COURSE STRUCTURE

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

I Year I Sem

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AEEE11T	Basic Electrical and Electronics Engineering	3	0	0	3
2	BS	24ACHE11T	Chemistry	3	0	0	3
3	BS	24AMAT11T	Matrix Theory and Calculus	3	0	0	3
4	ES	24ACSE11T	Computational Problem Solving	3	0	0	3
5	ES	24AMEC11T	Engineering Drawing	1	0	4	3
6	BS	24AEEE11L	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1
7	BS	24ACHE11L	Chemistry Lab	0	0	2	1
8	ES	24ACSE11L	Computational Problem-Solving Lab	0	0	2	1
9	HSM	24ALAN11T	Language Elective	1	0	0	1
						Total Credits	**19**

I Year II Sem

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24APHY21T	Applied Physics	3	0	0	3
2	BS	24AMAT21T	Differential Equations and Transform Techniques	3	0	0	3
3	HSM	24AENG21T	English for Engineers	3	0	0	3
4	ES	24ACSE21T	Data Structures	3	0	3	3
5	ES	24ACSE22T	The Joy of Computing using Python	3	0	0	3
6	ES	24AMEC22L	Engineering & IT Workshop	1	0	4	3
7	BS	24APHY21L	Applied Physics Lab	0	0	2	1
8	HSM	24AENG21L	English Language Communication Skills Lab	0	0	2	1
9	ES	24ACSE21L	Data Structures Lab	0	0	2	1
						Total Credits	**21**

II Year I Sem

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	BS	24AMAT33T	Discrete Mathematics	3	0	0	3
2	HSM	24AUHV31T	Universal Human values-II	3	0	0	3
3	PC	24ACSE31T	Advanced Data structures and algorithm analysis	3	0	0	3
4	PC	24ACSE32T	Object Oriented Programming Using Java	3	0	0	3
5	PC	24ACSE33T	Digital Logic Design and Computer Organization	3	0	0	3
6	PC	24ACSE31L	Advanced Data structures and algorithm analysis Lab	0	0	3	1.5
7	PC	24ACSE32L	Object Oriented Programming Using Java Lab	0	0	3	1.5
8	PC	24ACSE33L	Digital Logic Design and Computer Organization Lab	0	0	3	1.5
9	SEC	24ACSE34L	Full Stack Development	1	0	2	2
						Total Credits	**21.5**

Category	Credits
Basic Science course	3
Professional core Courses	13.5
Humanities Sciences	3
Skill oriented course	2
Total Credits	21.5

II Year II Sem

Sl. No.	Category	Course Code	Course Title	Hours per Week			Credits
				L	T	P	C
1	PC	24ACSE41T	Database Management Systems	3	0	0	3
2	PC	24ACSE42T	Software Engineering	3	0	0	3
3	PC	24AAID41T	Introduction to Data Science	3	0	0	3
4	BS	24AMAT41T	Probability and Statistics	3	0	0	3
5	HSM	24AMBA42T	Management Science	3	0	0	3
6	PC	24ACSE41L	Database Management Systems Lab	0	0	3	1.5
7	PC	24ACSE42L	Software Engineering Lab	0	0	3	1.5
8	PC	24AAID41L	Introduction to Data Science Lab	0	0	3	1.5
9	SEC	24ACSE44L	Advanced Java Programming	1	0	2	2
10	MC	24AENS41T	Environmental Science	2	0	0	0
						Total Credits	**21.5**
Internship 2 Months (Mandatory) during summer vacation							

Category	Credits
Basic Science Courses	3
Professional core Courses	9
Engineering Science Courses	4.5
Humanities Sciences	3
Skill oriented course	2
Total Credits	21.5

Title of the Course	Basic Electrical and Electronics Engineering
Category	BS
Year	I
Semester	I
Course Code	24AEEE11T
Branch/es	CE, ME, EEE, ECE, CSE(AI),AI &DS & CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	1	0	3

Course Objectives:

1. To understand the fundamental laws and circuit elements
2. To analyzethe working of various Machines.
3. To Summarize the different Energy Resources, various Measuring Instruments and importance of Safety Measures
4. To Describe the various Electronic Devices
5. To Illustrate the concepts of Bipolar Junction transistor and Diode Applications

Course Outcomes:

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

1. Understand the fundamental laws and circuit elements.
2. Analyze the Working of DC and AC Machines.
3. Summarize the different Energy Resources, various Measuring Instruments and importance of Safety Measures
4. Analyze basic Semiconductor devices
5. Illustrate the concepts of Bipolar Junction transistor and Diode Applications.

Unit 1 Fundamental Laws and Electrical Circuits 9

Basic definitions - Voltage, current, power, energy, charge, flux, static and dynamic emf, Faraday's laws of electromagnetic induction, Fleming's right hand rule, Fleming's left hand rule, Lenz's law, Cork screw rule, Right hand thumb rule, Right hand palm rule.Types of elements, Types of sources, ohms law, resistive, inductive, capacitive networks, Series-parallel circuits and Kirchhoff's laws-(Basic Numerical Problems).

Unit 2 DC Machines and Transformers 9

DC Generator: Constructional Details of DC machine, Principle of operation, emf equation, types of generators, applications.(Basic Numerical Problems on EMF equation)

DC Motor: principle of operation, torque equation, types, losses and efficiency, applications, Brake test, Speed control methods. (Basic Numerical Problems).

Transformers: 1-Φ Transformer: Principle of operation, emf equation, losses and efficiency calculations using OC and SC tests.

Unit 3 Energy Resources, Measuring Instruments& Safety Measures 9

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of Hydel, Solar & Wind power generation.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and CRO.

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

Unit 4 Semiconductor Devices 9

Energy Band Diagram of Semiconductors (Intrinsic & Extrinsic), PN Diode, V-I Characteristics of PN Junction Diode, Applications of diode-Breakdown Mechanisms in semiconductor diodes, Zener diode characteristics and Zener diode acts as a regulator.

Unit 5 Diode Applications and Introduction to Transistors 9

Half Wave and Full Wave Rectifiers – Different parameters and comparison, General Filter Considerations – Capacitor Filter. Transistor constructions – Types,Transistor operation in CE configuration and its Characteristics.

Prescribed Text Books:

1. J.B. Gupta, "Fundamental of Electrical Engineering & Electronics" KATSON Books, First Edition 2012.

References Books:

1. V.K. Mehta and Rohit Mehta, "Principles of Electrical Engineering & Electronics",S chand and Company Ltd,First Edition,2010.
2. S.K.Bhattacharya, "Basic Electrical & Electronics Engineering" Pearson Education, Second Edition 2017.

Web Resources:

1.https://electricalvani.com
2.https://www.electrical4u.com
3.https://nptel.ac.in/courses/108105053
4.https://nptel.ac.in/courses/108108076

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative team work	Communication	Project management	Life-long learning
24AEEE11T.1	2	2	1	1	-	2	-	-	1	-	1
24AEEE11T.2	3	3	2	2	-	2	-	-	2	-	1
24AEEE11T.3	2	2	1	1	-	2	-	-	1	-	1
24AEEE11T.4	3	3	2	2	-	2	-	-	2	-	1
24AEEE11T.5	3	2	1	1	-	2	-	-	2	-	1

Title of the Course: Chemistry
Category: BS
Year: I
Semester: I
Course Code: 24ACHE11T
Branches: EEE, ECE, AI&DS, CSE(AI), CSE (ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The course aims to familiarize students with the fundamentals of engineering chemistry and its practical applications. It provides training on key principles of electrochemistry and polymers, while also introducing students to various instrumental methods. Additionally, the course highlights the importance of green energy and e-waste management, emphasizing their relevance in modern engineering practices.

Course Outcomes:

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

1. discuss quantum mechanics and molecular orbital theory to interpret bonding, energy levels, and bond order in various molecules.
2. demonstrate the construction and functionality of various sensors, batteries, and fuel cells through practical examples.
3. summarize the preparation, characteristics, and applications of various polymers in real-world contexts.
4. utilize principles of various analytical techniques to evaluate nanomaterials effectively.
5. analyze sustainable energy solutions and develop strategies for effective e-waste management.

Unit 1 Structure and bonding models 9

Fundamentals of Quantum mechanics, Schrodinger wave equation, significance of Ψ and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

Unit 2 Electrochemistry and applications 8

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, types of electrodes - indictor and reference electrodes. Electrochemical sensors – potentiometric and amperometric sensors with examples.

Primary cells – Dry cell, secondary cells – Lithium-ion batteries - working of the batteries including cell reactions; Fuel cells, Hydrogen-Oxygen fuel cell – working of the cell.

Unit 3 Polymer chemistry 8

Introduction to polymers, functionality of monomers, Thermoplastics and Thermo-setting plastics, properties and applications of PVC and Bakelite.

Fibres - polyesters, mechanical requirements for fibres - crystallinity, stress strain curves. Biodegradable polymers - properties and applications of Poly Glycolic Acid (PGA), Polylactic Acid (PLA).

Elastomers – properties and applications of Buna-S, Buna-N, Thiokol.

Conducting polymers – Polyacetylene – mechanism of conduction and applications.

Unit 4 Nanomaterials and instrumental methods 9

Nanomaterials - Introduction, classification, synthesis of nanomaterial by Sol-gel method, properties and applications of carbon-based nanomaterials - CNT and Graphene.
Electromagnetic spectrum, absorption of radiation: Beer-Lambert's law. UV-Visible spectroscopy, principle, instrumentation and applications, IR spectroscopy – principle, instrumentation and applications, Potentiometry - potentiometric titrations (redox titrations), Conductometric titrations (acid-base titrations).

Unit 5 Alternative energy sources and e-waste management 8

Green Fuels: Introduction, construction and working of photovoltaic cell, applications, generation of green hydrogen energy by electrolysis of water and its advantages.

e-waste management: Introduction, sources of e-waste, composition and health hazards of toxic materials present in electronic and electrical e-waste, need for e-waste management, recycling and recovery; different approaches of recycling, extraction of Gold from e-Waste.

Prescribed Textbooks:

1. Jain, Jain. *Engineering Chemistry*. 16th Ed., Dhanpat Rai, 2013.
2. Atkins, Peter, Julio de Paula, and James Keeler. *Atkins' Physical Chemistry*. 10th Ed., Oxford University Press, 2010.
3. Jing, Dengwei. *Handbook of Hydrogen Energy*. 1st Ed., Wiley-VCH, 2023.
4. Fowler, Bruce A. *Electronic Waste: Toxicology and Public Health Issues*. 1st Ed., Academic Press, 2017.

Reference Books:

1. Skoog, Douglas A., F. James Holler, Stanley R. Crouch. *Principles of Instrumental Analysis*. 7th ed., Cengage Learning, 2016.
2. Lee, J.D. *Concise Inorganic Chemistry*. 5th ed., Wiley-Blackwell, 1999.
3. Billmayer, Fred W. Jr. *Textbook of Polymer Science*. 3rd ed., Wiley, 2007.
4. Sherif, S.A., D. Yogi Goswami, E.K. Stefanakos, A. Steinfeld. *Handbook of Hydrogen Energy*. CRC Press, 2014.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning
24ACHE11T.1	2	2	1	1	-	-	-	-	-	-	1
24ACHE11T.2	3	2	1	2	-	-	-	-	-	-	1
24ACHE11T.3	3	2	1	2	-	-	-	-	-	-	1
24ACHE11T.4	3	2	1	2	-	-	-	-	-	-	1
24ACHE11T.5	3	3	2	2	-	-	-	-	-	-	1

Title of the Course: Matrix Theory and Calculus
Category: BS
Year: I
Semester: I
Course Code: 24AMAT11T
Branches: Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: This course aims to familiarize students with matrix theory and its practical applications, equipping them with essential tools for mathematical and engineering problem-solving. It also focuses on imparting knowledge of partial derivatives, mean value theorems, and multiple integrals to effectively address real-world engineering challenges. Additionally, students will develop proficiency in vector differentiation and integration to solve complex engineering problems.

Course Outcomes:

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

1. understand the methods for solving systems of linear equations
2. utilize matrix algebra techniques for engineering applications
3. analyze functions of several variables to optimization techniques
4. determine the area of solids using multiple integrals
5. apply vector integral theorems in evaluating double and triple integrals

Unit 1 Matrices **10**

Rank of a matrix by echelon form, normal form, solving system of homogeneous and non-homogeneous linear equations, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem.

Unit 2 Eigen values and Eigen vectors **8**

Eigen values and Eigen vectors and their properties, diagonalization of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation.

Unit 3 Mean Value Theorems & Multivariable calculus **10**

Taylor’s theorem and Maclaurin's theorem for one variable (without proofs) – simple problems.

Partial derivatives, total derivatives, Chain rule, change of variables, Jacobian, Maxima and Minima of functions of two variables, method of Lagrange multipliers for three variables.

Unit 4 Multiple Integrals 8

Double integrals, change of order of integration, change of variables (Cartesian to polar), areas enclosed by plane curves, evaluation of triple integrals.

Unit 5 Vector Calculus 10

Vector differentiation: Scalar and Vector point functions, vector operator Del, del applies to scalar point functions-Gradient, directional derivative, del applied to vector point functions-Divergence and Curl.

Vector integration: Line integral - work done, surface integral, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, divergence theorem (without proof) and related problems.

Prescribed Textbooks:

1. E. Kreyszig. *Advanced Engineering Mathematics*. 10th Ed., John Wiley & Sons, 2011.
2. B. S. Grewal. *Higher Engineering Mathematics*, 44th Ed., Khanna Publishers, 2017.

Reference Books:

1. B. V. Ramana. *Higher Engineering Mathematics.* Mc Graw Hill Education
2. G. B. Thomas. *Maurice D. Weir and Joel* Hass. Thomas Calculus, 13th Ed., Pearson Publishers, 2013
3. R.L. Garg Nishu Gupta. *Engineering Mathematics Volumes-I &II.* Pearson Education
4. H. K. Das, Er. Rajnish Verma. *Higher Engineering Mathematics.* S. Chand

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and world	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24AMAT11T.1	2	2	1	1	-	-	-	-	-	-	1
24AMAT11T.2	3	2	1	2	-	-	-	-	-	-	1
24AMAT11T.3	3	3	2	2	-	-	-	-	-	-	1
24AMAT11T.4	2	2	1	1	-	-	-	-	-	-	1
24AMAT11T.5	3	2	1	2	-	-	-	-	-	-	1

Title of the Course : Computational Problem Solving
Category : ES
Year : I
Semester : I
Course Code : 24ACSE11T
Branch/es : Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Understanding the steps in problem solving and formulation of algorithms to problems.
2. Develop programming skills as a means of implementing an algorithmic solution with appropriate control and data structures.
3. Develop intuition to enable students to come up with creative approaches to problems.
4. Develop programs using pointers, structures and unions.
5. Manipulation of text data using files.

Course Outcomes:

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

1. demonstrate solutions to problems and represent those using algorithms/flowcharts.
2. choose proper control statements and use arrays for solving problems.
3. decompose a problem into modules and use functions to implement the modules.
4. apply and use allocation of memory for pointers and solve the problems related to manipulation of text data using files and structures.
5. develop the solutions for problems using c programming language.

Unit 1 Problem Solving and Introduction to C 9

Steps to solve problems, algorithm, Pseudo code, Flowchart with examples, Program Development. Environments. Introduction to programming: Programming languages and generations.
Introduction to C: Introduction, structure of C program, keywords, identifiers, Variables, data types, constants, I/O statements, operators, precedence and associatively

Unit 2 Introduction to decision control statements and Arrays 9

Selective, looping and nested statements, jumping statements.
Arrays: Introduction, declaration of arrays, accessing and storage of array elements, searching (linear and binary search algorithms) and sorting (selection and bubble) algorithms, multidimensional arrays, matrix operations

Unit 3 Strings and Functions 9

Strings: Declaration and Initialization, String Input / Output functions, String manipulation functions.
Functions: Types of functions, recursion, scope of variables and storage classes.
Preprocessor Directives: Types of preprocessor directives, examples

Unit 4 Pointers 9

Pointers: Understanding computer 's memory, introduction to pointers, declaration pointer variables, pointer arithmetic, pointers and strings, array of pointers, function pointers, dynamic memory allocation, advantages and drawbacks of pointers

Unit 5 Structures and Files **9**

Structures: Structure definition, initialization and accessing the members of a structure, nested structures, array of structures, structures and functions, structures and pointers, self-referential structures, unions and enumerated data types.

Files: Introduction to files, file operations, reading and writing data on files, error handling during file operations.

Prescribed Textbooks:

1. C Programming and Data Structures. B.A. Forouzan, R. F.Gilberg, Cengage learning, Indian edition.
2. C and Data Structures, E.Balaguruswamy, Tata McGraw Hill.
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.

Reference Books:

1. LET US C, YeswanthKanitkar, Ninth Edition, BPB Publication.
2. Byron Gottfried, Schaum 's‖ Outline of Programming with C‖, McGraw-Hill.
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
4. A K Sharma —Computer Fundamentals and Programming‖, 2nd Edition, University Press, 2018.
5. PradeepDey and Manas Ghosh, —Programming in C‖, Oxford Press, 2ndEdition, 2017.
6. ReemaTharaja —Introduction to C Programming‖, Second Edition, OXFORD Press, 2015.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning
24ACSE11T.1	3	2	1	2	-	-	-	-	-	-	-
24ACSE11T.2	3	3	2	2	-	-	-	-	-	-	-
24ACSE11T.3	3	3	2	2	-	-	-	-	-	-	3
24ACSE11T.4	3	2	1	2	-	-	-	-	-	-	3
24ACSE11T.5	3	3	3	3	-	-	-	-	-	-	3

Title of the Course: Engineering Drawing
Category: ES
Year: I
Semester: I
Course Code: 24AMEC11T
Branch/es: CE, EEE, ME, ECE, CSE(AI), AI&DS & CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	4	3

Course Objectives:

1. To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing.
2. To impart knowledge on the projection of points, lines and plane surfaces.
3. To improve visualization skills for better understanding of projection of solids.
4. To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
5. To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

Course Outcomes:

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

1. apply the appropriate annotations and geometric techniques to draw the conic sections, cycloidal curves and involutes
2. apply the principles of orthographic projection for engineering problems involving inclined lines to create drawings that represent real-world objects.
3. apply the principles of orthographic projection for solving engineering problems of planes with respect to both reference planes.
4. apply the principles of orthographic projection for solving engineering problems of solids.
5. apply the conversion techniques to solve problems related to orthographic projections and isometric projection views.

Unit 1 **5**

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

Engineering Curves:

Construction of Ellipse, Parabola and Hyperbola by General Method - Normal and tangent
Cycloid & Epicycloid curves (basic problem) - Normal and tangent
Involute of Square, Pentagon - Normal and tangent

Unit 2 **3**

Orthographic Projections: Reference plane, importance of reference lines or Planes, 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.

Unit 3 **5**

Projections of Planes (Square, Circle, Pentagon, Hexagon): A Plane perpendicular to one reference plane and parallel to other, A plane Perpendicular to both reference planes, A plane perpendicular to one reference plane and inclined to the other, A plane inclined to both the reference planes.

Unit 4 **5**

Projections of Solids: Projections of solids (Prism, Pyramid, Cylinder and Cone): Axis perpendicular to Horizontal reference plane and parallel to other, Axis inclined to Horizontal reference plane and parallel to another plane.

Development of Surfaces: Simple Developments of a prism, cylinder, Pyramid and Cone

Unit 5 **5**

Isometric Projections / Conversions: Principles of Isometric Projection – Isometric Scale – Isometric Views of Lines, Planes, Conversion of orthographic views to isometric views (simple problems) and Conversion of isometric views to orthographic views (simple problems)

Prescribed Textbooks:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House
2. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill

Reference Books:

1. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc
2. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and the World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning
24AMEC11T.1	3	2	1	2	-	-	1	-	1	-	1
24AMEC11T.2	3	2	1	2	-	-	1	-	1	-	1
24AMEC11T.3	3	2	1	2	-	-	1	-	1	-	1
24AMEC11T.4	3	2	1	2	-	-	1	-	1	-	1
24AMEC11T.5	3	2	1	2	2	-	1	-	1	-	1

Title of the Course	Basic Electrical and Electronics Engineering Laboratory
Category	BS
Year	I
Semester	I
Course Code	24AEEE11L
Branch/es	CE, ME, EEE, ECE, AI&DS, CSE(AI) &CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. To identify the various electrical and electronic components and devices.
2. To impart knowledge and practical exposure on various elements of electrical circuits, operational aspects of various electrical machines and electronic circuits
3. To analyze the performance of rectifier circuits in practical approach
4. To observe the characteristics of semiconductor devices

Course Outcomes:

At the end of the course, the student will be able to Blooms Level of Learning

1. Identify the various Electrical and Electronic Components and Devices.
2. Analyze various characteristics of electrical circuits, electrical machines and measuring instruments
3. Analyze the characteristics of various semiconductor devices through practical investigations.
4. Comprehend the usage of Electronic devices as half wave and full wave rectifier

List of Experiments

S.NO	Name of Experiments
1	Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs, Diodes, BJT)
2	Study and operation of • Multi-meters (Analog and Digital) • Function Generator • Regulated Power Supplies
3	Verification of KCL and KVL
4	Measurement of resistance by using Ammeter and Voltmeter method
5	Measurement of Earth Resistance using Megger
6	Speed control of a DC Shunt Motor
7	Brake Test on DC Shunt Motor
8	OC and SC Test on Single Phase Transformer
9	Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias
10	Plot V – I characteristics of Zener Diode
11	Determination of Ripple Factor and Regulation of Half Wave Rectifier with and without capacitive

filter

12 Determination of Ripple Factor and Regulation of Full Wave Rectifier with and without capacitive filter

13 Study of Cathode Ray Oscilloscope. (CRO)

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative team work	Communication	Project management and finance	Life-long learning
24AEEE11L.1	1	1	1	1	-	1	-	2	2	-	1
24AEEE11L.2	3	3	2	2	-	2	-	2	2	-	1
24AEEE11L.3	3	3	2	2	-	2	-	2	2	-	1
24AEEE11L.4	2	2	1	1	-	1	-	2	2	-	1

Title of the Course: Chemistry Lab
Category: BS
Year: I
Semester: I
Course Code: 24ACHE11L
Branches: EEE, ECE, AI&DS, CSE(AI), CSE (ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives: The course aims to equip students with practical skills in Conductometry, Potentiometry, and Colorimetry for precise chemical analysis. It also provides hands-on experience in synthesizing polymers and nanomaterials, emphasizing their industrial relevance. Additionally, students are trained in separation techniques and UV-Visible spectroscopy for material identification, while enhancing their ability to perform quantitative chemical analyses, such as metal estimation and battery acid strength determination.

Course Outcomes:

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

1. determine the strength of an acid present in secondary batteries.
2. calculate the cell constant and conductance of solutions.
3. estimate metal ions by using various analytical techniques.
4. analyse the separation methods used for various organic compounds.
5. synthesize nanomaterials and polymers.

List of experiments

1. Conductometric titration of strong acid vs. strong base.
2. Determination of cell constant and conductance of solutions.
3. Potentiometry - determination of redox potentials and emfs.
4. Determination of strength of an acid in Pb-acid battery.
5. Preparation of Poly Methyl Methacrylate (PMMA).
6. Preparation of Poly Glycidyl Methacrylate (PGMA).
7. Determination of chromium (VI) in potassium dichromate by Colorimetry.
8. Estimation of Zinc by EDTA titration.
9. Preparation of nanomaterials by precipitation method.
10. Identification of simple organic compounds by IR spectroscopy.
11. Estimation of Ferrous Iron by Dichrometry.
12. Wavelength measurement of sample through UV-Visible Spectroscopy.

Prescribed books:

1. Mendham, J., Denney, R. C., Barnes, J. D., and Sivasankar, B. *Vogel's Quantitative Chemical Analysis.* 6th ed., Pearson Publications, 2009.
2. Anand, Amirtha, and Kumari, Ramesh. *Physical Chemistry Laboratory Manual: An Interdisciplinary Approach.* Dreamtech Press, 2020.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning
24ACHE11L.1	2	2	-	1	1	-	-	1	-	-	3
24ACHE11L.2	2	2	-	1	1	-	-	1	-	-	3
24ACHE11L.3	3	2	-	2	1	-	-	1	-	-	3
24ACHE11L.4	3	3	-	2	1	-	-	1	-	-	3
24ACHE11L.5	3	3	-	2	1	-	-	1	-	-	3

Title of the Course	:	Computational Problem-Solving Lab
Category	:	ES
Year	:	I
Semester	:	I
Course Code	:	24ACSE11L
Branch/es	:	Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives:

1. Setting up programming environment.
2. Develop Programming skills to solve problems.
3. Use of appropriate C programming constructs to implement algorithms.
4. Identification and rectification of coding errors in program
5. Develop applications using a modular programming and Manage data using files

Course Outcomes:

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

1. identify and setup program development environment
2. develop the algorithms using c programming language constructs
3. analyze and rectify the syntax errors and debug program for semantic errors
4. demonstrate problems in a modular approach using functions
5. assessing file operations with simple text data

A minimum number of FOUR programs from each exercise is to be done students.

Data Types, Constants, Input and Output and expressions

Exercise 1: Data types, Variables, Constants and Input and Output.
Exercise 2: Operators, Expressions and Type Conversions.

Decision Control Statements and Arrays

Exercise 3: Conditional Statements [two way and multipath].
Exercise 4: Loop Control Statements. [for, while and do-While]
Exercise 5: Unconditioned JUMP Statements- break, continue, goto.
Exercise 6: Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.
Exercise 7: Multidimensional Arrays

Strings and Functions

Exercise 8: String Basics, String Library Functions and Array of Strings.
Exercise 9: Simple user defined functions, Parameter passing methods- pass by value, pass by reference.
Exercise 10: Storage classes- Auto, Register, Static and Extern
Exercise 11: Recursive Functions, Preprocessor commands.
Exercise 12: Array Elements as Function Arguments

Pointers

Exercise 13: Pointers, Dynamic memory allocation and error handling

Structures and Files

Exercise 14: Structures
Exercise 15: File handling

Prescribed Textbooks:

1. C Programming and Data Structures. B.A. Forouzan, R. F.Gilberg,Cengage learning, Indian edition
2. C and Data Structures, E.Balaguruswamy, Tata McGraw Hill
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education

Reference Books:

1. Let Us C, YeswanthKanitkar, Ninth Edition, BPB Publication
2. A K Sharma —Computer Fundamentals and Programming‖, 2nd Edition, University Press, 2018
3. PradeepDey and Manas Ghosh, —Programming in C‖, Oxford Press, 2ndEdition, 2017
4. ReemaTharaja —Introduction to C Programming‖, Second Edition, OXFORD Press, 2015
5. https://www.cprogramming.com/
6. https://www.mycplus.com/tutorials/c-programming-tutorials

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning
24ACSE11L.1	3	2	1	2	-	-	-	-	-	-	-
24ACSE11L.2	3	3	3	3	-	-	-	-	-	-	-
24ACSE11L.3	3	3	2	2	-	-	-	-	-	-	3
24ACSE11L.4	3	2	1	2	-	-	-	-	-	-	3
24ACSE11L.5	3	3	2	3	-	-	-	-	-	-	3

Title of the Course: Language Elective
Category: HSM
Year: I
Semester: I
Course Code: 24ALAN11T
Branches: Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	0	1

Course Objectives:

The course aims to enhance students' global communication skills through foreign language acquisition while fostering cultural awareness and appreciation of diverse backgrounds. It provides a flexible learning platform with a range of reputable online courses, empowering students to tailor their educational experiences. Additionally, the course allows to focus on career development by equipping students with valuable language skills that enhance their employability.

Course Outcomes:

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

1. enhance their global communication skills by learning foreign language of their choice.
2. understand cultural diversity
3. apply a variety of reputed online courses and enjoy flexible learning
4. acquire additional language skills to secure suitable job opportunities
5. analyze the ability in self-paced learning

Guidelines:

1. **Course Selection:** Students can choose from the following languages:
    - German
    - French
    - Spanish
    - Arabic
2. **Approved Platforms:** Courses must be taken from recognized MOOC platforms such as NPTEL, Coursera, Udemy, or edX.
3. List of recommended courses:
    - German: https://www.udemy.com/course/german-course-for-beginners-learn-german
    - French: https://www.udemy.com/course/complete-french-course
    - Spanish: https://www.udemy.com/course/el-metodo-spanish-1
    - Arabic: https://www.udemy.com/course/arabic-a21/
4. Enrolment Verification: Students must submit proof of enrolment in the chosen course to the academic office of I Year at the beginning of the semester.
5. Minimum Course Duration: The selected course should be a minimum of 4 weeks in duration.
6. Progress Reports: Students are encouraged to submit progress reports periodically to their course mentor.

7. Completion Deadline: The course must be completed by the end of the semester.
8. Certificate Submission: Students must submit the certificate of completion issued by the MOOC platform to the Head, First Year Academics.

Policies

1. **Credit Allocation**: Upon successful completion and submission of the certificate, students will be awarded 1 academic credit.
2. **Grading**: The course will be graded on a Pass/Fail basis. A pass grade is awarded upon verification of the completion certificate.
3. **Integrity and Authenticity**: The submitted certificate must be authentic and verifiable. Any attempt to submit falsified documents will result in disciplinary action.
4. **Support**: Students can seek support from language faculty/course mentors if they encounter any difficulties during the course.
5. **Non-Completion**: Failure to complete the course within the stipulated time frame will result in no credit being awarded, and the elective will need to be retaken

A committee shall be formed at the level of the University to evaluate the grades / marks given for a course by external agencies and convert to the equivalent marks / grades. The recommended conversions and appropriate grades / marks are to be approved by the Academic Council of the University.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning
24ALAN11T.1	-	-	-	-	-	-	-	-	2	-	1
24ALAN11T.2	-	-	-	-	-	-	-	-	2	-	1
24ALAN11T.3	-	-	-	-	-	-	-	-	2	-	1
24ALAN11T.4	-	-	-	-	-	-	-	-	2	-	1
24ALAN11T.5	-	-	-	-	-	-	-	-	2	-	1

Title of the Course: Applied Physics
Category: BS
Year: I
Semester: II
Course Code: 24APHY21T
Branches: EEE, ECE, AI&DS , CSE(AI), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

The course aims to provide a strong foundation in the basic concepts of wave optics, lasers, and fiber optics, while also introducing students to crystal structures and X-ray diffraction techniques. It further explains key principles of dielectrics, magnetic materials, semiconductors, and superconductors, highlighting their importance and applications in various engineering fields**.**

Course Outcomes:

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

1. understand interference, diffraction and polarization in engineering.
2. explain the types of crystal structures and X-ray diffraction.
3. analyze various types of polarization of dielectrics and magnetic materials.
4. apply laser and fiber optics principles in communication field.
5. describe the properties and behavior of semiconductors and superconductors.

Unit 1 Wave Optics 10

Interference: Introduction – Principle of superposition – Interference of light – Interference in thin films (Reflection Geometry)– Newton's Rings, determination of wavelength – Engineering applications of interference.

Diffraction: Introduction – Fresnel and Fraunhofer diffractions – Fraunhofer diffraction due to single slit, double slit & Diffraction Grating - Grating spectrum – Dispersive power of Grating– Engineering applications of diffraction.

Polarization: Introduction –Types of polarization – Double refraction – Nicol's Prism – Half wave and Quarter wave plates – Engineering applications of polarization.

Unit 2 Crystallography and X-ray diffraction 9

Crystallography: Space lattice, basis, unit cell and lattice parameters – 7 crystal systems- Bravais Lattices – coordination number – packing fraction of SC, Bcc & Fcc – Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law – X-ray Diffractometer –Laue's method and powder method.

Unit 3 Dielectric and Magnetic Materials 10

Dielectric Materials: Introduction – Dielectric polarization – Dielectric polarizability, susceptibility, dielectric constant and displacement vector – relation between the electric vectors – Types of polarizations– electronic, ionic, orientation (Qualitative) and Space charge (Qualitative) – Frequency dependence of polarization – Lorentz internal field – Clausius-Mossotti equation – Applications of dielectrics.

Magnetic Materials: Introduction – Magnetic dipole moment – Magnetization–Magnetic susceptibility and permeability –Origin of magnetic moments – Classification of magnetic materials: Dia, para, ferro, anti-ferro & ferri magnetic materials – Hysteresis – soft and hard magnetic materials – Applications of magnetic materials.

Unit 4 LASERs and Fiber Optics 10

LASERs: Introduction – characteristics of lasers – spontaneous and stimulated emission of radiation – Einstein's coefficients – population inversion – pumping mechanism – He-Ne laser – semiconductor laser – Applications of lasers.

Fiber Optics: Introduction - Optical Fiber construction – Working principle (Total Internal Reflection & critical Angle) – Acceptance angle & Numerical Aperture of optical fiber – Classification of fibers based on Refractive index profile & modes (Step index and Graded index optical fibers) – optical fiber losses – Block diagram of fiber optic communication – Medical and Sensor Applications.

Unit 5 Semiconductors and Superconductors 9

Semiconductors: Formation of energy bands – classification of solids on the basis energy band theory-Intrinsic and Extrinsic semiconductors – Drift and diffusion currents – Einstein's equation–Direct and indirect band gap semiconductors- Hall Effect and its applications.

Superconductors: Properties of superconductors– Meissner's effect – Type-1 and Type-2 Superconductors – BCS Theory – Josephson effect (AC & DC) – Applications of superconductors.

Prescribed Textbooks:

1. M. N. Avadhanulu, P. G. Kshirsagar & T. V. S. Arunmurthy. *A Textbook of Engineering Physics.* 11th Ed., S. Chand Publications, 2019
2. K. Thyagarajan. *Applied Physics.* McGraw Hill Education (India) Private Ltd, 2020
3. Neeraj Mehta. *Applied Physics for Engineers.* PHI Learning Private Limited, 2014

Reference Books:

1. K. Palanisamy. *Applied Physics.* Sci. Tech, 2017
2. K. Vijaya Kumar. *A Textbook of Engineering Physics.* S. Chand Publications, 2018
3. Charles Kittel. *Introduction to Solid State Physics.* Wiley Publications, 2011

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and world	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24APHY21T.1	2	2	1	1	-	-	-	-	-	-	1
24APHY21T.2	2	2	1	1	-	-	-	-	-	-	1
24APHY21T.3	3	3	2	2	-	-	-	-	-	-	1
24APHY21T.4	3	2	1	2	-	-	-	-	-	-	1
24APHY21T.5	2	2	1	1	-	-	-	-	-	-	1

Title of the Course: Differential Equations and Transform Techniques
Category: BS
Year: I
Semester: II
Course Code: 24AMAT21T
Branches: Common to all branches

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The course aims to develop proficiency in solving ordinary and partial differential equations, emphasizing their application in engineering and scientific contexts. It will cover Laplace Transforms and their inverses, illustrating their role in solving engineering and real-world problems. Additionally, the course will introduce Fourier Series and Fourier Transforms, focusing on their practical applications for addressing real-life challenges

Course Outcomes:
At the end of the course, the student will be able to
1. describe the application of higher order differential equations with constant coefficients in modeling dynamic systems.
2. solve the standard partial differential equations relevant to engineering scenarios.
3. utilize the Laplace transformations to handle various types of functions in engineering context.
4. analyze ordinary differential equations by employing Laplace transformations for solutions derivation.
5. apply Fourier series and Fourier transforms in engineering context.

Unit 1 Linear differential equations of higher order with constant Coefficients 10
Basic concepts - general solution-operator D-rules for finding complimentary function-inverse operator-rules for finding particular integral for RHS term of the type $e^{ax}, \sin ax / \cos ax$, polynomials in x, $e^{ax} \sin ax / e^{ax} \cos ax / e^{ax} x^n, x \sin ax / x \cos ax$ -method of variation of parameters

Unit 2 Partial Differential Equations 8
Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method, non-linear PDEs (Charpit's method), method of separation of variables for second order linear partial differential equations.

Unit 3 Laplace transforms 8
Laplace transforms of standard functions- first shifting theorem - change of scale property - multiplication by t^n - division by t - transforms of derivatives and integrals - Unit step function – second shifting theorem– Laplace transform of periodic functions (without proofs).

Unit 4 Inverse Laplace transforms 8
Inverse Laplace transforms (without proofs) – Convolution theorem (without proof).
Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

Unit 5 Fourier series and Fourier Transforms 10

Fourier series: Dirichlet conditions - functions of any period - odd and even functions - half range series.

Fourier Transforms: Fourier integrals - Fourier cosine and sine integrals - Fourier transform - sine and cosine transform.

Prescribed Textbooks:

1. E. Kreyszig. *Advanced Engineering Mathematics*. 10th Ed., John Wiley & Sons, 2011.
2. B. S. Grewal. *Higher Engineering Mathematics.* 44th Ed., Khanna Publishers, 2017.

Reference Books:

1. B. V. Ramana. *Higher Engineering Mathematics.* Mc Graw Hill Education.
2. G. B. Thomas, Maurice D. Weir and Joel Hass. *Thomas Calculus*. 14th Ed., Pearson Publishers, 2022.
3. D. G. Zill. *Advanced Engineering Mathematics*. 6th Ed., Jones and Bartlett, 2016
4. Glyn James. *Advanced Modern Engineering Mathematics*. 5th Ed., Pearson publishers, 2018.
5. R. K. Jain and S. R. K. Iyengar. *Advanced Engineering Mathematics.* 5th Ed., Alpha Science International Ltd., 2021 (9th reprint).

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and world	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24AMAT21T.1	2	2	1	1	-	-	-	-	-	-	1
24AMAT21T.2	3	2	1	2	-	-	-	-	-	-	1
24AMAT21T.3	3	2	1	2	-	-	-	-	-	-	1
24AMAT21T.4	3	3	2	2	-	-	-	-	-	-	1
24AMAT21T.5	3	2	1	2	-	-	-	-	-	-	1

Title of the Course: English for Engineers
Category: HSM
Year: I
Semester: II
Course Code: 24AENG21T
Branches: CE,EEE,ME,ECE, AI&DS, CSE (AI), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The course aims to enhance listening, reading, speaking, and writing skills of the students by improving their comprehension abilities and knowledge of grammatical structures and vocabulary. Through targeted instruction, students will develop effective speaking and writing capabilities, fostering a more comprehensive understanding of language use.

Course Outcomes:
At the end of the course, the student will be able to
1. understand the context, topic, and pieces of specific information from social or transactional details
2. analyze literary forms, journalistic articles and scientific readings for comprehension and retention
3. demonstrate effective writing and speaking skills
4. apply grammatical knowledge in speaking and writing and formulate sentences with grammatical accuracy
5. produce coherent and unified paragraphs with adequate support and detail

Unit 1 9

Lesson: A Proposal to Girdle the Earth
Reading: Skimming the text to get main ideas of it; scanning the text to look for specific pieces of information.
Writing: Mechanics of Writing - Capitalization, Spellings, Punctuation
Grammar: Parts of Speech, Content and Structure words, Basic Sentence Structures, Forming Questions
Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words

Unit 2 9

Lesson: The District School As It Was by One Who Went to It
Reading: Identifying the sequence of ideas; recognizing verbal techniques that help to link ideas in a paragraph together
Writing: Paragraph writing: Structure of a Paragraph, Cohesive devices - linkers
Grammar: Use of Articles and Zero Article; Prepositions
Vocabulary: Homonyms, Homophones, Homographs

Unit 3 9

Lesson: The Future of Work
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
Vocabulary: Compound words, Collocations

Unit 4 9

Lesson: H. G. Wells and the Uncertainties of Progress

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

Writing: Letter Writing: Official Letters, Resumes

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

Vocabulary: Words often confused, Jargon

Unit 5 8

Lesson: Leaves from the Mental Portfolio of a Eurasian

Reading: Reading comprehension.

Writing: Writing 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 Jargon

Prescribed Textbooks:

1. Prabhavathi Y et al. *English All Round: Communication Skills for Undergraduate Students – 1*. Orient Black Swan, 2022

Reference Books:

1. Dubey, Sham Ji & Co. *English for Engineers*. Vikas Publishers, 2020
2. Bailey, Stephen. *Academic writing: A Handbook for International Students*. Routledge, 2014.
3. Murphy, Raymond. *English Grammar in Use. 4th Ed. Cambridge University Press*, 2019.
4. Lewis, Norman. *Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary.* Anchor, 2014.

Web Resources:

GRAMMAR:

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

VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of	Engineering tools usage	The Engineer and World	Ethics	Individual and collaborative teamwork	Communication	Project M a engagement and Finance	Life-long Learning
24AENG21T.1	-	-	-	-	-	-	1	-	3	-	1
24AENG21T.2	-	-	-	-	-	-	1	-	3	-	1
24AENG21T.3	-	-	-	-	-	-	1	-	3	-	1
24AENG21T.4	-	-	-	-	-	-	1	-	3	-	1
24AENG21T.5	-	-	-	-	-	-	1	-	3	-	1

Title of the Course : Data Structures
Category : ES
Year : I
Semester : II
Course Code : 24ACSE21T
Branch/es : CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:

1. Understand the significance of linear data structures in problem-solving and basic time/space complexity analysis.
2. Create and manage linked lists to efficiently organize and manipulate data, emphasizing memory efficiency.
3. Implement and apply stacks and queues to manage program flow and solve problems involving expression evaluation and backtracking.
4. Understand the importance of non-linear data structures Tress and Graphs.
5. Explore basic concepts of hashing and apply it to solve problems requiring fast data retrieval and management.

Course Outcomes:

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

1. interpret the role of linear data structures in organizing and accessing data efficiently
2. apply linked lists for dynamic data storage and understanding of memory allocation.
3. develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.
4. analyze queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between de-queues and priority queues and apply them appropriately to solve data management challenges.
5. recognize scenarios where hashing is advantageous, and design hash-based solutions for specific Problems.

Unit 1 Introduction to Linear Data Structures **9**

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.

Unit 2 Linked Lists **9**

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

Unit 3 Stacks, Queues and De-queues **9**

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

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

De-queues: Introduction to De-queues (double-ended queues), Operations on De-queues and their applications.

Unit 4 Introduction to non-linear Data Structures 9

Trees: Introduction to Trees, Binary Trees, creation of binary tree, Operations on Binary Tree. Introduction to Binary Search Tree, Operations on Binary Search Trees.

Graphs: Defining graph, basic terminology, graph representation.

Unit 5 Hashing 9

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

Prescribed Textbooks:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, Silicon Press, 2008

Reference Books:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein.
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms, Robert Sedge wick

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24ACSE21T.1	3	2	1	2	2	-	-	-	-	-	3
24ACSE21T.2	3	2	1	2	2	-	-	-	-	-	3
24ACSE21T.3	3	3	3	3	2	-	-	-	-	-	3
24ACSE21T.4	3	3	3	3	2	-	-	-	-	-	3
24ACSE21T.5	3	3	3	3	2	-	-	-	-	-	3

Title of the Course : The Joy of Computing Using Python
Category : ES
Year : I
Semester : II
Course Code : 24ACSE22T
Branch/es : ME, CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives:
1. To learn basics of computational problem solving, python programming and basic control structures.
2. To understand python programming basic constructs like lists, dictionaries, sets and functions.
3. To apply module design and usage of text files in python programming.

Course Outcomes:
At the end of the course, the student will be able to
1. interpret computational problem solving and basic elements of python programming.
2. analyze python programming basics like lists, tuple, dictionaries, and sets.
3. demonstrate functions in python programming.
4. evaluate string processing applications and exception handling in python programming.
5. develop programs using class and object in python programming.

Unit 1 Introduction to python programming language
Introduction to python programming language, literals, variables and identifiers, operators, expressions and data types. Control Structures: Boolean expressions, selection control, and iterative control.

Unit 2 Lists
Lists: List structures, lists in python, iterating over lists in python, more on python lists. Dictionaries and sets, tuple.

Unit 3 Functions
Functions: Program routines, more on functions, Module Design: Modules, Top-Down design, python modules.

Unit 4 Text Files
Text Files: Text File, Using Text files, string processing, exception handling.

Unit 5 Introduction to object-oriented programming
Introduction to Object oriented programming: class, three fundamental features of object-oriented programming, encapsulation-what is encapsulation, defining classes in python. Inheritance: subtypes, defining subclasses in python, Polymorphism: use of polymorphism.

Prescribed Textbooks:

1. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach.

Reference Books:

1. Python Programming using problem solving approach, ReemaThareja, Oxford University press.
2. Python Programming: An Introduction to Computer Science, John Zelle, Franklin,Beedle & Associates Inc.,3rd Edition.
3. Think Python: How to think like a computer Scientist, Allen Downey 2nd Edition O'Reilly Publications.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24ACSE22T.1	3	2	1	2	-	-	-	-	-	-	3
24ACSE22T.2	3	3	2	2	-	-	-	-	-	-	3
24ACSE22T.3	3	2	1	2	-	-	-	-	-	-	3
24ACSE22T.4	3	3	2	3	-	-	-	-	-	-	3
24ACSE22T.5	3	3	3	3	-	-	-	-	-	-	3

Title of the Course: Engineering & IT Workshop
Category: ES
Year: I
Semester: II
Course Code: 24AMEC22L
Branch/es: CE, EEE, ME, ECE, AI&DS, CSE(AI), AI&DS, CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	4	3

Engineering Workshop Syllabus:

Course Objectives:

This course will enable the student to

1. make familiar with different types of wooden joints.
2. make conversant with tools used in sheet metal work.
3. develop electrical wiring skills.
4. have practical exposure to metal joining processes.
5. gain knowledge with tools used in Plumbing and Fitting

Course Outcomes:

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

1. apply wood working skills to prepare different joints.
2. develop sheet metal jobs with gi sheet.
3. apply basic electrical engineering knowledge for house wiring practice.
4. operate on different metal joining equipment.
5. apply practical skills in trouble shooting the plumbing systems and various fittings.

Unit 1 Wood Working **6**

Familiarity with different types of woods and tools used in wood working and making following joints.

a) Cross- Lap joint b) Mortise and Tenon joint

Unit 2 Sheet Metal Working **6**

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheet.

a) rectangular tray b) Conical funnel

Unit 3 Electrical Wiring **6**

Familiarity with different types of basic electrical circuits and make the following connections.

a) Series connection and two switches, two bulbs in parallel connection.

b) Staircase connection and tube light connection.

Unit 4 Metal Joining process **9**

Familiarity with different types of tools used in metal joining process and practice on

a) Soldering

b) Brazing (preparation of Butt joint)

c) Arc welding (Preparation of Lap joint)

Unit 5 Demonstration & Practice 3

Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

a) Tap Connection

(For practice: branches other than civil & mechanical.

For Demonstration: civil & mechanical Branch)

Demonstration and practice of fitting tools.

Familiarity with different types of tools used in fitting and do the following fitting exercises.

a) Square-Fit

b) Dove-tail Fit

(For practice: civil & mechanical.

For Demonstration: branches other than civil & mechanical.)

Prescribed Textbooks:

1. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 3rd Edn, Scitech publishers.

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.
4. Jeyapoovan T. and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub.2008.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering Tool Usage	The Engineer and the World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning
24AMEC22L.1	3	3	1	-	-	-	1	2	2	-	2
24AMEC22L.2	3	3	2	-	-	-	1	2	2	-	2
24AMEC22L.3	3	3	1	-	-	-	1	2	2	-	2
24AMEC22L.4	3	3	1	-	-	-	1	2	2	-	2
24AMEC22L.5	3	3	1	-	-	-	1	2	2	-	2

IT Workshop Syllabus

Course Objectives:

This course will enable the student to

1. Demonstrate the disassembling and assembling of a personal computer system.
2. Demonstrate the Installation the operating system and other software required in a personal computer system.
3. Introduce connecting the PC on to the internet from home and work place and effectively usage of the internet, Usage of web browsers, email, news groups and discussion forums.
4. Introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations.
5. To utilize Cloud based productivity enhancement and collaboration tools

Course Outcomes:

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

1. interpret the peripherals of a computer, perform assembling and disassembling of various components of a computer.
2. illustration of installation and un-installation of Windows and Linux operating systems and also perform troubleshooting of various hardware and software components
3. discuss about Web browsers to access Internet, Search Engines
4. apply and use word processor; spread sheet, presentation and data storage tools
5. analyze and Implement Cloud based productivity enhancement and collaboration tools

Task 1 **2**

Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report

Task 2 **2**

Assembling a computer: Disassemble and assemble the PC back to working condition. Students should be able. Student should Students should record the process of assembling and troubleshooting a computer.

Task 3 **2**

Install Operating System: Student should install Linux on the computer. Students should record the entire installation process.

Task 4 **2**

Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc. should be done by the student. The entire process has to be documented.

Task 5 **2**

Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail accounts and send emails. They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, search process using different natural languages, and creating e-mail account

Task 6 **2**

Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Task 7 **4**

Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 8 **4**

Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 9 **4**

Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper linking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Task 10 **2**

Store, sync, and share files with ease in the cloud-Google Drive
Document creation and editing text documents in your web browser- Google docs

Prescribed Textbooks:

1. Introduction to Information Technology, ITL Education Solutions limited,Pearson Education.
2. Upgrading and Repairing PC's, 22nd Edition, Scott Muller QUE, PearsonEducation
3. Comdex Information Technology Course Kit, Vikas Gupta, WILEYDreamtech
4. MOS 2010 Study Guide for Microsoft Word, Excel, PowerPoint, and Outlook Exams, 1st Edition, Joan Lambert, Joyce Cox, Microsoft Press

Reference Books:

1. IT Essentials PC Hardware and Software Companion Guide, CICSO Networking Academy
2. Network Your Computer & Devices Step by Step 1st Edition, CiprianRusen, Microsoft Press
3. Troubleshooting, Maintaining & Repairing PCs, 5th Edition, Bigelow, TMH
4. Introduction to computers, Peter Norton, 6/e, Mc Graw Hill
5. Cloud computing, productivity and collaboration tools, software and products offered by Google: https://en.wikipedia.org/wiki/G_Suite

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and the World	Ethics	Individual and Collaborative Team work	Communication	Project management and finance	Life-long learning
24AMEC22L.1	3	2	1	2	-	-	-	-	-	-	-
24AMEC22L.2	3	2	1	2	-	-	-	-	-	-	-
24AMEC22L.3	3	3	2	2	-	-	-	-	-	-	-
24AMEC22L.4	3	2	1	2	-	-	-	-	-	-	-
24AMEC22L.5	3	3	2	2	-	-	-	-	-	-	-

Title of the Course: Applied Physics Lab
Category: BS
Year: I
Semester: II
Course Code: 24APHY21L
Branches: EEE, ECE, AI&DS , CSE(AI), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives: This course aims to provide a comprehensive understanding of interference and diffraction, including their practical applications and the significance of optical fiber parameters in communication. It emphasizes the role of energy gaps in semiconductor conductivity and the Hall effect, explores the applications of magnetic and dielectric materials, and applies semiconductor principles to various electronic devices.

Course Outcomes:

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

1. operate various optical instruments to measure optical parameters.
2. determine the magnetic and dielectric parameters by various methods.
3. evaluate various parameters of semiconductors by different methods.
4. estimate general parameters of materials.

List of Experiments

1. Determination of the thickness of the wire using wedge method.
2. Determination of the radius of curvature of the lens by Newton's ring method.
3. Determination of wavelength of light radiation using plane diffraction grating by spectrometer.
4. Determination of Dispersive power of a diffraction grating.
5. Determination of Particle size using laser.
6. Determination of dielectric constant by bridge resonance method.
7. Determination of Magnetic field along the axis of a circular coil carrying current by stewart-Gee's method.
8. Determination of Wavelength of laser by using Diffraction grating.
9. Determination of Hysteresis loss of ferro magnetic material by tracing B-H curve.
10. Determination of the numerical aperture and acceptance angle of an optical fiber.
11. Deterrmination of the rigidity modulus of metal wire by using torsional pendulum.
12. Determination of Hall coefficient and carrier concentration of a given semiconductor using Hall effect.
13. Determination of the resistivity of semiconductor by Four probe method.
14. Determination of the energy gap of a semiconductor by using P-N Junction diode.
15. Determination of resistance with varying temperature using thermister

Reference Books:

1. S. Balasubramanian, M.N. Srinivasan. *A Textbook of Practical Physics.* S Chand Publishers, 2017
2. C.V. Madhusudan Rao, V. Vasanth kumar. *Engineering Physics laboratory.* SciTech publications, 2010

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and world	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24APHY21L.1	3	2	1	2	3	-	-	-	-	-	3
24APHY21L.2	3	2	1	2	3	-	-	-	-	-	3
24APHY21L.3	3	3	2	2	3	-	-	-	-	-	3
24APHY21L.4	3	3	2	2	3	-	-	-	-	-	3

Title of the Course: English Language Communication Skills Lab
Category: Humanities
Year: I
Semester: II
Course Code: 24AENG21L
Branches: CE, EEE, ME, ECE, AI&DS, CSE (ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives: The main objective of introducing this course is to expose the students to a variety of self-instructional, learner-friendly modes of language learning. The students will get trained in basic communication skills.

Course Outcomes:
At the end of the course, the student will be able to

1. relate and differentiate English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension
2. develop communication skills through various language learning activities
3. demonstrate professional skills in participating role-plays and descriptions
4. build effective resonate and equip themselves with employability skills
5. enhance public speaking skills and deliver oral presentations with clarity and confidence

List of Topics
1. Phonetics: Vowels / Consonants; Accent Rules
2. Just a Minute
3. Role Play / Situational Dialogues
4. Oral Presentation
5. Information Transfer
6. Describing people/Objects/Situations

Suggested Software:
1. Sky Pronunciation Suite
2. Clarity Pronunciation Power – Part I
3. Learning to Speak English - 4 CDs
4. Lose Your Accent in 28 days, CD Rom, Judy Ravin

Reference Books:
1. Meenakshi Raman, Sangeeta-Sharma. *Technical Communication*. Oxford Press, 2018.
2. Grant Taylor. *English Conversation Practice*. Tata McGraw-Hill Education India, 2016.
3. Hewing's, Martin. *Cambridge Academic English* (B2). CUP, 2012.
4. T. Balasubramanyam. *A Textbook of English Phonetics for Indian Students*. 3rd Ed., Trinity Press.

Web Resources:

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/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

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

CO-PO Mapping:

COs	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of	Engineering tools usage	The Eengineer and World	Ethics	Individual and collaborative teamwork	Communication	Project Management and Finance	Life-long Learning
24AENG21L.1	-	-	-	-	-	-	1	1	3	-	1
24AENG21L.2	-	-	-	-	-	-	1	1	3	-	1
24AENG21L.3	-	-	-	-	-	-	1	1	3	-	1
24AENG21L.4	-	-	-	-	-	-	1	1	3	-	1
24AENG21L.5	-	-	-	-	-	-	1	1	3	-	1

Title of the Course	:	Data Structures Lab
Category	:	ES
Year	:	I
Semester	:	II
Course Code	:	24ACSE21L
Branch/es	:	CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	2	1

Course Objectives: The course aims to strengthen the ability of the students to identify and apply suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

Course Outcomes:

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

1. interpret the role of linear data structures in organizing and accessing data efficiently
2. apply linked lists for dynamic data storage and understanding of memory allocation.
3. develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.
4. analyze queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between de-queues and priority queues and apply them appropriately to solve data management challenges.
5. recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

PART-A

WEEK 1: Linked List Implementation

Implement a singly linked list to perform all of its operations.

WEEK 2: Double Linked List Implementation

i) Implement a doubly linked list and perform all of its operations.
ii) Implement a circular linked list and perform insertion, deletion, and traversal.

WEEK 3: Stacks, Queues and De-queues

i) Implement a stack using arrays and linked lists.
ii) Implement a queue using arrays and linked lists.

WEEK 4: Stacks Applications

i) Write a program to evaluate a postfix expression using a stack.
ii) Use a stack to evaluate an infix expression and convert it to postfix.
iii) Implement a program to check for balanced parentheses using a stack.

WEEK 5: Binary Search Tree Implementation:

i) Implementing BST operations using Linked List.

WEEK 6: Binary Search Tree Traversing:

i) Traversing of BST.

WEEK 7: Implementation of Hashing:

i) Implement a hash table with collision resolution techniques

PART-B

WEEK 1: Python Basics, Conditions and Loops

i) Write a Python Program to check if a number is a prime number.
ii) Write a python program to generate the Fibonacci sequence up to a given number of terms.
iii) Write a python program to find the largest prime factor of a given number.

WEEK 2: Python Lists, Dictionaries, and Tuples

i) Write a Python Program to manage a To-Do List.
ii) Write a Python Program to create Contact Book Using Dictionaries.
iii) Write a Python Program to demonstrate Tuples.

WEEK 3: Python Functions and Files

i) Write a Python Function for finding Prime Numbers in a range.
ii) Write a Python function to perform matrix multiplication.
iii) Write a Python Program to read and Print File Contents.
iv) Write a Python Program to write a user input to a file.
v) Write a Python Program to append a user input to a file.

WEEK 4: Single Linked List and Double Linked List Implementation

i) Implement a singly linked list to perform all of its operations.
ii) Implement a doubly linked list and perform all of its operations.

WEEK 5: Stacks, and Queues

i) Implement a stack using arrays and linked lists.
ii) Implement a queue using arrays and linked lists.

WEEK 6: Binary Search Tree Implementation:

i) Implementing a BST operations using Linked List.

WEEK 7: Binary Search Tree Traversing:

i) Traversing of BST.

Prescribed Textbooks:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, Silicon Press, 2008
3. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24ACSE21L.1	3	2	1	2	2	-	-	-	-	-	3
24ACSE21L.2	3	2	1	2	2	-	-	-	-	-	3
24ACSE21L.3	3	3	3	3	2	-	-	-	-	-	3
24ACSE21L.4	3	3	3	3	2	-	-	-	-	-	3
24ACSE21L.5	3	3	3	3	2	-	-	-	-	-	3

Title of the Course: Discrete Mathematics
Category: BS
Year: II
Semester: I
Couse Code: 24AMAT33T
Branches: CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML),CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives

The course aims to build a strong foundation in discrete mathematics with emphasis on logical reasoning and problem-solving. It covers mathematical logic, recurrence relations, relations, functions, algebraic structures, graph theory, and trees. Students will learn techniques for analyzing algorithms, switching circuits, coding theory, and traversal methods. Overall, the course equips learners with essential mathematical tools for applications in computer science and engineering.

Course Outcomes:

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

1. understand and apply the logic statements and express logical sentences in terms of logical connectives
2. analyze the various types of recurrence relations and apply the methods to find out their solutions
3. understand sets, relations, functions, and discrete structures.
4. apply graph theory concepts in core subjects such as data structures and network theory effectively
5. apply the properties of Trees in Engineering applications.

Unit 1 Mathematical logic 12

Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus. Applications to switching circuits.

Unit 2 Recurrence relations 9

Generating functions of sequences, calculating coefficients of generating functions, Recurrence relations - Solving homogeneous and non-homogeneous recurrence relations of first and second order by substitution and generating functions, method of characteristic roots. Applications of recurrence relation.

Unit 3 Relations and functions 10

Relations and functions: Properties of binary relations in a set, relation matrix and the graph of a relation, partition and covering of a set, equivalence relations, compatibility relations, partial ordering, Hasse diagram, functions - composition of functions, inverse functions.

Algebraic structures: algebraic systems, simple algebraic systems and general properties, semi group and monoid, group (Simple problems only).Applications to coding theory.

Unit 4 Graph theory 9

Definitions, finite and infinite graphs, incidence and degree, isolated and pendant vertices, Graph Representations- Adjacency and Incidence Matrices, isomorphism, sub graphs, walk, path and circuit, connected and disconnected graphs, components, Multi graphs, Bipartite and Planar Graphs, Euler's

formula, Euler graphs, , Hamiltonian paths and circuits, Graph Traversal technique-travelling salesman problem.

Unit 5 Trees 8

Some properties of trees, distance and centers, rooted and binary trees, Spanning Trees: DFS, BFS, Minimal Spanning Trees, Tree traversal technique-Kruskal's Algorithm.

Prescribed Textbooks:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 1997. (Units 1 & 3)
2. J.L. Mott, A. Kandel and T. P. Baker, Discrete Mathematics for computer scientists & Mathematicians, 2/e, Prentice Hall of India Ltd, 2012. (Unit 2)
3. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, Prentice Hall of India, 2006. (Units 4 and 5).

Reference Books:

1. K. H. Rosen, Discrete Mathematics and its Applications, 6/e, Tata McGraw-Hill, 2009.
2. R. Johnsonbaugh, Discrete mathematics, 7/e, Pearson Education, 2008.
3. A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, Data Structures using C, PHI/Pearson Education,2005.

Web Resources:

1. https://www.slideshare.net/slideshow/formal-logic-switching-circuits/231907871
2. https://www.geeksforgeeks.org/recurrence-relations-a-complete-guide/
3. https://www.geeksforgeeks.org/maths/real-life-applications-of-abstract-algebra/

CO-PO Mapping:

CO	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and society	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24AMAT33T.1	2	2	1	1	-	-	-	-	-	-	1
24AMAT33T.2	3	3	2	2	-	-	-	-	-	-	1
24AMAT33T.3	2	2	1	1	-	-	-	-	-	-	1
24AMAT33T.4	3	2	1	2	-	-	-	-	-	-	1
24AMAT33T.5	3	2	1	2	-	-	-	-	-	-	1

Title of the Course: Universal Human Values-II
Category: HSM
Year: II
Semester: I
Course Code: 24AUHV31T
Branches: CE, EEE, ECE,AI&DS,CSE(AI),CSE(DS), AI&ML,CSE(AIML)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The course aims to help students recognize the vital interplay between values and skills, promoting sustained happiness and prosperity. It seeks to foster a holistic perspective on life and profession, encouraging value-based living through a clear understanding of human reality and existence. Additionally, the course emphasizes the ethical implications of such an understanding, fostering trustful behaviour, fulfilling human interactions, and a harmonious relationship with nature.

Course Outcomes:
At the end of the course, the student will be able to
1. comprehend the terms like Natural Acceptance, Happiness and Prosperity
2. analyze one's self, and one's surroundings (family, society, nature)
3. apply human values in enriching human relationships and human society.
4. analyze the need for universal human values and harmonious existence.
5. evaluate themselves as socially and ecologically responsible engineers.

Unit 1 12

Introduction to Value Education

Lecture1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture2: Understanding Value Education
Tutorial 1: Practice Session1: Sharing about oneself
Lecture 3: Self-Exploration as the Process for Value Education
Lecture4: Continuous Happiness and Prosperity – The Basic Human Aspirations
Tutorial 2: Practice Session2: Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session3: Exploring Natural Acceptance

Unit 2 Harmony in the Human Being 8

Lecture 7: Understanding Human being as the co-existence of the self and the body.
Lecture 8: Distinguishing between the needs of the self and the body
Tutorial 4: Practice Session4: Exploring the difference of needs of self and body.
Lecture 9: The body as an instrument of the self
Lecture 10: Understanding harmony in the self
Tutorial 5: Practice Session5: Exploring sources of imagination in the self
Lecture 11: Harmony of the self with the body
Lecture 12: Programme to ensure self-regulation and health
Tutorial 6: Practice Session 6: Exploring harmony of self with the body

Unit 3 Harmony in the Family and Society 8

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session7: Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session 8: Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session9: Exploring systems to fulfil human goal

Unit 4 Harmony in the Nature/Existence 10

Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, Self-Regulation and Mutual Fulfilment among the Four Orders of Nature
Tutorial 10: Practice Session 10: Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session11: Exploring Co-existence in Existence

Unit 5 10

Implications of the Holistic Understanding – A Look at Professional Ethics

Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session 12: Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session13: Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management
Models-Typical Case Studies
Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial 14: Practice Session14: Exploring Steps of Transition towards Universal Human Order

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 of Needs of 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 fulfil Human Goal
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

Prescribed Textbooks:

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

Reference Books:

1. A. Nagaraj. *Jeevan Vidya: Ek Parichaya.* Jeevan Vidya Prakashan, Amarkantak, 1999.
2. A.N. Tripathi. *Human Values.* New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi. *The Story of My Experiments with Truth*
5. E. F Schumacher. *Small is Beautiful*

Web Resources:

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3S2%20Respect%20July%2023.pdf
4. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
5. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%202325%20Ethics%20v1.pdf
6. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-humanvalues/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385https://onlinecourses.swayam2.ac.in/aic22_ge23/preview
7. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning
24AUHV31T.1			-	-	-	-	3	-	1	-	2
24AUHV31T.2			-	-	-	-	3	-	1	-	2
24AUHV31T.3			-	-	-	-	3	-	1	-	2
24AUHV31T.4			-	-	-	-	3	-	1	-	3
24AUHV31T.5			-	-	-	2	3	-	1	-	2

Title of the Course	:	Advanced Data Structures and Algorithm Analysis
Category	:	PC
Year	:	II
Semester	:	I
Course Code	:	24ACSE31T
Branch/es	:	CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: This course will be able to

1. To understand and analyse the time and space complexity of algorithms using asymptotic notations.
2. To study advanced data structures like AVL trees, B-trees, heaps, and graphs, and apply them in real-world problems.
3. To explore algorithmic design paradigms including divide-and-conquer, greedy, and dynamic programming techniques.
4. To solve complex computational problems using backtracking and branch-and-bound strategies.
5. To introduce the concept of NP-completeness and understand the complexity of intractable problems.

Course Outcomes:

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

1. Analyze algorithm performance using time and space complexity and apply asymptotic notations.
2. Implement AVL trees, B-trees, heap trees, and graph traversals for efficient data handling.
3. Solve problems using divide-and-conquer, greedy, and dynamic programming techniques.
4. Apply backtracking and branch-and-bound algorithms to solve combinatorial and optimization problems.
5. Understand NP-hard and NP-complete problems and evaluate the computational complexity of algorithms.

Unit 1 Introduction to Algorithms and advanced Data Structures 10

Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations.
AVL Trees – Creation, Insertion, Deletion operations and Applications
B-Trees – Creation, Insertion, Deletion operations and Applications

Unit 2 Advanced Data Structures and Divide and Conquer 10

Heap Trees (Priority Queues) – Min and Max Heaps, Operations and Applications
Graphs – Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications
Divide and Conquer: The General Method, Quick Sort, Merge Sort, Strassen‟s matrix multiplication, Convex Hull

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Unit 3 Greedy Method and Dynamic Programming

Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths.
Dynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths– General

Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem

Unit 4 Backtracking & Branch and Bound 10

Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem

Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem

Unit 5 NP Hard and NP Complete Problems 10

NP Hard and NP Complete Problems: Basic Concepts, Cook‟s theorem.
NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP)
NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling

Prescribed Textbooks:

1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh, 2nd Edition Universities Press
2. Computer Algorithms in C++, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition University Press

Reference Books:

1. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
2. An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill
3. The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison-Wesley, 1997.
4. Data Structures using C & C++: Langsam, Augenstein & Tanenbaum, Pearson, 1995
5. Algorithms + Data Structures & Programs:, N.Wirth, PHI
6. Fundamentals of Data Structures in C++: Horowitz Sahni & Mehta, Galgottia Pub.
7. Data structures in Java:, Thomas Standish, Pearson Education Asia

Online Learning Resources:

1. https://www.tutorialspoint.com/advanced_data_structures/index.asp
2. http://peterindia.net/Algorithms.html
3. https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24ACSE31T.1	3	2	1	2	-	-	-	-	-	-	-
24ACSE31T.2	3	3	3	2	3	-	-	2	-	-	3
24ACSE31T.3	3	2	1	2	-	-	-	-	-	-	-
24ACSE31T.4	2	1	1	1	-	-	-	-	-	-	-
24ACSE31T.5	-	3	3	2	-	-	-	3	-	2	3

Title of the Course	:	Object Oriented Programming using Java
Category	:	PC
Year	:	II
Semester	:	I
Course Code	:	24ACSE32T
Branch/es	:	CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: This course will be able to

1. To understand the history, evolution, and core principles of Java and object-oriented programming.
2. To learn the use of data types, control structures, classes, objects, methods, and constructors.
3. To implement inheritance, access control, interfaces, and exception handling in Java applications.
4. To explore multithreading, generics, and synchronization for developing concurrent applications.
5. To apply lambda expressions and utilize the Java Collections Framework for efficient data handling.

Course Outcomes:

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

1. Use Java data types, operators, control structures, and arrays to write structured programs.
2. Design and implement classes, methods, constructors, and object-oriented features in Java.
3. Apply inheritance, access control, and exception handling to build robust Java applications.
4. Develop multithreaded programs and use generics for type-safe and reusable code.
5. Implement lambda expressions and work with the Java Collections Framework to manage data efficiently.

Unit 1 Introduction to Java Programming 10

The History and Evolution of Java, Magic: The Byte code, The Java Buzzwords, The Evolution of Java, Java SE 8. Object-Oriented Programming -Two Paradigms, Abstraction, The three OOP Principles, A First Simple Program-Entering the Program, Compiling the Program, Running the Program, Overview of Java, Data Types, Variables, Arrays, operators and control statements. Classes and Objects: Class Fundamentals, Declaration of Objects, Assigning Object Reference Variables, Introducing Methods, Adding a Method to the Class, Returning a Value, Adding a Method That Takes Parameters, Constructors, Parameterized Constructors, The this Keyword, Instance Variable Hiding, Garbage Collection, The finalize() Method, Overloading Methods, Overloading Constructors, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion.

Unit 2 Access Controls and Inheritance 10

Introducing Access Control: Understanding static, Introducing final, Arrays Revisited, Introducing Nested and Inner Classes, Exploring the String Class.

I**nheritance**: Inheritance Basics, Member Access and Inheritance, A Practical Example, Accessing super class members, Usage super key word, Creating a Multilevel Hierarchy, Accessing Constructors in inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Using final with Inheritance. Object Class.

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Unit 3 Packages, Interfaces and Exception Handling

Packages and Interfaces: Packages, Defining a Package, Finding Packages and CLASSPATH, A Short Package Example, Access Protection, an Access Example, Importing Packages.

Interfaces: Defining an Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces, Interfaces Can Be Extended, Default Interface Methods, Default Method Fundamentals, A More Practical Example, Multiple Inheritance Issues, Use static Methods in an Interface, Final Thoughts on Packages and Interfaces.

Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Displaying a Description of an Exception, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Built-in Exceptions, Creating Your Own Exception Subclasses.

Unit 4 Multithreaded Programming and Generics 10

Multithreaded Programming: The Java Thread Model, Thread Priorities, Synchronization, Messaging, The Thread Class and the Runnable Interface, The Main Thread, Creating a Thread, Implementing Runnable, Extending Thread, Choosing an Approach, Creating Multiple Threads, Using isAlive( ) and join( ), Thread Priorities, Synchronization Using Synchronized Methods, The synchronized Statement, Inter thread Communication.

Generics: What Are Generics, Generics Work Only with Reference Types, A Generic Class with Two Type Parameters, The General Form of a Generic Class, Bounded Types, Using Wildcard Arguments, Bounded Wildcards Creating a Generic Method, Generic Constructors, Generic Interfaces, Raw, Generic Class Hierarchies, Using a Generic super class, A Generic Subclass, Run-Time Type Comparisons Within a Generic Hierarchy, Casting, Overriding Methods in a Generic Class, Type Inference with Generics.

Unit 5 Lambda Expressions and The Collection of Framework 10

Lambda Expressions: Introducing Lambda Expressions, Lambda Expression Fundamentals, Functional Interfaces, Some Lambda Expression Examples, Block Lambda Expressions, Generic Functional Interfaces, Passing Lambda Expressions as Arguments, Lambda Expressions and Variable Capture.

java.util Package: The Collections Framework: Collections Overview, The Collection Interfaces: The Collection Interface, The List Interface; The Collection Classes: The ArrayList Class, The LinkedList Class, Accessing a Collection via an Iterator, Using an Iterator, The For-Each Alternative to Iterators, Storing User-Defined Classes in Collections, Working with Maps, The Map Interfaces, The Map Classes, The Collection Algorithms. Arrays, StringTokenizer.

Prescribed Textbook:

1. Herbert Schildt. Java. The complete reference, 11th Edition, Tata McGraw Hill

Reference Books:

1. J.Nino and F.A. Hosch, An Introduction to programming and OO design using Java, John Wiley&sons.
2. Y. Daniel Liang, Introduction to Java programming, Pearson Education. 6th Edition
3. R.A. Johnson- Thomson, An introduction to Java programming and object oriented application development,
4. Cay.S.Horstmann and Gary,Cornell, Core Java 2, Vol. 1, Fundamentals, Pearson Education. 7th Edition,
5. P. Radha Krishna, Object Oriented Programming through Java, University Press.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24ACSE32T.1	3	3	-	-	-	3	-	3	2	-	2
24ACSE32T.2	3	3	3	3	-	3	-	3	-	-	2
24ACSE32T.3	3	3	3	3	-	3	-	3	2	-	-
24ACSE32T.4	3	3	3	3	1	3	-	3	-	-	-
24ACSE32T.5	3	3	3	3	-	3	-	3	-	-	-

Title of the Course : Digital Logic Design and Computer Organization
Category : PC
Year : II
Semester : I
Course Code : 24ACSE33T
Branch/es : CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	-	-	3

Course Objectives: This course will be able to

1. Introduce data representation techniques and the basic structure of computers.
2. Develop understanding of digital logic circuits, simplification techniques, and their applications.
3. To understand computer arithmetic operations and how they are implemented using hardware algorithms
4. To provide insights into memory hierarchy, storage devices, and performance considerations.
5. Introduce input/output systems, interrupt mechanisms, and standard I/O interfaces

Course Outcomes:
At the end of the course, the student will be able to

1. Represent data using different number systems and understand basic computer architecture.
2. Design, simplify, and analyse both combinational and sequential digital logic circuits.
3. Perform fixed and floating-point arithmetic operations and understand processor execution cycles.
4. Analyse memory systems, including cache and virtual memory, and evaluate their performance.
5. Explain I/O operations, manage hardware interrupts, and describe standard interface mechanisms

Unit 1 Data Representation and Basic Structure of Computer 10

Data Representation: Number base conversions, Octal and Hexadecimal Numbers, Signed binary numbers, Binary Numbers, Fixed Point Representation. Floating Point Representation, Binary codes
Basic Structure of Computers: Computer Types, Computer Generations, Functional units, Basic operational concepts, Bus structures.

Unit 2 Digital Logic Circuits 10

DIGITAL LOGIC CIRCUITS - I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions, K-Map Simplification, Combinational Circuits.
DIGITAL LOGIC CIRCUITS - II: Flip-Flops, Registers, Shift Registers, Binary counters, Decoders, Multiplexers.

Unit 3 Computer Arithmetic and Process Organization 10

Computer Arithmetic: Algorithms for fixed point and floating point addition, subtraction, multiplication and division operations.
Processor Organization: Introduction to CPU, Execution of a Complete Instruction, Multiple-Bus

Organization, Hardwired Control and Multi programmed Control.

Unit 4 The Memory Organization 10

The Memory Organization: Basic Concepts, RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

Unit 5 Input/ Output Organization 10

Input /Output Organization: Introduction to I/O, Interrupts- Hardware, Enabling and disabling Interrupts, Device Control, Direct memory access, buses, Interface Circuits, Standard I/O Interfaces.

Prescribed Textbooks:

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 6th edition, McGraw Hill
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education

Reference Books:

1. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.
2. Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson
3. Computer Organization and Design, David A. Paterson, John L. Hennessy, Elsevier
4. Fundamentals of Logic Design, Roth, 5thEdition, Thomson
5. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24ACSE33T.1	3	2	1	2	-	-	-	-	-	-	-
24ACSE33T.2	3	3	3	2	3	-	-	2	-	-	3
24ACSE33T.3	3	2	1	2	-	-	-	-	-	-	-
24ACSE33T.4	2	1	1	1	-	-	-	-	-	-	-
24ACSE33T.5	-	3	3	2	-	-	-	3	-	2	3

Title of the Course	:	Advanced Data Structures and Algorithm Analysis Lab
Category	:	PC
Year	:	II
Semester	:	I
Course Code	:	24ACSE31L
Branch/es	:	CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives: This course will be able to

1. Acquire practical skills in constructing and managing Data structures.
2. Use the Java SDK environment to create, debug and run simple Java Programs.

Course Outcomes:

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

1. Design and develop programs to solve real world problems with the popular algorithm design methods.
2. Demonstrate an understanding of Non-Linear data structures by developing implementing the operations on AVL Trees, B-Trees, Heaps and Graphs.
3. Critically assess the design choices and implementation strategies of algorithms and data structures in complex applications.
4. Utilize appropriate data structures and algorithms to optimize solutions for specific computational problems.
5. Compare the performance of different of algorithm design strategies

Exercise 1 3

Construct an AVL tree for a given set of elements which are stored in a file. And implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order.

Exercise 2 3

Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.

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Exercise 3

Construct Min and Max Heap using arrays, delete any element and display the content of the Heap

Exercise 4 3

Implement BFT and DFT for given graph, when graph is represented by

a) Adjacency Matrix b) Adjacency Lists

Exercise 5 3

Write a program for finding the bi-connected components in a given graph..

Exercise 6 3

Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).

Exercise 7 3

Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.

Exercise 8 3

Implement Job Sequencing with deadlines using Greedy strategy.

Exercise 9 3

Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.

Exercise 10 3

Implement N-Queens Problem Using Backtracking

Exercise 11 3

Use Backtracking strategy to solve 0/1 Knapsack problem

Exercise 12 3

Implement Travelling Sales Person problem using Branch and Bound approach.

Reference Books:

1. Fundamentals of Data Structures in C++, Horowitz Ellis, Sahni Sartaj, Mehta, Dinesh, 2nd Edition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition, University Press
3. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
4. An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill

Online Learning Resources:

1. http://cse01-iiith.vlabs.ac.in/
2. http://peterindia.net/Algorithms.html

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2	PSO3
24ACSE31L.1	1	-	3	-	3	3	3	3	-	3	-	3	-	2
24ACSE31L.2	-	-	3	3	3	-	3	-	-	3	-	3	-	2
24ACSE31L.3	-	-	3	3	3	3	3	3	-	3	-	3	-	2
24ACSE31L.4	-	-	3	-	3	3	3	3	-	3	-	3	-	2
24ACSE31L.5	-	-	3	-	3	3	-	3	-	3	-	3	-	2

Title of the Course	:	Object Oriented Programming using Java Lab
Category	:	PC
Year	:	II
Semester	:	I
Course Code	:	24ACSE32L
Branch/es	:	CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives: This course will be able to

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods.
2. Understand fundamentals of Object-Oriented Programming in Java, Including defining classes, Invoking methods, using libraries.
3. Aware of the important topics and principles of software development.
4. Have the ability to write a computer program to solve specified problems.
5. Use the Java SDK environment to create, debug and run simple Java Programs.

Course Outcomes:

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

1. Design and implement the programs to demonstrate classes, objects and encapsulation.
2. Demonstrate and implement the principles of inheritance, polymorphism, constructor overloading, and method overloading
3. Understanding the use of packages, creation of packages, importing the packages and the importance of the collection of framework
4. Implementation of multithread programming, Thread Priority, Exception Handling and Creation of own Exceptions.
5. Implement and demonstrate generic programming, lambda expressions and collection of framework.

Exercise 1 3

a) Write a program using classes and objects in java?

b) Write a Java program to calculate sum of 5 subjects and find percentage.

c) Write a Java program to convert temperature from Centigrade to Fahrenheit and Fahrenheit to Centigrade

d) Write a Java program to perform the arithmetic operations using switch case statement

Exercise 2 3

a) Write a Java program to display all strong numbers between 1 to n.

b) Write a Java program to display Fibonacci series between 1 to n.

c) Write a Java program to find the factorial of a given number using recursion.

d) Write a Java program to find multiplication of two matrices.

e) 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.

Exercise 3 3

a) Write a Java program to implement the access control.

b) Write a Java program to implement the method overloading.

c) Write a program to call default constructor first and then any other constructor in the class?

d) Create a class Box that uses a parameterized constructor to initialize the dimensions of a box. 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.

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

A static method called powerInt(int num1,int num2) This method should return num1 to the power num2. A static method called powerDouble(double num1,double num2). This method should return num1 to the power num2. Invoke both the methods and test the functionality. Also count the number of objects created

Exercise 4 3

a) Write a Java program to implement the method overriding.

b) 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.

c) 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 of Figure_3D. Create an array of Figure_3D, fill it with different specific types of Figure_3Ds and call your base class methods

Exercise 5 3

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.

b) Write a Java program to implement the multiple inheritance using interfaces.

Exercise 6 3

a) Write a Java program to find whether the given string is palindrome or not.

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

c) Accept an array of strings and display the number of vowels and consonants occurred in each string.

d) Accept a String and a number n from user. Divide the given string into substrings each of size n and sort them lexicographically

Exercise 7 3

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

b) Write a Java program to implement the nested try statement.

c) Write a Java program to implement the own exception class.

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Exercise 8

a) Write a Java program for multi-thread implementation.

Note: First thread displays “Good Morning” every one second, the second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.

b) Write a Java program to use the is Alive() and join() methods.

c) Write a program to illustrate Thread synchronization.

d) Write a Java program to implement producer consumer problem using inter-thread communication mechanism.

Exercise 9 3

a) Create a generic Stack class that can hold any type of object. Implement the following methods: i) void push(T obj): pushes an object onto the top of the stack, ii) T pop(): removes and returns the object at the top of the stack iii) boolean is Empty(): returns true if the stack is empty, false otherwise

b) Create a generic class for sorting the elements of different data types.

c) Any two programs on Lambda expressions.

Exercise 10 3

a) Write a Java program to display the sum of all the integers of given line of integers using StringTokenizer class.

b) Write a Java program to demonstrate the working of LinkedList collection class.

c) Write a Java program to create a Priority Queue and add some elements to it. Then remove the highest priority element from the Priority Queue and print the remaining elements

Prescribed Text Books:

1. H.M.Dietel and P.J.Dietel, Java How to Program 6thEdition, Pearson Education/PHI
2. Y.Daniel Liang, Introduction to Java programming, Pearson Education, 6thEdition.

Reference Books:

1. Cay Horstmann, Big Java, 2ndedition, Wiley Student Edition, Wiley India Private Limited.
2. Herbert Schildt. Java. The complete reference, TMH. 9thEdition.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24ACSE32L.1	1	-	3	-	3	3	3	3	-	3	-
24ACSE32L.2	-	-	3	3	3	-	3	-	-	3	-
24ACSE32L.3	-	-	3	3	3	3	3	3	-	3	-
24ACSE32L.4	-	-	3	-	3	3	3	3	-	3	-
24ACSE32L.5	-	-	3	-	3	3	-	3	-	3	-

Title of the Course	:	Digital Logic Design and Computer Organization Lab
Category	:	PC
Year	:	II
Semester	:	I
Course Code	:	24ACSE33L
Branch/es	:	CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives: This course will be able to

1. Understand the basics of logic gates.
2. Know basic combinational circuits and verify their functionalities
3. Apply the design procedures to design basic sequential circuits
4. Learn about counters and Shift Registers
5. Understand the basic digital circuits and to verify their operation

Course Outcomes:

1. At the end of the course, the student will be able to
2. Develop Boolean equations and truth tables for synthesis using different logic gates
3. Design combinational and sequential logic circuits.
4. Develop various shift registers and Counters
5. Design and construct synchronous, asynchronous counters and special type of counters
6. Design and construct ALU, CPU and Memory

Exercise 1 3

To verify the truth table of basic logic gates AND, OR, NOT, NAND, NOR, XOR, XNOR and their realization using universal logic gates

Exercise 2 3

a) To realize Half adder, Full adder, Half Subtractor and Full Subtractor using logic gates.
b) To realize Half Adder, Full adder, Half subtractor and Full subtractor using NAND gate

Exercise 3 3

a) To implement 2-to-4 Decoder and 3-to-8 Decoder using logic gates.
b) To implement Full adder using 3-to-8 Decoder.

Exercise 4 3

a) To implement 2-to-1, 4 to 1, 8 to 1 multiplexer using logic gates.
b) To implement Full adder using 4 to 1 multiplexer

Exercise 5 3

To Realize and verify the truth table of SR, JK, D and T flip flop.

Exercise 6 3

Create a 4-bit ripple carry adder circuit using half adders and full adders and test it by giving proper input.

Exercise 7 3

Design a 5-bit Shift Registers using the flip-flops and check the output

Exercise 8 3

Create a combinational multiplier circuit to multiply two 4-bit binary numbers. Use half adders, full adders and logic gates and test it by giving proper input

Exercise 9 3

a) Design a 4-bit Booth's multiplier circuit

b) Design a 4-bit ALU comprising only the AND, OR, XOR and Add operations.

Exercise 10 3

Design a 4X3 RAM memory which will have 4 words each of 3 bits using binary RAM cells, decoder with enable, OR gates and test it by giving proper input.

Exercise 11 3

a) Design a CPU with single instruction

b) Design a CPU with more instructions

Exercise 12 3

To understand the Karnaugh Maps.

Prescribed Textbooks:

1. Stephen Brown, ZvonkoVranesic, —Fundamentals of Digital Logic with Verilog Design‖, Tata McGraw Hill Publishing Company Limited, Second Edition.
2. 2. M Morris Mano, Micheal D Ciletti —Digital Design with an introduction to the verilog HDL‖, Pearson Education, Fifth Edition, 2013

Reference Books:

1. Donald D Givone, —Digital Principles and Design‖, Tata McGraw Hill Publishing Company Limited, 2003.
2. http://vlabs.iitkgp.ac.in/coa

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2	PSO3
24ACSE33L.1	3	3	3	-	-	-	-	-	-	3	3	-	-	-
24ACSE33L.2	3	3	3	2	3	-	-	2	-	3	3	-	2	-
24ACSE33L.3	3	3	-	-	-	1	-	-	-	3	3	-	-	-
24ACSE33L.4	-	3	-	3	3	-	-	3	-	3	-	-	-	-
24ACSE33L.5	-	3	3	2	-	-	-	3	-	3	3	-	-	-

Title of the Course	:	Full Stack Development
Category	:	SEC
Year	:	II
Semester	:	I
Course Code	:	24ACSE34L
Branch/es	:	CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives: This course will be able to

1. Interpret and use HTML concepts in developing the web pages
2. Use the tables and forms controls to design web pages.
3. Use the CSS to design web pages.
4. Interpret the JavaScript programming language
5. Use JavaScript DOM concepts to create dynamic webpages.

Course Outcomes: At the end of the course, the student will be able to

1. Interpret and apply the fundamental HTML mark-ups when designing web pages
2. Apply and design the web pages with Tables and forms controls.
3. Implement cascading style sheets to design web pages
4. Interpret and use JavaScript concepts in designing web pages
5. Implement JavaScript DOM concepts to create dynamic webpages.

Unit 1 Introduction to HTML 10

Structuring Documents for the Web-A Web of Structured Documents, Introducing HTML, Tags and Elements, Attribute Groups: Core Attributes, Internationalization, Core Elements, Basic Text Formatting, Understanding Block and Inline Elements, Grouping Content, Text Processing tags, working with lists: ordered, unordered, Nested lists.

Links and Navigation :Basic Links, Creating In-Page Links with the Element

Unit 2 Design of Webpages 10

Images: adding images, using images as links. Audio and video: adding audio and video to your webpages.

Tables: Introducing Tables, Basic Table Elements and Attributes, adding a Caption to a Table, Grouping Sections of a Table, Nested Tables.

Forms: Introducing Forms, creating a Form with the Top of Form Element, Form Controls, and Creating Labels for Controls and the Element, Structuring Your Forms with field set and legend Elements, Focus, Disabled and Read-Only Controls.

Unit 3 Design of Webpages using CSS 10

Working with Frames: frame and frameset elements.

Cascading Style Sheets: Introducing CSS, CSS Properties: Controlling Text, Text Formatting, and Text Pseudo-Classes. Styling Text: Selectors-universal, ID, class, Child, Descendant, Adjacent sibling, general sibling. Lengths, Introducing the Box Model: An Example Illustrating the Box Model.

More CSS: Backgrounds, Lists, Tables.

Unit 4 Introduction to Java Script 10

JavaScript: Introduction to JavaScript, How to Add a Script to Your Pages, comments in JavaScript, Create an External JavaScript, Input and Output in javas cript. JavaScript Programming console, General Programming Concepts: Variables, Operators, String Operators (Using + with Strings), Functions, Conditional Statements, Loops.

Unit 5 Java Script DOM 10

JavaScript pre-defined object properties and methods: Document, Window, Array, Math, String, Regex. Document object model: DOM tree, Accessing elements: Class, id, Tagname. Update Text content Using text Content, Inner Text and Inner HTML property. Adding an Element to the DOM Tree, Removing an element from the DOM Tree.

Prescribed Books:

1. Beginning HTML and CSS Rob Larsen, Wrox Programmer to Programmer.
2. Jon Duckett, "javascript & jQuery: Interactive Front-End Web Development", Wiley, 2014.

Reference Books:

1. JavaScript and JQuery: Interactive Front-End Web Development, Jon Duckett, Wiley Publications
2. Web Design with HTML, CSS, JavaScript and jQuery Set, Jon Duckett, Wiley Publications
3. jQuery in Action, Bear Bibeault, Yehuda Katz, and Aurelio De Rosa, Third Edition, Manning Publications

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24ACSE34L.1	3	2	3	1	3	-	-	-	1	-	2
24ACSE34L.2	3	2	3	1	3	-	-	-	1	-	2
24ACSE34L.3	3	2	3	1	3	-	-	-	1	-	2
24ACSE34L.4	3	3	3	2	3	-	-	-	2	-	2
24ACSE34L.5	3	3	3	2	3	-	-	-	2	-	2

Title of the Course : Database Management Systems
Category : PC
Year : II
Semester : II
Course Code : 24ACSE41T
Branch/es : CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: This course will be able to

1. To introduce the fundamental concepts and architecture of database systems and the basics of SQL
2. To understand database design using the Entity-Relationship (ER) model and its mapping to relational models.
3. To develop skills in writing SQL and PL/SQL queries, including functions, procedures, and triggers.
4. To understand normalization techniques and schema refinement for maintaining data integrity and reducing redundancy.
5. To learn transaction management concepts and concurrency control mechanisms in database systems.

Course Outcomes:

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

1. Explain the basic structure, components, and applications of database systems and perform basic SQL operations.
2. Design conceptual data models using ER diagrams and convert them into relational schemas.
3. Write complex SQL and PL/SQL queries including joins, views, sub queries, triggers, and cursors.
4. Apply normalization techniques and functional dependency concepts to design efficient and consistent database schemas.
5. Understand and implement transaction properties, concurrency control, and recovery mechanisms in DBMS.

Unit 1 Introduction to DBMS and Basics of SQL 10

INTRODUCTION: Database-System Applications, Characteristics, Purpose of Database Systems, View of Data, Database Languages, Data Storage and Querying, Transaction Management, Data Base Architecture, Database Users and Administrators.

Basic SQL: Simple Database Schema ,data types, table definitions(create, alter),different DML operations(insert, delete, update)

Unit 2 Database Design 10

DATABASE DESIGN: Database Design and ER Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model, Case study: The Internet Shop. The Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity Constraints, Querying Relational Data, Logical Data Base Design: ER to Relational.

Unit 3 SQL and PL/SQL 10

SQL AND PL/SQL: Introduction to SQL, Data Definition Commands, Data Manipulation Commands, Basic SQL Querying(Select and project) Select Queries, Virtual Tables: Creating View, Altering View, Updating View, Destroying View, Relational Set Operators, SQL Join Operators, Sub Queries and Correlated Queries, implementation of different integrity constraints, Aggregate Functions, Procedural SQL: Stored Procedures, Stored Functions, Triggers, Cursors

Unit 4 Introduction to schema Refinement 10

Introduction to Schema Refinement: Purpose of Normalization or Schema refinement Problems Caused by Redundancy, Decompositions, Problems Related to Decomposition, Functional Dependencies, Reasoning about FDs, Normal Forms: 1NF, 2NF, 3NF, BCNF, Properties of Decomposition: Lossless Join Decomposition, Dependency Preserving Decomposition, Multivalued Dependencies, 4 NF.

Unit 5 Transactions and concurrency control 10

ACID Properties: Consistency and Isolation, Atomicity and Durability, Transactions and Schedules, Serializability, Recoverability, Testing for serializability, Concurrent Execution of Transactions, Lock-Based Concurrency Control, Performance of Locking, Transaction Support in SQL. Deadlocks, Recovery and Atomicity.

Prescribed Textbook:

1. Silberschatz, Korth, Sudarshan, Database System Concepts. McGraw Hill, 5th Edition.
2. Raghu RamaKrishnan, Johannes Gehrke, Database Management Systems, McGraw Hill, Third Edition.

Reference Books:

1. C.J. Date, Introduction to Database Systems, Pearson Education, 8th Edition.
2. Database Management System,6th edition,Ramez Elmasri,Shamkant B.Navathe, Pearson.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24ACSE41T.1	3	2	1	1	2	-	-	1	2	-	2
24ACSE41T.2	3	3	3	2	2	-	-	1	2	1	2
24ACSE41T.3	3	2	3	2	3	-	-	1	2	1	2
24ACSE41T.4	3	3	3	2	2	-	-	-	1	-	2
24ACSE41T.5	3	3	2	3	3	-	-	-	1	1	2

Title of the Course : Software Engineering
Category : PC
Year : II
Semester : II
Course Code : 24ACSE42T
Branch/es : CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: This course will be able to

1. To understand the evolution of software engineering and various software development life cycle models.
2. To impart knowledge on software project management, including estimation techniques, risk management, and requirement analysis.
3. To study software design principles, including modularity, cohesion, coupling, and interface design.
4. To learn coding standards, testing strategies, software quality assurance, and reliability techniques.
5. To explore software maintenance, CASE tools, and software reuse concepts and methodologies

Course Outcomes:

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

1. Explain the software development life cycle models and identify suitable models for different software projects.
2. Analyze and document software requirements using specification techniques and apply estimation models like COCOMO.
3. Design function-oriented and user-friendly software systems with proper design strategies and user interfaces.
4. Implement coding standards and conduct effective testing to ensure software reliability and quality.
5. Understand the processes of software maintenance, CASE tools, and approaches to software reuse

Unit 1 Introduction to Software Engineering 10

Introduction: Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering.

Software Life Cycle Models: Basic concepts, Waterfall model and its extensions, Rapid application development, Agile development model, Spiral model

Unit 2 Software Requirement Analysis 10

Software Project Management: Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project estimation techniques, Empirical Estimation techniques, COCOMO, Halstead's software science, risk management.

Requirements Analysis and Specification: Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL

Unit 3 Software Design 10

Software Design: Overview of the design process, how to characterize a good software design? Layered arrangement of modules, Cohesion and Coupling. Approaches to software design.

Agility: Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process (Textbook 2)

Function-Oriented Software Design: Overview of SA/SD methodology, Structured analysis, Developing the DFD model of a system, Structured design, Detailed design, and Design Review.

User Interface Design: Characteristics of a good user interface, Basic concepts, Types of user interfaces, Fundamentals of component-based GUI development, and user interface design methodology.

Unit 4 Software Coding and Testing 10

Coding And Testing: Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing, testing object-oriented programs, Smoke testing, and some general issues associated with testing.

Software Reliability and Quality Management: Software Reliability. Statistical testing, Software quality, Software quality management system, ISO 9000. SEI Capability maturity model. Few other important quality standards, and Six Sigma.

Unit 5 Software Maintenance 10

Computer-Aided Software Engineering (Case): CASE and its scope, CASE environment, CASE support in the software life cycle, other characteristics of CASE tools, Towards second generation CASE Tool, and Architecture of a CASE Environment.

Software Maintenance: Characteristics of software maintenance, Software reverse engineering, and Software maintenance process models and Estimation of maintenance cost.

Software Reuse: reuse- definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, A reuse approach, and Reuse at organization level.

Prescribed Textbook:

1. Software Engineering A Practitioner's Approach, Roger S. Pressman, 9th Edition, Mc-Graw Hill International Edition
2. Fundamentals of Software Engineering, Rajib Mall, 5th Edition, PHI.

Reference Books:

1. Software Engineering, Ian Sommerville,10th Edition, Pearson.
2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press

e-Resources:

1) https://nptel.ac.in/courses/106/105/106105182/
2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview
3) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview

Co-Po Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24ACSE42T.1	3	3	2	1	2	-	-	1	1	1	2
24ACSE42T.2	3	3	3	2	3	-	-	1	1	1	2
24ACSE42T.3	3	3	3	3	3	-	-	2	1	2	3
24ACSE42T.4	3	3	3	3	3	2	-	2	1	2	3
24ACSE42T.5	3	3	3	3	3	2	-	2	2	2	3

Title of the Course : Introduction to Data Science
Category : PC
Year : II
Semester : II
Course Code : 24AID41T
Branch/es : AI&DS, CSE(DS)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: This course will be able to
1. Knowledge and expertise to become a data scientist.
2. Essential concepts of statistics and machine learning that are vital for data science.
3. Significance of exploratory data analysis (EDA) in data science.
4. Critically evaluate data visualizations presented on the dashboards
5. Suitability and limitations of tools and techniques related to data science process

Course Outcomes:
At the end of the course, the student will be able to
1. Understand the data science process and its components, including data cleansing and exploratory analysis.
2. Apply machine learning techniques for feature engineering and model selection using Python tools.
3. Analyze the NoSQL movement and the principles guiding NoSQL databases in handling big data.
4. Utilize graph databases and Python libraries for text mining and analytics in data science applications.
5. Develop data visualizations and interactive dashboards to present findings from data science projects.

Unit 1 Introduction to Data Science **10**

Introduction to Data science, benefits and uses, facets of data, data science process in brief, big data ecosystem and data science

Data Science process**:** Overview, defining goals and creating project charter, retrieving data, cleansing, integrating and transforming data

Unit 2 Handling large Data **10**

Applications of machine learning in Data science, role of ML in DS, Python tools like sklearn, modelling process for feature engineering, model selection, validation and prediction, types of ML, semi-supervised learning

Handling large data**:** problems and general techniques for handling large data, programming tips for dealing large data, case studies on DS projects for predicting malicious URLs, for building recommender systems.

Unit 3 NoSQL Movement for handling Bigdata **10**

NoSQL movement for handling Bigdata**:** Distributing data storage and processing with Hadoop framework, case study on risk assessment for loan sanctioning, ACID principle of relational databases, CAP theorem, base principle of NoSQL databases, types of NoSQL databases, case study on disease diagnosis and profiling.

Unit 4 Applications of Data Science 10

Tools and Applications of Data Science: Introducing Neo4jfor dealing with graph databases, graph query language Cypher, Applications graph databases, Python libraries like nltk and SQLite for handling Text mining and analytics, case study on classifying Reddit posts .

Unit 5 Data Visualization and Prototype Application Development 10

Data Visualization and Prototype Application Development**:** Data Visualization options, Crossfilter, the JavaScript MapReduce library, Creating an interactive dashboard with dc.js, Dashboard development tools. Applying the Data Science process for real world problem solving scenarios as a detailed case study.

Prescribed Textbooks:

1. Davy Cielen, Arno D.B.Meysman, and Mohamed Ali, "Introducing to Data Science using Python tools", Manning Publications Co, Dreamtech press, 2016
2. Prateek Gupta, "Data Science with Jupyter" BPB publishers, 2019 for basics

Reference Books:

1. Joel Grus, "Data Science From Scratch", OReilly, 2019
2. Doing Data Science: Straight Talk From The Frontline, 1 st Edition, Cathy O'Neil and Rachel Schutt, O'Reilly, 2013

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development t of solutions	Conduct investigations of Complex Problems	Engineering tools usage	The Engineer and World	Ethics	Individual and collaborative teamwork	Communication	Project Management and Finance	Life-long Learning
24AAID41T.1	3	3	-	-	-	3	-	-	3	2	-
24AAID41T.2	3	3	3	3	-	3	2	-	3	-	-
24AAID41T.3	3	3	3	3	-	3	-	-	3	2	-
24AAID41T.4	3	3	3	3	1	3	2	-	3	-	-
24AAID41T.5	3	3	3	3	-	3	-	-	3	-	-

Title of the Course:	Probability and Statistics
Category:	BS
Year:	II
Semester:	II
Couse Code:	24AMAT41T
Branch:	CE, ME ,CSE, AI&DS, CSE (AI), CSE (DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives

The course aims to build a strong foundation in probability and statistics for modeling and analyzing data under uncertainty. It covers probability theorems, random variables, distributions, correlation, estimation, and hypothesis testing for large and small samples. Students will gain the ability to apply statistical tools in data analysis, research, and engineering problem-solving.

Course Outcomes:

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

1. apply the concepts of probability theorems in stochastic process
2. apply the probability distribution in real life problems
3. calculate the correlation between two variables
4. evaluate the hypotheses of large samples
5. evaluate the hypotheses of small samples

Unit 1: Probability **10**

Probability - axioms of probability – addition theorem of probability - conditional probability-multiplication theorem of probability (without proof) - Baye's theorem.
Random variables - discrete and continuous - Distribution functions - Mean and Variance.

Unit 2: Probability distributions **8**

Probability distributions – Binomial and Poisson distribution - fitting - normal distribution - their properties.

Unit 3: Introduction of statistics **8**

Introduction of Statistics – Mean - Median and Mode for ungrouped and grouped data.
Correlation - correlation coefficient : Karl Pearson's coefficient - Spearman's rank correlation

Unit 4: Estimation and Testing of hypothesis for large samples **10**

Estimation - Point estimation - Interval estimation of one mean (small and large) - one Proportion (large).
Test of Hypothesis: Types of errors, one and two tailed tests, level of significance, single mean -difference of means - single proportion - difference of proportions (large).

Unit 5: Testing of hypothesis for small samples **8**

Student t-distribution test for single mean - two means and paired t-test,
Testing of equality of variances (F-test) - χ^2 test for goodness of fit - χ^2 test for independence of attributes.

Textbooks:

1. Miller and Freund, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
3. T. K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, Probability and Statistics, 2nd edition, S. Chand, 2010.

CO-PO Mapping:

CO	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and society	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24AMAT41T.1	3	2	1	2	-	-	-	-	-	-	-
24AMAT41T.2	3	2	1	2	-	-	-	-	-	-	-
24AMAT41T.3	3	2	1	2	-	-	-	-	-	-	-
24AMAT41T.4	3	3	1	2	-	-	-	-	-	-	-
24AMAT41T.5	3	3	1	2	-	-	-	-	-	-	-

Title of the Course : Management Science
Category : MBA
Year : II
Semester : II
Course Code : 24AMBA42T
Branch/es : AI&DS, AI&ML, CSE(AI), CSE(DS)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
3	0	0	3

Course Objectives: The course aims to provide a comprehensive understanding of the basic concepts of Management and various Organizational Structures, along with their types, merits, and demerits. It emphasizes the importance of comprehending the key functions of Human Resource Management (HRM) while also enabling students to develop an idea about Operations Management and Project Management. Furthermore, it seeks to build a foundation in the essential areas of Financial Management and Marketing Management. In addition, the course covers the fundamental concepts of Total Quality Management (TQM), Supply Chain Management (SCM), Business Ethics, and Management Information Systems (MIS), offering learners a holistic perspective on management practices.

Course Outcomes:
At the end of the course, the student will be able to
1. Summarize the basic concepts of management and organization structures.
2. Analyze the different human resource management process.
3. Apply the concepts of PERT, CPM to find the critical path for project success.
4. Apply different financial and marketing strategies in the organization.
5. Comprehend the different concepts of TQM, SCM, Ethics, and MIS & ERP in an organization.

Unit 1 Management and Organization Structure 12

Meaning, Nature, Concept and Importance of Management, Functions of Management, Evolution of Management Thought: Taylor Scientific Management, Fayol's Administrative Management, Systems Approach. Roles and Skills of Manager, Principles and Need of Organization Structure, Forms of Organization Structure: Line, Line and Staff, Functional, Divisional and Matrix Organizations.

Unit 2 Human Resources Management (HRM) 12

Definition, Significance of HRM, Functions of HRM, HR Planning Process, Job Analysis, Job Design, Recruitment and Selection, Placement, Induction and Training, Performance Appraisal, Compensation, Industrial Relations.

Unit 3 Operations Management and Project Management 12

Introduction and Functions of Operations, Plant Location and Layout, Methods of Production (Job, Batch and Mass Production), Objectives of Inventory Management, Need for Inventory Control, Method of Inventory Management: EOQ, ABC Analysis. Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM).

Unit 4 Financial Management and Marketing Management 12

Objectives, Scope, Techniques of Investment Analysis, Pay Back Period, Accounting Rate of Return, and Working Capital, Cost of Capital, Sources of Financing, Definitions of Marketing, Core Concepts of Marketing, Marketing Mix, Product Levels – Product Life Cycle, Pricing Objectives, Pricing Methods

Unit 5 Advances in Management Practices 12

Definitions of quality, Basic concepts of TQM, TQM framework, Principles of Total Quality Management (TQM), Definitions of Supply Chain Management, Decision Phases in Supply Chain, Transportation Services, Overview Of Ethics, Nature and Objectives of Ethics, Relationship Between Ethics and Organization, Basic Concepts and Overview of Management Information System (MIS), Enterprise Resource Planning (ERP).

Prescribed Textbooks:

1. Principles and Practice of Management by L M Prasad.,Sultan Chand & Sons Publisher.
2. Human resource management, Aswathappa, 4th Edition, THM 2006.
3. Management Science by Aryasri, McGraw Hill Education India, ISBN: 9780070090279.
4. Operations Management by James R Evans & David A Coller, Thompson Press Publications.
5. Marketing Management By Philip Kotler, Kevin Lane Kellar, 12/e, Pearson 2007

Reference Books:

1. Stoner, Freeman, Gilbert, Management, Pearson Edu., 2005, 6th Ed. ISBN: 9788131707043
2. Panneer Selvam, Production and Operations Management. PHI, 2004. ISBN, 8120324528, 9788120324527

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The Engineer and world	Ethics	Individual and Collaborative teamwork	Communication	Project management and finance	Life-long learning
24AMBA42T.1	2	1	2	-	1	-	-	1	1	1	-
24AMBA42T.2	2	2	2	1	1	1	1	1	1	1	1
24AMBA42T.3	1	1	-	1	-	1	-	2	1	1	-
24AMBA42T.4	1	2	2	1	1	1	1	-	-	-	2
24AMBA42T.5	2	2	2	1	1	1	-	2	-	1	-

Title of the Course	:	Database Management Systems Lab
Category	:	PC
Year	:	II
Semester	:	II
Course Code	:	24ACSE41L
Branch/es	:	CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives: This course will be able to

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, the student will be able to

1. Understand and apply SQL commands for creating, altering, and managing database tables and constraints.
2. Construct complex SQL queries using various conditions, aggregate functions, and sub queries.
3. Develop PL/SQL programs utilizing control structures, exception handling, and transaction management.
4. Implement stored procedures, functions, and triggers to enhance database operations and integrity.
5. Create Java applications that connect to databases using JDBC for data manipulation and retrieval.

Exercise 1 3

Draw Relational Databases and ER Diagrams for the following applications.

a) Student Information System, Student(Student No, Student Name, Address, Mobile No, Email ID, Institute Name, Branch Name, Fee, Mark1, Mark2, Mark3, Mark4, Mark5,TotalMarks,Percentage,Grade)

b) Employee Information System, Employee (Employee ID, Employee Name, Address, Mobile No, Email ID, Organization Name, Employee Designation, Basic Salary, DA, HRA, Gross Salary, Deductions, Net Salary)

Exercise 2 3

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

Exercise 3 3

Queries (along with sub-Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example: - Select the roll number and name of the student who secured fourth rank in the class

Exercise 4 3

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

Exercise 5 3

Write SQL queries to perform JOIN OPERATIONS (i.e. CONDITIONAL JOIN, EQUI JOIN, LEFT OUTER JOIN, RIGHT OUTER JOIN, FULL OUTER JOIN

Exercise 6 3

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 (Sys date, next day, add months, last day, months between, least, greatest, trunc, round, to_char, to date)

Exercise 7 3

a)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)

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

Exercise 8 3

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

Exercise 9 3

a) Write SQL queries to perform KEY CONSTRAINTS (i.e. primary key, foreign key, unique not null, check, default).

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

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

Exercise 10 3

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

b)Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

Exercise 11 3

Create a table and perform the search operation on table using indexing and non-indexing techniques

Exercise 12 3

a)Write a Java program that connects to a database using JDBC

b)Write a Java program to connect to a database using JDBC and insert values into it

c) 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

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning
24ACSE41L.1	3	2	-	-	-	-	-	-	-	-	-
24ACSE41L.2	3	3	-	2	-	-	-	-	-	-	-
24ACSE41L.3	3	2	-	3	-	-	-	-	-	-	-
24ACSE41L.4	3	2	3	-	2	-	-	-	-	-	-
24ACSE41L.5	3	2	3	-	3	1	-	-	-	-	-

Title of the Course	:	Software Engineering Lab
Category	:	PC
Year	:	II
Semester	:	II
Course Code	:	24ACSE42L
Branch/es	:	CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives: This course will be able to

1. To familiarize students with software engineering processes, tools, and techniques through hands-on implementation.
2. To develop the ability to gather requirements and create software requirement specifications (SRS) for real-world applications.
3. To enable students to design system models using Data Flow Diagrams (DFDs) and Unified Modelling Language (UML).
4. To implement test cases and apply software testing techniques like black-box and white-box testing.
5. To promote teamwork, documentation, and presentation skills through mini projects or case studies.

Course Outcomes:

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

1. Prepare Software Requirement Specifications (SRS) and functional models for given problems.
2. Design and document software using tools such as DFDs, UML diagrams, and design notations.
3. Implement and validate software components using software engineering practices and testing strategies.
4. Apply software testing tools and write test cases to ensure software quality and reliability.
5. Demonstrate effective teamwork, prepare professional documentation, and deliver structured presentations by engaging in mini projects or case studies.

Exercise 1 3

a) Define a problem statement.

b) Preparation of Software Requirement Specification Document, Design Document.

Exercise 2 3

Define the functional and non-functional requirements of the system using use cases and prepare a SRS document also

Exercise 3 3

a) Identify and analyze all the possible risks and its risk mitigation plan for the system to be automated.

b) Design and document a use case diagram for a problem statement

Exercise 4 3

Design a use case diagram class diagram and object diagrams using Rational tools for any one application

Exercise 5 3

a) Write C/C++/Java/Python program for classifying the various types of cohesion and coupling.
b) Develop test cases for unit testing and integration testing

Exercise 6 3

Schedule all the activities and sub-activities Using the PERT/CPM charts

Exercise 7 3

Define an appropriate metrics for at least 3 quality attributes for any software application

Case study-1 A POINT OF SALE (POS) SYSTEM 6

Problem Statement: A POS System is a computerized application used to record sales and handle payments; it is typically used in a retail store. It includes hardware components such as a computer and bar code scanner, and software to run the system. It interfaces to various service applications, such as a third-party tax calculator and inventory control. These systems must be relatively fault tolerant; that is, even if remote services and temporarily unavailable they must still be of capturing sales and handling at least cash payments. A POS system must support multiple and varied client – side terminals and interfaces such as browser, PDA‟s, touch – screens

Case study-2 ONLINE AUCTION SALES 6

Problem Statement: The online auction system is a design about a website where sellers collect and prepare a list of items they want to sell and place it on the website for visualizing. To accomplish this purpose the user has to access the site. Incaseit‟s a new user he has to register. Purchaser‟s login and select items they want to buy and keep bidding for it. Interacting with the purchasers and sellers through messages does this. There is no need for customer to interact with the sellers because every time the purchasers bid, the details will be updated in the database. The purchaser making the highest bid for an item before the close of the auction is declared as the owner of the item. If the auctioneer or the purchaser doesn't want to bid for the product then there is fixed cutoff price mentioned for every product. He can pay that amount directly and own the product. The purchaser gets a confirmation of his purchase as an acknowledgement from the website. After the transition by going back to the main menu where he can view other items.

Case study-3 RECRUITMENT PROCEDURE FOR SOFTWARE INDUSTRY 6

Problem Statement: In the software industry the recruitment procedure is the basic thing that goes in the hand with the requirement as specified by the technical management team. HR first gives an advertisement in leading Newspapers, Journals, Weeklies and Websites. The job seekers can apply for it through by Post or by e-mail to the company. The technical skill and the experience of the candidates are reviewed and the short listed candidates are called for the interview. There may be different rounds for interview like the written test, technical interview, and HR interview. After the successful completion of all rounds of interview, the selected candidates‟ names are displayed. Meanwhile HR gives all the details about the salary, working hours, terms and conditions and the retirement benefit to the candidate

Case study-4 ONLINE TICKET RESERVATION FOR RAILWAYS 6

Problem Statement: Computer play an integral part of the day in today's life. It makes the entire job easier and faster, every job is computerized so as the ticket reservation we can book over the online ticket reservation system. During the booking of the ticket reservation passenger has to select origin, date of journey, destination, class of train etc. The reservation counter keeps track of passenger's information. Thus the system will have all the details about the trains and facilities provided by them. There are various trains with the different level of convenience for the passengers. The whole database will be maintained by database administrator. There are varieties of trains where the passengers can select the

train according to the convenience for their destination journey. The journey could be within the state or across the India. Each train has the three types of classes i.e. Sleeper class, First class and the AC compartment. Design the application for the above problem description

Prescribed Books:

1. Software Engineering A Practitioner's Approach, Roger S. Pressman, Seventh Edition, 2009, McGraw- Hill International Edition.
2. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education

Reference Books:

1. Software Engineering, Ian Sommerville, Ninth edition, Pearson education
2. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. Software Engineering, A Precise Approach, PankajJalote, Wiley India, 2010.

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2	PSO3
24ACSE42L.1	3	3	2	-	-	-	-	-	-	-	-	3	-	-
24ACSE42L.2	3	2	3	-	3	-	-	-	-	-	-	3	2	-
24ACSE43L.3	3	2	3	2	-	-	-	-	-	-	-	3	3	-
24ACSE44L.4	3	2	2	-	3	-	-	-	-	-	-	3	3	-
24ACSE45L.5	-	-	-	-	-	1	1	3	3	2	-	-	2	-

Title of the Course	:	Introduction to Data Science Lab
Category	:	PC
Year	:	II
Semester	:	II
Course Code	:	24AAID41L
Branch/es	:	AI&DS, CSE(DS)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
0	0	3	1.5

Course Objectives: The main objective of the course is to inculcate the basic understanding of Data Science and its practical implementation using Python.

Course Outcomes:

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

1. Understand and create various types of NumPy arrays and perform basic operations on them.
2. Manipulate the shape and structure of NumPy arrays through reshaping, flattening, and transposing.
3. Utilize Pandas for data manipulation, including creating DataFrames and handling missing values.
4. Implement data preprocessing techniques for machine learning using Python libraries.
5. Apply data visualization techniques using Matplotlib and develop insights from visualized data.

Exercise 1 **3**

Creating a NumPy Array

a. Basic ndarray
b. Array of zeros
c. Array of ones
d. Random numbers in ndarray
e. An array of your choice
f. Imatrix in NumPy
g. Evenly spaced ndarray

Exercise 2 **3**

The Shape and Reshaping of NumPy Array

a. Dimensions of NumPy array
b. Shape of NumPy array
c. Size of NumPy array
d. Reshaping a NumPy array
e. Flattening a NumPy array
f. Transpose of a NumPy array

Exercise 3 **3**

Expanding and Squeezing a NumPy Array

a. Expanding a NumPy array
b. Squeezing a NumPy array
c. Sorting in NumPy Arrays

Exercise 4 **3**

Indexing and Slicing of NumPy Array

a. Slicing 1-D NumPy arrays
b. Slicing 2-D NumPy arrays

c. Slicing 3-D NumPy arrays
d. Negative slicing of NumPy arrays

Exercise 5 **3**

Stacking and Concatenating Numpy Arrays

a. Stacking ndarrays
b. Concatenating ndarrays
c. Broadcasting in Numpy Arrays

Exercise 6 **3**

Perform following operations using pandas

a. Creating dataframe
b. concat()
c. Setting conditions
d. Adding a new column.
e. Filling NaN with string
f. Sorting based on column values
g. groupby()

Exercise 7 **3**

Read the following file formats using pandas

a. Text files
b. CSV files
c. Excel files
d. JSON files
e. Pickle files
f. Image files using PIL
g. Multiple files using Glob
h. Importing data from database

Exercise 8 **3**

Demonstrate web scraping using python.

Exercise 9 **3**

Perform following preprocessing techniques on loan prediction dataset

a. Feature Scaling
b. Feature Standardization
c. Label Encoding
d. One Hot Encoding

Exercise 10 **3**

Perform following visualizations using matplotlib

a. Bar Graph
b. Pie Chart
c. Box Plot
d. Histogram
e. Line Chart and Subplots
f. Scatter Plot

Exercise 11 **3**

Python program to implement with Python Sci Kit-Learn & NLTK

Exercise 12 **3**

Python program to implement with Python NLTK/Spicy/Py NLPI.

Prescribed Textbooks:

1. "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython" by Wes McKinney
2. "Python Data Science Handbook: Essential Tools for Working with Data" by Jake VanderPlas
3. "Hands-On Data Science with Anaconda: Utilize the right mix of tools to create high-performance data science applications" by Dr. Yuxing Yan

Reference books:

1. https://www.analyticsvidhya.com/blog/2020/04/the-ultimate-numpy-tutorial-for-data-science-beginners/
2. https://www.analyticsvidhya.com/blog/2021/07/data-science-with-pandas-2-minutes-guide-to-key-concepts/
3. https://www.analyticsvidhya.com/blog/2020/04/how-to-read-common-file-formats-python/
4. https://www.analyticsvidhya.com/blog/2016/07/practical-guide-data-preprocessing-python-scikit-learn/
5. https://www.analyticsvidhya.com/blog/2020/02/beginner-guide-matplotlib-data-visualization-exploration-python/6.
6. https://www.nltk.org/book/ch01.html

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development t of solutions	Conduct investigations of Complex Problems	Engineering tools usage	The Engineer and World	Ethics	Individual and collaborative teamwork	Communication	Project Management and Finance	Life-long Learning
24AAID41L.1	3	3	3	-	-	-	-	-	-	-	3
24AAID41L.2	3	3	3	2	3	-	-	-	2	-	3
24AAID41L.3	3	3	-	-	-	1	-	-	-	-	3
24AAID41L.4	-	3	-	3	3	-	-	-	3	-	3
24AAID41L.5	-	3	3	2	-	-	-	-	3	-	3

Title of the Course	:	Advanced Java Programming
Category	:	SEC
Year	:	II
Semester	:	II
Course Code	:	24ACSE44L
Branch/es	:	CSE, AI&DS, CSE(AI), CSE(DS), AI&ML, CSE(AIML), CSE(ICB)

Lecture Hours	Tutorial Hours	Practice Hours	Credits
1	0	2	2

Course Objectives: This course will be able to

1. To be able to develop JAVA Program to access DATA from database
2. Develop user interface applications
3. Develop data persistence, messaging, location based services

Course Outcomes: At the end of the course, the student will be able to

1. Understand JavaFX GUI Programming Concepts.
2. Apply JavaFX Controls and event handling in GUI applications.
3. Understand and apply JDBC API to retrieve data from Data Base.
4. Understand and apply Servlets in server side programming.
5. Understand and apply JSPs in developing web applications

Unit 1 Introduction JavaFX GUI Programming 10

JavaFX Basic Concepts -The JavaFX Packages, the Stage and Scene Classes, Nodes and Scene Graphs, Layouts, the Application Class and the Lifecycle Methods, Launching a JavaFX Application, A JavaFX Application Skeleton, Compiling and Running a JavaFX Program. A Simple JavaFX Control: Label, Using Buttons and Events - Event Basics, Introduction, Demonstrating Event Handling and the Button

Unit 2 Exploring JavaFX Controls 10

Exploring JavaFX Controls: Using Image and Image View, Toggle Button, Radio Button, CheckBox, ListView, ComboBox, TextField, ScrollPane, TreeView. Adding Tooltips, Disabling a Control. JavaFX Menus: Menu Basics, An Overview of MenuBar, Menu, and MenuItem. Create a Main Menu, Add Menu Items, Add Images to Menu Items

Unit 3 Java Database Connectivity 10

JDBC API: Introduction to JDBC API. System Requirements. Types of JDBC Drivers. Creating a Database Table-Oracle Database. Connecting to a Database. Setting the Auto-Commit Mode. Committing and Rolling Back Transactions, JDBC-Types-to-Java-Types Mapping. Knowing About the Database. Executing SQL Statements. Processing Result Sets. Making Changes to a ResultSet. Handling Multiple Results from a Statement. Connecting Java to relational databases (MySQL, PostgreSQL, etc.)

Unit 4 Introduction to Java Servelets 10

Introducing Servlets: Background, The Life Cycle of a Servlet. Servlet Development Options. Using Tomcat A Simple Servlet. Create and Compile the Servlet Source Code. Start Tomcat. Start a Web Browser and Request the The Servlet API: The javax.servlet Package. Reading Servlet Parameters. The javax.servlet.httpPackage. Handling HTTP Requests and Responses. Handling HTTP GET Requests. Handling HTTP POST Requests. Using Cookies .Session Tracking. Accessing Databases with JDBC using servlets.

Unit 5 Introduction to JSP 10

JSP Basics: What's Wrong with Servlets? Running Your First JSP, How JSP Works, The JSP Servlet Generated Code, The Generated Servlet Revisited, Implicit Objects, JSP Syntax, Directives, Scripting Elements, Standard Action Elements, Comments. Developing JSP Beans: Calling Your Bean from a JSP Page, Accessing Properties Using jsp:getProperty and jsp:setProperty, Accessing Databases with JDBC using JSP

Prescribed Books:

1. JAVA The Complete Reference 9th edition, Herbert Schildt Oracle Press.
2. Java for the Web with Servlets, JSP, and EJB: A Developer's Guide to J2EE Solutions By Budi Kurniawan.

Reference Books:

1. Beginning java8 Apis extensions and libraries, Kishori Sharan, Apress.
2. Java 6 Programming, Black Book, Dreamtech
3. Java Server Programming, Java EE6 (J2EE 1.6), Black Book, Dreamtech
4. Advanced Java Technology, By M.T. Savaliya, Dreamtech

CO-PO Mapping:

Course Outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and World	Ethics	Individual and Collaborative team work	Communication	Project management and finance	Life-long learning	PSO1	PSO2	PSO3
24ACSE44L.1	3	2	2	-	-	-	-	-	-	-	2	2	3	-
24ACSE44L.2	3	2	3	-	-	-	-	-	-	-	2	2	3	-
24ACSE44L.3	3	2	2	2	3	-	-	-	-	-	2	3	3	-
24ACSE44L.4	3	3	3	2	3	-	-	-	-	-	2	3	3	-
24ACSE44L.5	3	3	3	2	3	-	-	-	-	-	2	3	3	-

Title of the Course: Environmental Science
Category: MC
Year: II
Semester: II
Course Code: 24AENS41T
Branches: CE , ECE, AI&DS, CSE(AI), CSE(DS), AI&ML

Lecture Hours	Tutorial Hours	Practice Hours	Credits
2	0	0	0

Course Objectives: This course aims to raise environmental awareness, promote sustainable practices aligned with the Sustainable Development Goals (SDGs), and highlight the significance of ecosystems and biodiversity. It sensitizes students to major pollution issues and related legislative measures, fosters ethical responsibility and problem-solving skills to tackle environmental challenges, and explains the impact of human population growth on the environment and public health. The course also emphasizes the role of education, information technology, and public policy in promoting environmental sustainability.

Course Outcomes:
At the end of the course, the student will be able to
1. explain how natural resources should be utilised with a focus on sustainability.
2. describe the need to protect ecosystems and biodiversity for future generations.
3. comprehend major pollution problems related to ecosystems.
4. Summarize key environmental issues, sustainable practices, and laws supporting environmental protection in the context of sustainable development goals.
5. explain the effects of population growth on environment and health, and the role of education, IT, and welfare programs in managing them.

Unit 1 Natural resources **7**

Natural Resources: Renewable and non-renewable resources – Forest resources: Uses, deforestation – Water resources: Uses, floods, drought – Mineral resources: Uses, environmental effects of extracting mineral resources– Energy resources: Renewable and non-renewable energy sources (overview only).

Unit 2 Ecosystems, Biodiversity and its conservation **6**

Ecosystems: Producers, consumers and decomposers – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and functions of the following ecosystems: Forest ecosystem and lake ecosystem.
Biodiversity and its conservation: Definition – Values of biodiversity – Hot-spots of biodiversity – Threats to biodiversity – Conservation of biodiversity.

Unit 3 Environmental pollution **5**

Definition, causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.
Self-learning: Genetically modified crops

Unit 4 Social issues and the Environment **6**

Sustainable development – Rainwater harvesting – Environmental ethics – Climate change, global warming, acid rain, ozone layer depletion – Air (Prevention and Control of Pollution) Act – Water (Prevention and Control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Environment Protection Act.

Unit 5 Human population and the Environment **6**

Population explosion – Family welfare programmes – Environment and human health – Value education – Role of information technology in environment and human health, Field work – Visit to a local area to document environmental assets.

Prescribed Textbooks:

1. Kaushik, Anubha, and C. P. Kaushik. *Perspectives in Environmental Studies*. 7th ed., New Age International Publishers, 2022.
2. Chawla, Shashi. *A Textbook of Environmental Studies*. 1st ed., McGraw Hill Education, 2017.

Reference Books:

1. Joseph, Benny. *Environmental Studies*. 3rd ed., McGraw Hill Education India, 2017.
2. Dhinakaran, A., and Sankaran, B. *A Textbook of Environmental Studies*. 1st ed., Himalaya Publishing House, 2023.
3. Basu, Mahua, and Xavier, S. *Fundamentals of Environmental Studies*. 1st ed., Cambridge University Press, 2017.
4. Bharucha, Erach. *Textbook of Environmental Studies for Undergraduate Courses*. 3rd ed., Universities Press (India), 2021.
5. Tiwari, Vijay Kumar. *A Textbook of Environmental Studies*. 1st ed., Himalaya Publishing House, 2024.

CO-PO Mapping:

Course outcomes	Engineering Knowledge	Problem Analysis	Design/Development of solutions	Conduct investigations of complex problems	Engineering tool usage	The engineer and the world	Ethics	Individual and collaborative teamwork	Communication	Project management and finance	Life-long learning
24AENS41T.1	2	2	-	-	-	-	2	-	-	-	2
24AENS41T.2	2	2	-	-	-	-	2	-	-	-	2
24AENS41T.3	2	2	-	-	-	-	2	-	-	-	2
24AENS41T.4	3	2	-	-	-	-	2	-	-	-	3
24AENS41T.5	2	2	-	-	-	-	2	-	-	-	2