

Reference Books:

1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
2. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.

Online Learning Resources:

1. https://www.w3schools.com/html
2. https://www.w3schools.com/css
3. https://www.w3schools.com/js/
4. https://www.w3schools.com/nodejs
5. https://www.w3schools.com/typescript

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 $3 \times 7 \times 9 \times 11$?
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: $2 \times 3 + 12 \div 4$ - 5
12. Evaluate: 18 - $3 \times 2 + 12 \div 4$
13. Simplify: $9 + 8 \div 2 \times 3$ - 1
14. Evaluate: 15 - $2 \times 3 + 8 \div 2$
15. Simplify: $24 \div 4 \times 2 + 10 - 3$
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?

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R24MC04   **INTELLECTUAL PROPERTY RIGHTS**   **3 0 0 3**
(Common to CSE, CSE (DS), CSE (AI&ML), ECE, EEE, ME)

Course Objectives:

The main objectives of the course are to:

1. To introduce the fundamental concepts, types, and importance of Intellectual Property Rights (IPR) in the modern knowledge economy.
2. To understand the legal framework and procedures for protecting and enforcing patents, copyrights, trademarks, and other IP forms.
3. To enable students to apply IPR knowledge in managing and safeguarding intellectual assets in business and research environments.
4. To analyze case studies involving IPR infringement, disputes, and resolution mechanisms in various industries.
5. To create awareness about emerging IPR challenges related to digital innovation, artificial intelligence, and global trade agreements.

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

Course Code	Course Outcomes	Mapping with POs										DoK
		PO1	PO2	PO3	PO4	PO5	PO6	PO8	PO9	PO10	PO11	
R24MC04.1	Understand the Fundamentals of IPR	3	2	-	-	-	2	3	-	2	--	L1, L2
R24MC04.2	Analyze Legal Aspects of Patents and Copyrights	3	3	2	-	2	-	3	-	2	--	L2, L3
R24MC04.3	Evaluate Trademarks and Industrial Design Protection	3	3	2	-	2	-	3	-	2	--	L2, L4
R24MC04.4	Examine the Significance of GIs and Trade Secrets	3	2	-	-	2	2	3	-	2	--	L4, L5
R24MC04.5	Apply IPR Laws and Address Emerging Challenges	3	3	3	3	3	2	3	2	3	--	L5, L6

SYLLABUS

UNIT I: Introduction to Intellectual Property Rights   **9 Hours**

Concept and evolution of Intellectual Property Rights (IPR) – types and significance of IPR: patents, copyrights, trademarks, trade secrets, industrial designs, and geographical indications; nature and characteristics of IPR; historical development and global perspectives; importance of IPR in innovation and knowledge economy.   **CO's-CO1**

Self Learning Concepts: Explore the concept and evolution of Intellectual Property Rights (IPR), including patents, copyrights, trademarks, industrial designs, trade secrets, and geographical indications. Understand their significance in protecting innovation and intellectual assets. Study the

historical development of IPR and its role in the knowledge economy, fostering innovation and creativity in industries.

UNIT II: Patents and Copyrights   12 Hours

Patents-definition, features, types, patentable inventions, non-patentable inventions, procedure for filing, rights of patentees, and infringement issues; Copyrights-meaning, subject matter, rights of authors, duration and protection, exceptions and limitations, fair use, and remedies for infringement. **CO's-CO2**

Self Learning Concepts: Learn about patents, including the types of inventions that can be patented, the filing procedure, and the rights of patentees. Understand copyright protection, the rights of authors, and the duration of protection. Explore the concept of fair use and remedies for copyright infringement, alongside the limitations and exceptions within copyright law.

UNIT III: Trademarks and Industrial Designs   12 Hours

Trademarks – concept, types, functions, registration process, rights of the holder, infringement and remedies; Industrial designs – concept, features, registration procedure, rights conferred, term of protection, and case studies on design rights violations.   **CO's-CO3**

Self Learning Concepts: Focus on trademarks and their role in brand protection, including registration, rights of holders, and infringement issues. Study the protection of industrial designs, registration procedures, and the term of protection. Review case studies on design rights violations and the process of trademark registration.

UNIT IV: Geographical Indications and Trade Secrets   14 Hours
Geographical Indications (GI) – meaning, significance, registration procedure, rights granted, famous Indian GIs; Trade secrets – definition, scope, protection mechanisms, trade secret misappropriation, and differences between patents and trade secrets; relevance of GIs and trade secrets in business and commerce.   **CO's-CO4**

Self Learning Concepts: Examine Geographical Indications (GI) and their importance in protecting regional products. Understand the GI registration process and famous Indian GIs. Learn about trade secrets, their legal protection, and the differences between patents and trade secrets, especially in sectors like technology and business.

UNIT V: IPR Laws, Organizations and Emerging Issues   16 Hours
Overview of Indian IPR laws – key provisions of the Patents Act, Copyright Act, Trademarks Act, and GI Act; international IPR organizations – WIPO, WTO, TRIPS Agreement; IPR management in industries and academic institutions; contemporary issues – digital piracy, IPR in biotechnology, AI and IPR, and IPR challenges in the digital era.   **CO's-CO5**

Self Learning Concepts: Study Indian IPR laws, including provisions in the Patents Act, Copyright Act, Trademarks Act, and GI Act. Learn about global IPR organizations like WIPO and

WTO, and the TRIPS Agreement. Explore emerging IPR issues such as digital piracy, IPR in biotechnology, and challenges related to AI and IPR in the digital age.

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

1) **Neeraj Pandey & Khushdeep Dharni** – Intellectual Property Rights, PHI Learning.
2) **P. Narayanan** – Law of Intellectual Property, Eastern Law House.

Reference Books:

1) **Deborah E. Bouchoux** – Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets, Cengage Learning.
2) **T. Ramakrishna** – Basic Principles and Acquisition of Intellectual Property Rights, Notion Press.
3) **N.S. Gopalakrishnan & T.G. Agitha** – Principles of Intellectual Property, Eastern Book Company.

Web References:

1) www.ipindia.gov.in – Official website of the Indian IPR Office.
2) www.wipo.int – World Intellectual Property Organization.
3) www.wto.org – World Trade Organization – TRIPS Agreement.
4) www.indianiprsurvey.in – IPR awareness and industry surveys.
5) www.mhrd.gov.in – IPR cell initiatives under the National IPR Policy.

Internal Assessment Pattern

Cognitive Level	Internal Assessment # 1 (%)	Internal Assessment # 2 (%)
L1	13	-
L2	38	10
L3	12	10
L4	25	30
L5	-	30
L6	12	10
Total (%)	**100**	**100**

Sample Short and Long Answers to Questions of Various Cognitive Levels
L1: Remember

1. What is the full form of IPR?
2. List any four types of Intellectual Property Rights.
3. What are patentable inventions?
4. Define a trademark.
5. Mention any two famous Indian Geographical Indications.
6. What is the term of protection for industrial designs?

7. State the main function of the World Intellectual Property Organization (WIPO).

8. Name the law that governs copyrights in India.

9. What is a trade secret?

10. List any two international agreements related to IPR.

L2: Understand

1. Explain the significance of IPR in the knowledge economy.

2. Differentiate between patentable and non-patentable inventions.

3. Describe the rights granted to a copyright holder.

4. Discuss the importance of geographical indications in protecting local heritage.

5. Explain how a trademark helps in brand recognition.

6. Clarify the concept of "fair use" under copyright law.

7. Interpret the difference between patents and trade secrets.

8. Describe the process for registering an industrial design.

9. Explain the function of the TRIPS Agreement.

10. Discuss how IPR supports innovation.

L3: Apply

1. Apply the knowledge of patents to identify protectable aspects of a new product.

2. Demonstrate how to check trademark availability for a business logo.

3. Use the concept of GI to suggest a registration for a local craft product.

4. Illustrate a situation where trade secret protection is more suitable than patenting.

5. Apply copyright law to determine if a user is violating fair use.

6. Identify which type of IPR would apply to a mobile app design.

7. Use an example to show how IPR can prevent product imitation.

8. Demonstrate the steps for filing a patent in India.

9. Apply IPR knowledge to analyze a case of music piracy.

10. Show how industries can manage IPR to protect their innovations.

L4: Analysing

1. Compare and contrast the protection mechanisms of patents and trade secrets.

2. Analyze how digital technologies have challenged copyright enforcement.

3. Examine the role of IPR in promoting economic growth.

4. Break down the key differences between trademarks and industrial designs.

5. Investigate the impact of geographical indications on rural economies.

6. Distinguish between moral rights and economic rights under copyright law.

7. Analyze a real case where trademark infringement occurred and its resolution.

8. Explore the challenges of enforcing IPR laws in the digital era.

9. Examine the role of WIPO and WTO in shaping global IPR policies.

10. Compare Indian IPR laws with those of another country in one IPR domain.

L5: Evaluating

1. Evaluate the effectiveness of India's patent laws in protecting inventions.

2. Assess whether trade secrets offer better protection than patents for tech startups.

3. Critique the fairness of copyright exceptions under "fair use."

4. Judge the impact of digital piracy on the creative industry.

5. Argue for or against compulsory licensing in pharmaceuticals.

6. Evaluate the relevance of geographical indications in the global market.

7. Appraise the challenges industries face in enforcing design rights.

8. Debate whether AI-generated content should be protected under IPR.

9. Justify stronger IPR laws to encourage academic research and innovation.

10. Review the pros and cons of current international IPR agreements for developing countries.

L6: Create and Develop

1. Design a proposal to raise awareness about GI protection in rural India.

2. Develop a guidebook for startups on managing their IPR portfolio.

3. Formulate a business strategy that incorporates trade secrets for competitive advantage.

4. Create a short case study on a successful use of IPR in product commercialization.

5. Construct a training module for students on patent filing.

6. Propose a digital solution for detecting copyright infringement.

7. Draft a sample copyright notice for an e-learning platform.

8. Build an IPR audit plan for a small software company.

9. Design a new trademark and justify its eligibility for registration.

10. Create a campaign to educate musicians on their copyright rights.

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