PROGRAM STRUCTURE AND SYLLABUS

INFORMATION TECHNOLOGY

For

B. Tech FOUR YEARS DEGREE PROGRAM

(Applicable for the batches admitted from2025-26)

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

Approved by AICTE, New Delhi & Permanently Affiliated to JNTUK, Kakinada
Accredited with A^{++} Grade by NAAC & Accredited by NBA (B. TECH – CSE, ECE & EEE)
Ph: 08816-221238 Email: dnrcet@gmail.com website: https://dnrcet.org

Vision & Mission of the Institution

Vision of the Institution:

To evolve as a Quality Institution in Teaching, Innovative Research, Entrepreneurship and Consultation in Engineering & Technology, empower rural youth globally competent and self-disciplined technocrats.

Mission of the Institution:

IM_1: Inculcate technical knowledge, soft skills through student centric teaching & learning.

IM_2: Strengthen industry institute interaction; provide solutions to the ever-changing requirements.

IM_3: Implant entrepreneurial attitude and ethical values.

IM_4: Create work culture towards learning, Research & Development.

IM_5: Develop a unique practice that instills responsibility and accountability among the stakeholders

Vision & Mission of the Department

Vision of the Department:

To convert as a standard focal point with creative traits meeting the expectations of worldly fit professionals in the field of IT.

Mission of the Department:

DM1: To implant quality initiatives among teacher and the taught in the area of IT

DM2: To promote skill set infusing latest techniques in software field.

DM3: To create student centric learning environment imparting entrepreneurial and moral etiquettes.

Program Educational Objectives

Graduates of the Program will be

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	
PEO-1	Graduates will excel in their IT careers by applying strong theoretical and practical knowledge to solve real-world challenges effectively.
PEO-2	Graduates will continuously adapt to evolving technologies and acquire advanced skills through higher education, certifications, or research to remain globally competitive.
PEO-3	Graduates will demonstrate leadership qualities, entrepreneurial mindset, and ethical behavior while working individually or in teams, contributing positively to society and the profession.

Program Outcomes (POs)

After successful completion of the Program, the graduates will be able to

PROGRAM OUTCOMES (POS)		
1	**Engineering knowledge:**	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	**Problem analysis:**	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	**Design/development of solutions:**	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	**Conduct investigations of complex problems:**	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	**Modern tool usage:**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6	**The engineer and society:**	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7	**Environment sustainability:**	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	**Ethics:**	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	**Individual and team work:**	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	**Communication:**	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	**Project management and finance:**	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	**Lifelong learning**	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

After successful completion of the Program, the graduates will be able to

PROGRAM SPECIFIC OUTCOMES (PSOS)	
PSO-1	Apply modern programming tools and techniques to design, develop, test, and manage robust software systems aligned with industrial and societal needs.
PSO-2	Employ IT principles and entrepreneurial thinking to provide innovative solutions in domains like cloud computing, cybersecurity, data science, and web/mobile applications, with a strong emphasis on ethical practices.

Mission of the Department – PEOs mapping

PEO Statements	DM1	DM2	DM3
PEO1: Graduates will excel in their IT careers by applying strong theoretical and practical knowledge to solve real-world challenges effectively.	3	3	1
PEO2: Graduates will continuously adapt to evolving technologies and acquire advanced skills through higher education, certifications, or research to remain globally competitive.	2	3	1
PEO3: Graduates will demonstrate leadership qualities, entrepreneurial mindset, and ethical behavior while working individually or in teams, contributing positively to society and the profession.	1	2	3

PROGRAM STRUCTURE

B. Tech.-I Year I SEMESTER						
Course Code	**Course Title**	**Course Component**	**Total Number of contact hours**			**Credits (C)**
			Lecture(L)	**Tutorial (T)**	**Practical(P)**	
BT24BS1104	Engineering Physics	BS&H	3	0	0	3
BT24BS1103	Linear Algebra & Calculus	BS&H	3	0	0	3
BT24EE1101	Basic Electrical & Electronics Engineering	ES	3	0	0	3
BT24ME1102	Engineering Drawing	ES	1	0	4	3
BT24CS1101	Introduction To Programming	ES	3	0	0	3
BT24CS1102	IT Workshop	ES	0	0	2	1
BT24BS1107	Engineering Physics Lab	ES	0	0	2	1
BT24EE1102	Basic Electrical & Electronics Engineering Workshop Lab	ES	0	0	3	1.5
BT24CS1103	Computer Programming Lab	ES	0	0	3	1.5
BT24BS1109	NSS/NCC/Scouts & Guides/ Community	BS&H	-	-	1	0.5
		Total	**13**	**0**	**15**	**24**

B. Tech.-I Year II SEMESTER						
Course Code	**Course Title**	**Course Component**	**Total Number of contact hours**			**Credits (C)**
			Lecture (L)	**Tutorial (T)**	**Practical (P)**	
BT24BS1201	Communicative English	BS&H	2	0	0	2
BT24BS1202	Chemistry	BS& H	3	0	0	3
BT24BS1204	Differential Equations & Vector Calculus	BS& H	3	0	0	3
BT24CE1201	Basic Civil & Mechanical Engineering	ES	3	0	0	3
BT24CS1201	Data Structures	PC	3	0	0	3
BT24BS1206	Communicative English Lab	BS& H	0	0	2	1
BT24BS1207	Chemistry Lab	BS& H	0	0	3	1
BT24ME1203	Engineering Workshop	ES	0	0	3	1.5
BT24CS1203	Data Structures Lab	PC	0	0	3	1.5
BT24BS1210	Health & Wellness, YOGA & Sports	BS& H	-	-	1	0.5
		Total	**14**	**0**	**11**	**19.5**

BS&H: Basic Sciences and Humanities; ES :Engineering Sciences;

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- I Semester	Course Code: BT24BS1104	L	T	P	C
		3	0	0	3
ENGINEERING PHYSICS *(Common for all branches of Engineering)*					

Course Objectives:

To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

Course Outcomes:

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction (L4).

CO2: Examine the crystal structures with the basics of crystals (L3).

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials (L3).

CO4: Using fundamentals of quantum mechanics solve the one-dimensional motion of particles (L3).

CO5: Apply the basic concepts of quantum free electron theory to Fermi energy and classification of crystalline solids (L3).

CO6: Identify the type of semiconductor using Hall effect (L3).

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	2.00	2.00	1.00	-	-	-	-	-	-	-	1.00
CO2	3.00	2.00	2.00	1.00	-	-	-	-	-	-	-	1.00
CO3	3.00	2.00	2.00	-	-	-	-	-	-	-	-	1.00
CO4	3.00	2.00	2.00	-	-	-	-	-	-	-	-	1.00
CO5	3.00	2.00	2.00	-	-	-	-	-	-	-	-	1.00
CO6	3.00	2.00	2.00	-	-	-	-	-	-	-	-	1.00

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

UNIT I: Wave Optics **12hr**

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings, Determination of wavelength and refractive index. **Diffraction:** Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). **Polarization:** Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

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

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes. **X-ray diffraction:** Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

UNIT III: Dielectric and Magnetic Materials **8hr**

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation. **Magnetic Materials:** Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

UNIT IV: Quantum Mechanics and Free electron Theory **10hr**

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well. **Free Electron Theory:** Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

UNIT V: Semiconductors **8hr**

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications.

Textbooks:

1. Engineering Physics, Dr. D. Tirupathi Naidu and M. Veeranjaneyulu, VGS Publications, 2023.

2. A Text book of Engineering Physics, M. N. Avadhanulu, P. G. Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.

3. Engineering Physics - D. K. Bhattacharya and Poonam Tandon, Oxford press (2015)

Reference Books:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.

2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.

3. Engineering Physics - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press. 2010

4. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resources: https://dnrcet.org/web/departments/hs/courses/b-tech/syllabus/

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- I Semester	Course Code: BT24BS1103	L	T	P	C
		3	0	0	3
LINEAR ALGEBRA & CALCULUS *(Common to All Branches of Engineering)*					

Course Objectives:

To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

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

CO1: Describe the basic properties on elementary row and column operations (L3).

CO2: Solve a given system of linear algebraic equations (L3).

CO3: Find the Characteristic equation, Eigen values & Eigen vectors (L3).

CO4: Utilize mean value theorems to real life problems (L3).

CO5: Apply the concept of the partial differentiation in various engineering fields (L3).

CO6: Evaluate double, triple integrals and their applications (L3).

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1.00	3.00	-	-	-	-	-	-	-	-	-	-
CO2	1.00	3.00	-	-	-	-	-	-	-	-	-	-
CO3	1.00	3.00	-	-	-	-	-	-	-	-	-	-
CO4	1.00	3.00	-	-	-	-	-	-	-	-	-	-
CO5	2.00	3.00	-	-	-	-	-	-	-	-	-	-
CO6	2.00	3.00										

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

UNIT-I: Matrices **10 hr**

Rank of a matrix by echelon form, normal form. Cauchy– Binet formulae (without proof). Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations, Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

UNIT-II: Eigen values, Eigen vectors and Orthogonal Transformation **10 hr**

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

UNIT-III: Calculus **8 hr**

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

UNIT-IV: Partial differentiation and Applications (Multivariable Calculus) **10 hr**

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT-V: Multiple Integrals (Multi variable Calculus) **10 hr**

Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Textbooks:

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

Reference Books:

1. Thomas Calculus, George B.Thomas, Maurice D.Weirand Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R.K.Jain and S.R.K.Iyengar, Alpha Science International Ltd., 20215th Edition(9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5thEdition.
4. Advanced Engineering Mathematics, Micheael Greenberg,Pearson publishers, 9thedition
5. Higher Engineering Mathematics, H.KDas, Er.RajnishVerma, S.Chand Publications,2014, Third Edition (Reprint 2021)

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- I Semester	Course Code: BT24EE1101	L	T	P	C
		3	0	0	3

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Common to All branches of Engineering)

Course Objectives: Students will learn

- About the basic principles of Direct Current (DC) & Alternating Current (AC) Circuit analysis
- About the fundamentals of magnetic circuits analysis.
- About Electrical Wiring and Electrical Safety.

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

CO1: Apply the circuit laws for the analysis of simple DC and AC circuits.

CO2: Apply the basic principles for solving fundamental magnetic circuits.

CO3: Apply the basic principles of electrical wiring and electric safety measures.

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	1	2
CO2	1	1
CO3	1	2

PART A: BASIC ELECTRICAL ENGINEERING

UNIT I: INTRODUCTION TO ELECTRICAL CIRCUITS

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

UNIT II: MAGNETIC CIRCUITS

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

UNIT III: ELECTRICAL WIRING, ELECTRICITY BILL & SAFETY MEASURES

Electrical Wiring: Simple Lamp circuits, stair case wiring scheme, godown wiring scheme, types of service mains, types of electrical wiring, cost estimation of indoor wiring, wiring layout of workshop/ electrical laboratory. **Electricity bill:** Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc., Types of electricity tariff, calculation of electricity bill for domestic consumers. **Equipment Safety Measures:** Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock

PART B: BASIC ELECTRONICS ENGINEERING

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

CO4: Analyze various characteristics of semiconductor devices.

CO5: Apply the basic principles for understanding and working of rectifiers and power Supplies.

CO6: Explain the working of various logic gates.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	**PSO2**
CO4	2	-
CO5	2	-
CO6	2	-

UNIT IV: SEMI CONDUCTOR DEVICES

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier

UNIT V: BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple Zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT VI: DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple

combinational circuits–Half and Full Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

Textbooks:

Principles of Electrical and Electronics Engineering, V.K. Mehtha, S. Chand Technical Publishers

Basic Electrical Engineering, Ritu SahDev, Khanna Publishers, 2018, First Edition.

Fundamentals of Electrical Circuits, Charles K. Alexanderand Mathew N.O.Sadiku, McGraw Hill Education (India),2013,Fifth Edition

Electrical Wiring Estimating and Costing –Dr. S. L. Uppal-Khanna Publishers-198

Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition.

Reference Books:

Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019,Fourth Edition

Principles of Power Systems, V.K. Mehtha, S. Chand Technical Publishers, 2020

Circuit Theory, Abhijit Chakrabarti, Dhanpat Rai & Co. Publications, 8th edition, 2023.

Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGrawHill, First Edition, 2019

Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.

E-Resources:

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

https://nptel.ac.in/courses/108108076

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- I Semester	Course Code: BT24ME1102	L	T	P	C
		1	0	4	3
ENGINEERING DRAWING *(Common to EEE, ECE, CSE, CSE aligned branches and IT)*					

Course Objectives:

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

Course Outcomes:

CO1: Construct polygons, curves and scales.

CO2: Identify the position of points and lines.

CO3: Identify the position of lines when inclined to both the planes.

CO4: Analyze the location and position of plane figures.

CO5: Analyze the location and position of solid bodies.

CO6: Develop an Isometric view and orthographic views.

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

UNIT I:

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods. **Curves:** construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves. **Scales:** Plain scales, diagonal scales and Vernier scales.

UNIT II:

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants. **Projections of Straight Lines:** Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

UNIT III:

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT IV:

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

UNIT V:

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views. **Computer graphics:** Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (Not for end examination).

Textbook:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

Reference Books:

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.

2. Engineering Drawing, M. B. Shah and B.C. Rana, Pearson Education Inc,2009.

3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- I Semester	Course Code: BT24CS1101	L	T	P	C
		3	0	0	3
INTRODUCTION TO PROGRAMMING *(Common to All branches of Engineering)*					

Course Objectives:

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging.
- To foster logical thinking and problem-solving skills using programming.
- To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
- To encourage collaborative learning and teamwork in coding projects.

Course Outcomes: A student after completion of the course will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking (2

CO2: Analyze a problem and develop an algorithm to solve it (L4).

CO3: Implement various algorithms using the C programming language (L4).

CO4: Understand more advanced features of C language (L2).

CO5: Develop problem-solving skills and the ability to debug and optimize the code (L6).

CO6: Apply file input–output operations (L3)

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2.00	2.00	3.00	1.00	-	-	-	2.00	-	-	-	2.00
CO2	2.00	3.00	3.00	2.00	-	-	-	2.00	-	-	-	2.00
CO3	2.00	3.00	3.00	2.00	-	-	-	3.00	-	-	-	2.00
CO4	2.00	3.00	2.00	2.00	-	-	-	2.00	-	-	-	2.00
CO5	3.00	3.00	3.00	2.00	-	-	-	3.00	-	-	-	2.00
CO6	2.00	3.00	3.00	3.00	-	-	-	2.00	-	-	-	2.00

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	2.00	2.00
CO2	2.00	-
CO3	2.00	2.00
CO4	2.00	2.00
CO5	3.00	3.00
CO6	2.00	2.00

UNIT I: Introduction to Programming and Problem Solving

History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting. Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT II: Control Structures

Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and Continue.

UNIT III: Arrays and Strings

Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

UNIT IV: Pointers & User Defined Data types

Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

UNIT V: Functions & File Handling

Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling

Note: The syllabus is designed with C Language as the fundamental language of implementation**.**

Textbooks:

1. The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice- Hall, 1988
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition
3. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition

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BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202

DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- I Semester	Course Code: BT24CS1102	L	T	P	C
		0	0	2	1
IT WORKSHOP *(Common to all branches of Engineering)*					

Course Objectives:

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
- To demonstrate configuring the system as Dual boot both Windows and other Operating Systems
- To teach basic command line interface commands on Linux.
- To teach the usage of Internet for productivity and self-paced life-long learning
- To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

Course Outcomes:

CO1: Apply knowledge for computer assembling and software installation and solve trouble shooting problems
CO2: Understand hardware components and inter dependencies (L2).
CO3: Evaluate the cyber hygiene that is protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks (L5).
CO4: Use various Microsoft tools like professional word documents and presentations (L2).
CO5: Calculate various excel spread sheets (L4).
CO6: Build various AI Tools – ChatGPT (L6).

Mapping of Course Outcomes with Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2.00	3.00	2.00	2.00	2.00	-	-	-	-	-	-	-
CO2	2.00	3.00	3.00	3.00	-	-	-	-	-	-	-	-
CO3	2.00	3.00	3.00	2.00	3.00	-	-	-	-	-	-	-
CO4	2.00	3.00	3.00	3.00	2.00	-	-	-	-	-	-	-
CO5	2.00	3.00	3.00	2.00	2.00	-	-	-	-	-	-	-
CO6	3.00	2.00	3.00	2.00	2.00	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	2.00
CO2	-	-
CO3	-	-
CO4	2.00	-
CO5	2.00	-
CO6	-	-

PC Hardware & Software Installation:

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

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

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

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web:

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

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

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

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD:

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft

(MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered: -Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered: - Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL:

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

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel – average, std. Deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

POWER POINT

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

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

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide

slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

AI TOOLS – ChatGPT:

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the Capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?"

Reference Books:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- I Semester	Course Code: BT24BS1107	L	T	P	C
		0	0	2	1
ENGINEERING PHYSICS LAB *(Common to All Branches of Engineering)*					

Course Objectives:

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

Course Outcomes: The students will be able to

CO1: Operate optical instruments like travelling microscope and spectrometer.

CO2: Estimate the wavelengths of different colours using diffraction grating.

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance.

CO4: Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.

CO5: Calculate the band gap of a given semiconductor.

CO6: Identify the type of semiconductor using Hall effect.

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2	-	-	-	-	-	-	1	-	-	1
CO 2	3	2	-	-	-	-	-	-	1	-	-	1
CO 3	3	2	-	-	-	-	-	-	1	-	-	1
CO 4	3	2	-	-	-	-	-	-	1	-	-	1
CO 5	3	2	-	-	-	-	-	-	1	-	-	1
CO 6	3	2	-	-	-	-	-	-	1	-	-	1

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

List of Experiments:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by Nonuniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

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

References:

1. A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

Web Resources: www.vlab.co.in

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- I Semester	Course Code: BT24EE1102	L	T	P	C
		0	0	3	1.5

ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

(Common to All branches of Engineering)

Course Objectives: Students will learn

- To verify Kirchhoff ‘s laws.
- To measure various electrical quantities using different types of meters.
- About safety measures used in electrical systems.

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

CO1: Study and identification of various electrical circuit components and also measure voltage, current and power electrical circuits.

CO2: Choose and assemble various wiring schemes.

CO3: Solve electrical energy and measure earth resistance for domestic premises.

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO4	2	-
CO5	2	-
CO6	2	-

List of Experiments

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

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

Reference Books:

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- I Semester	Course Code: BT24CS1103	L	T	P	C
		0	0	3	1.5
COMPUTER PROGRAMMING LAB *(Common to All branches of Engineering)*					

Course Objectives:

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

Course Outcomes:

CO1: Read understand and trace they execution of programs written in C language. (L2)

CO2: Select the right control structure for solving the problem. (L2)

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers. (L3)

CO4: Develop, D-Bug and execute programs to demonstrate applications of arrays, functions, basic concepts of pointers in C.(L4)

CO5: Develop a program to demonstrate the applications of string operations in C.(L5)

CO6: Develop a program to demonstrate the applications of file operations in C. (L3

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2.00	3.00	-	2.00	-	-	-	-	-	-	-	-
CO2	2.00	3.00	3.00	3.00	-	-	-	-	-	-	-	-
CO3	2.00	3.00	3.00	2.00	3.00	-	-	-	-	-	-	-
CO4	2.00	3.00	3.00	3.00	2.00	-	-	-	-	-	-	-
CO5	2.00	3.00	3.00	2.00	2.00	-	-	-	-	-	-	-
CO6	-	2.00	3.00	2.00	2.00	-	-	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	2.00
CO2	-	-
CO3	-	-
CO4	2.00	-
CO5	2.00	-
CO6	-	-

UNIT I

WEEK 1

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

I. Basic Linux environment and its editors like Vi, Vim & Emacs etc.

II. Exposure to Turbo C, gcc

III. Writing simple programs using printf(), scanf()

WEEK 2

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments /Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab1: Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

I. Sum and average of 3 numbers

II. Conversion of Fahrenheit to Celsius and vice versa

III. Simple interest calculation

WEEK 3

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:

Lab3: Simple computational problems using arithmetic expressions.

I. Finding the square root of a given number

II. Finding compound interest

III. Area of a triangle using heron's formulae

IV. Distance travelled by an object

UNIT II

WEEK 4

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial4: Operators and the precedence and as associativity:

Lab4: Simple computational problems using the operator' precedence and associativity

Evaluate the following expressions.

I. A+B*C+(D*E) + F*G

II. A/B*C-B+A*D/3

III. A+++B---A

IV. J= (i++) + (++i)

Find the maximum of three numbers using conditional operator

Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5

Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-els, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab5: Problems involving if-then-else structures.

I. Write a C program to find the max and min of four numbers using if-else.

II. Write a C program to generate electricity bill.

III. Find the roots of the quadratic equation.

IV. Write a C program to simulate a calculator using switch case.

V. Write a C program to find the given year is a leap year or not.

WEEK 6

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and or loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops

Lab6: Iterative problems e.g., the sum of series

I. Find the factorial of given number using any loop.

II. Find the given number is a prime or not.

III. Compute sine and cos series

IV. Checking a number palindrome

V. Construct a pyramid of numbers.

UNIT III:

WEEK 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab7:1D Array manipulation, linear search

I. Find the min and max of a 1-D integer array.

II. Perform linear search on1D array.

III. The reverse of a 1D integer array

IV. Find 2's complement of the given binary number.

V. Eliminate duplicate elements in an array.

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab8: Matrix problems, String operations, Bubble sort

I. Addition of two matrices

II. Multiplication two matrices

III. Sort array elements using bubble sort

IV. Concatenate two strings without built-in functions

V. Reverse a string using built-in and without built-in string functions

UNIT IV:

WEEK 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab9: Pointers and structures, memory dereference.

I. Write a C program to find the sum of a 1D array using malloc()

II. Write a C program to find the total, average of n students using structures

III. Enter n students data using calloc() and display failed students list

IV. Read student name and marks from the command line and display the student details along with the total.

V. Write a C program to implement realloc()

WEEK 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists

Lab10: Bitfields, linked lists Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

I. Create and display a singly linked list using self-referential structure.

II. Demonstrate the differences between structures and unions using a C program.

III. Write a C program to shift/rotate using bitfields.

IV. Write a C program to copy one structure variable to another structure of the same type.

UNIT V

WEEK 11:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent,

Lab11: Simple functions using call by value, solving differential equations using Eulers theorem.

I. Write a C function to calculate NCR value.

II. Write a C function to find the length of a string.

III. Write a C function to transpose of a matrix.

IV. Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 12:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab12: Recursive functions

I. Write a recursive function to generate Fibonacci series.

II. Write a recursive function to find the lcm of two numbers.

III. Write a recursive function to find the factorial of a number.

IV. Write a C Program to implement Ackermann function using recursion.

V. Write a recursive function to find the sum of series.

WEEK 13:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab13: Simple functions using Call by reference, Dangling pointers.

I. Write a C program to swap two numbers using call by reference.

II. Demonstrate Dangling pointer problem using a C program.

III. Write a C program to copy one string into another using pointer.

IV. Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab14: File operations

I. Write a C program to write and read text into a file.

II. Write a C program to write and read text into a binary file using fread() and fwrite()

III. Copy the contents of one file to another file.

IV. Write a C program to merge two files into the third file using command-line arguments.

V. Find no. of lines, words and characters in a file

VI. Write a C program to print last n characters of a given file.

Textbooks:

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

Reference Books:

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year-I Semester	Course Code: BT24BS1109	L	T	P	C
		-	-	1	0.5

NSS / NCC /Scouts & Guides / Community Service

(Common to All Branches of Engineering)

Course Objectives:

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

Course Outcomes:

After completion of the course the students will be able to

CO1: Understand the importance of discipline, character and service motto (L2).

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques (L3).

CO3: Explore human relationships by analyzing social problems (L4).

CO4: Determine to extend their help for the fellow beings and downtrodden people (L5).

CO5: Develop leadership skills and civic responsibilities (L6).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3.00	2.00	2.00	3.00	2.00	-	-
CO2	-	-	-	-	-	3.00	2.00	2.00	3.00	2.00	-	-
CO3	-	-	-	-	-	3.00	2.00	3.00	3.00	2.00	-	-
CO4	-	-	-	-	-	2.00	2.00	2.00	3.00	2.00	-	-
CO5	-	-	-	-	-	2.00	2.00	2.00	3.00	2.00	-	-

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-

UNIT I: Orientation

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

Activities:

i. Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills

ii. Conducting orientations programs for the students –future plans-activities-releasing road map etc.

iii. Displaying success stories-motivational biopics- award winning movies on societal issues etc.

iv. Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT II: Nature & Care Activities:

i. Best out of waste competition.

ii. Poster and signs making competition to spread environmental awareness.

iii. Recycling and environmental pollution article writing competition.

iv. Organizing Zero-waste day.

v. Digital Environmental awareness activity via various social media platforms.

vi. Virtual demonstration of different eco-friendly approaches for sustainable living.

vii. Write a summary on any book related to environmental issues.

UNIT III: Community Service **Activities:**

i. Conducting One Day Special Camp in a village contacting village-area leaders-Survey in the village, identification of problems- helping them to solve via media-authorities experts-etc.

ii. Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,

iii. Conducting consumer Awareness. Explaining various legal provisions etc.

iv. Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.

v. Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service Scheme Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)

2. Red Book - National Cadet Corps – Standing Instructions Vol I & II, Directorate General

of NCC, Ministry of Defence, New Delhi

3. Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering", McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

Evaluation Guidelines:

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- II Semester	Course Code: BT24BS1201	L	T	P	C
		2	0	0	2
COMMUNICATIVE ENGLISH (Common to All Branches of Engineering)					

Course Objectives:

The main objective of introducing this course, *Communicative English*, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

Course Outcomes:

CO1: Understand the context, theme, and pieces of specific information from social or Transactional dialogues.
CO2: Apply the principles of writing skills and cohesive devices in paragraphs and formal/informal communication.
CO3: Build confidence and creative thinking by challenging the hardships in life.
CO4: Discover the peace and amicable relations in human development.
CO5: Perceive the personal traits and communicative competence in the form of interpersonal communication.
CO6: Form error free sentences in communication by using proper grammatical structures and correct word forms.

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

UNIT I: HUMAN VALUES: Gift of Magi (Short Story)

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Writing:** Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences. **Grammar:** Parts of Speech, Basic Sentence Structures-forming questions. **Vocabulary:** Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT II: NATURE: The Brook by Alfred Tennyson (Poem)

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

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

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Structure of a paragraph - Paragraph writing (specific topics). **Grammar:** Cohesive devices - linkers, use of articles and zero article; prepositions. **Vocabulary:** Homonyms, Homophones, Homographs.

UNIT III: BIOGRAPHY: Elon Musk

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed. **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing, Note-making, paraphrasing. **Grammar:** Verbs - tenses; subject-verb agreement; Compound words, Collocations. **Vocabulary:** Compound words, Collocations

UNIT IV: INSPIRATION: The Toys of Peace by Saki

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Letter Writing: Official Letters, Resumes. **Grammar:** Reporting verbs, Direct & Indirect speech, Active & Passive Voice. **Vocabulary:** Words often confused, Jargons

UNIT V: MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening: Identifying key terms understanding concepts and answering a series of relevant questions that test comprehension. **Speaking:** Formal oral presentations on topics from academic contexts. **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 Jargons

Textbooks:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

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, Fourth Edition, Cambridge University Press, 2019.

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- II Semester	Course Code: BT24BS1202	L	T	P	C
		3	0	0	3
CHEMISTRY *(Common to ECE, EEE and IT)*					

Course Objectives:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers

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

CO1: Understand the fundamentals of Quantum mechanics and Molecular Orbital Theory.

CO2: Apply the basic principles of semiconductors, super conductors, and nanomaterials in real world applications.

CO3: Compare the materials for construction of batteries and electrochemical sensors.

CO4: Explain the preparation, properties, and applications of thermoplastics thermosetting, elastomers and conducting polymers.

CO5: Summarize the concepts of Instrumental methods.

CO6: Define the principles of spectrometry, separation of solid and liquid mixtures.

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

UNIT I: Structure and Bonding Models

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ2, particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules– energy level diagrams of O2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT II: Modern Engineering materials Semiconductors – Introduction, basic concept, application **Super conductors**-Introduction basic concept, applications. **Super capacitors**: Introduction, Basic Concept-Classification – Applications. **Nano materials**: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphene nanoparticles.

UNIT III: Electrochemistry and Applications

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometer- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations). Primary cells – Zinc-air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC). Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples. Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

UNIT IV: Polymer Chemistry

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

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres. Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio- Degradable polymers - Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA).

UNIT V: Instrumental Methods and Applications

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

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.

2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J. D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Text book of Polymer Science, Fred W. Billmayer Jr., 3rd Edition
4. A text book of Engineering Chemistry by Sashi Chawala, Dhanpat Rai & Co. 201

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- II Semester	Course Code: BT24BS1204	L	T	P	C
		3	0	0	3
DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS *(Common to All Branches of Engineering)*					

Course Objectives:

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

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

CO1: Solve first-order linear differential equations

CO2: Understand homogeneous and non-homogeneous linear differential equations

CO3: Understand the basic concepts of partial differential equations (PDEs)

CO4: Solve first-order linear partial differential equations using **Lagrange's method.**

CO5: Apply the **Del operator** to scalar point functions to compute **gradients** and **directional derivatives**

CO6: Evaluate **volume integrals** and apply the **Divergence Theorem** (with proof) to relate surface and volume integrals in vector fields

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

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

Linear differential equations –Bernoulli's Equations-Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

UNIT-II: Linear differential equations of higher order (Constant Coefficients) 10 hr.

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT-III: Partial Differential Equations 10 hr.

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. Homogeneous Linear Partial differential equations with constant coefficients.

UNIT-IV: Vector differentiation 8 hr.

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 identities.

UNIT-V: Vector integration 10 hr.

L Without egral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

Textbooks:

1. Higher Engineering Mathematics, B.S. Grewal, KhannaPublishers,2017,44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B.V. Ramana, Mc Graw Hill Education,2017

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- II Semester	Course Code: BT24CE1201	L	T	P	C
		3	0	0	3
BASIC CIVIL AND MECHANICAL ENGINEERING (Common to All branches of Engineering)					

Course Objectives:

- Get familiarized with the scope and importance of Civil Engineering sub-divisions.
- Introduce the preliminary concepts of surveying.
- Acquire preliminary knowledge on Transportation and its importance in nation's economy.
- Get familiarized with the importance of quality, conveyance and storage of water.
- Introduction to basic civil engineering materials and construction techniques.

Course Outcomes: On completion of the course, the student should be able to:

CO1: Understand the various sub divisions of Civil Engineering and their role in ensuring better society.

CO2: Know the objectives of surveying and understand the measurement of distances, angles and levels through surveying

CO3: Understand the role of Transportation Engineering in Nation's economy and importance of Water Resource Engineering and Environmental Engineering.

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	1

Part A: BASIC CIVIL ENGINEERING

UNIT I:

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks- Cement concrete- Steel. Introduction to Prefabricated construction Techniques.

UNIT II:

Surveying: Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings- Contour mapping.

UNIT III:

Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering. Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

Textbooks:

1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.

Reference Books:

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

PART B: BASIC MECHANICAL ENGINEERING

Course Objectives: The students after completing the course are expected to

- Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
- Explain different engineering materials and different manufacturing processes.
- Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

Course Outcomes: On completion of the course, the student should be able to:

CO4: Understand the different manufacturing processes.

CO5: Explain the basics of thermal engineering and its applications and the working of different mechanical power transmission systems and power plants.

CO6: Describe the basics of robotics and its applications

Mapping of Course Outcomes with Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO4	2	-	-	-	-	2	2	-	-	-	-	-
CO5	2	1	-	-	1	1	-	-	-	-	-	-
CO6	1	-	-	-	-	1	1	-	-	-	-	-

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO4	1	-
CO5	-	-
CO6	-	-

UNIT IV:

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors. Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNIT V:

Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing. Thermal Engineering – Working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air- conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

UNIT VI:

Power plants – Working principle of Steam, Diesel, Hydro, Nuclear power plants. Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications. Introduction to Robotics - Joints & links, configurations, and applications of robotics. (Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject.)

Textbooks:

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
2. A text book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

Reference Books:

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- II Semester	Course Code: BT24CS1201	L	T	P	C
		3	0	0	3
DATA STRUCTURES *(Common to CSE and IT)*					

Course Objectives:

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

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

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges.

CO5: Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.

CO6: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2.00	2.00	2.00	2.00	-	-	-	-	-	-	-	2.00
CO2	2.00	2.00	3.00	2.00	-	-	-	-	-	-	-	2.00
CO3	2.00	3.00	3.00	2.00	-	-	-	-	-	-	-	3.00
CO4	2.00	3.00	3.00	2.00	-	-	-	-	-	-	-	2.00
CO5	2.00	3.00	3.00	3.00	-	-	-	-	-	-	-	2.00
CO6	2.00	2.00	3.00	3.00	-	-	-	-	-	-	-	2.00

	PSO1	PSO2
CO1	2.00	2.00
CO2	2.00	2.00
CO3	2.00	3.00
CO4	3.00	2.00
CO5	2.00	2.00
CO6	2.00	2.00

UNIT I:

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort

UNIT II:

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 III:

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

UNIT IV:

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc. **Deques:** Introduction to deques (double-ended queues), Operations on deques and their applications.

UNIT V:

Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal. **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.

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, Susan Anderson-Freed, 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" by Robert Sedgewick

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- II Semester	Course Code: BT24BS1206	L	T	P	C
		0	0	2	1
COMMUNICATIVE ENGLISH LAB (Common to All Branches of Engineering)					

Course Objectives: The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in basic communication skills and also make them ready to face job interviews.

Course Outcomes:

CO1: Distinguish the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension in day-to-day conversations.

CO2: Demonstrate communication skills through various language learning activities

CO3: Apply the writing skills in e-mail Writing and Resume Writing.

CO4: Appraise and manifest professionalism in participating group discussions and debates.

CO5: Exhibit the effective interpersonal skills in presentations and interviews

CO6: Understand the different aspects of the English language proficiency with emphasis on LSRW skills.

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

Suggested Software:

- Walden Infotech
- Young India Films

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Taylor Grant: English Conversation Practice, Tata McGraw-Hill Education India, 2016
3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
4. J. Sethi & P.V. Dhamija. A Course in Phonetics and Spoken English, (2nd Ed),Kindle, 2013

Web Resources:

Spoken English:

www.esl-lab.com

www.englishmedialab.com

www.englishinteractive.net

https://www.britishcouncil.in/english/onli

ne http://www.letstalkpodcast.com/

https://www.youtube.com/c/mmmEnglish_Emma/featured

https://www.youtube.com/c/ArnelsEverydayEnglish/featured

https://www.youtube.com/c/engvidAdam/featured

https://www.youtube.com/c/EnglishClass101/featured

https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists

https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

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

D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)
BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202

DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- II Semester	**Course Code: BT24BS1207**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**
CHEMISTRY LAB *(Common to ECE, EEE and IT)*					

Course Objectives:

Verify the fundamental concepts with experiments.

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

CO1: Determine the cell constant and conductance of solutions.

CO2: Prepare advanced polymer materials.

CO3: Determine the physical properties like surface tension, adsorption and viscosity.

CO4: Estimate the Iron and Calcium in cement

CO5: Calculate the hardness of water.

CO6: Preparation of a polymer (Bakelite)

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

List of Experiments:

1. Measurement of 10Dq by spectrophotometric method
2. Conductometric titration of strong acid vs. strong base
3. Conductometric titration of weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a Bakelite
8. Verify Lambert-Beer's law
9. Wavelength measurement of sample through UV-Visible Spectroscopy
10. Identification of simple organic compounds by IR
11. Preparation of nanomaterials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry

Reference:

1. Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- II Semester	Course Code: BT24ME1203	L	T	P	C
		0	0	3	1.5
ENGINEERING WORKSHOP (Common to All branches of Engineering)					

Course Objectives:

To familiarize students with wood working, sheet metal operations, fitting, electrical house wiring skills, and basic repairs of two-wheeler vehicle.

Course Outcomes:

CO1: Build carpentry fitting and forging operations in various applications.

CO2: Executing operations of foundry and sheet metal works using varies tools.

CO3: Inspect basic electrical engineering knowledge for house wiring practice

CO4: Develop a lap and butt joint using arc welding.

CO5: Develop pipe joint for different diameter of pipes

CO6: Inspect basic repair of two-wheeler vehicle.

Mapping of Course Outcomes with Program Outcomes:

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

Mapping of Course Outcomes with Program Specific Outcomes:

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

SYLLABUS

1. Demonstration: Safety practices and precautions to be observed in workshop.
2. Wood Working: Familiarity with different types of woods and tools used in wood working and make following joints.

a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. Sheet Metal Working: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

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

a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tire

5. Electrical Wiring: Familiarity with different types of basic electrical circuits and make the following connections.

a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires

6. Foundry Trade: Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
7. Welding Shop: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
8. Plumbing: Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.
9. Basic repairs of Two-wheeler vehicle – Demonstration of working of two-wheeler vehicle and its repairs.

Textbooks:

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

Reference Books:

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- II Semester	Course Code: BT24CS1203	L	T	P	C
		0	0	3	1.5
DATA STRUCTURES LAB *(Common to CSE and IT)*					

Course Objectives:

The course aims to strengthen the ability of the students to identify and apply the 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, Student will be able to

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms (L4).

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation (L6).

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems (L6).

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between dequeue and priority queues (L3).

CO5: Apply them appropriately to solve data management challenges (L3).

CO6: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems (L4).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	3.00	3.00	3.00	-	-	-	-	-	-	-	3.00
CO2	3.00	3.00	3.00	3.00	-	-	-	-	-	-	-	2.00
CO3	3.00	2.00	3.00	2.00	-	-	-	-	-	-	-	2.00
CO4	3.00	3.00	2.00	2.00	-	-	-	-	-	-	-	2.00
CO5	2.00	3.00	3.00	2.00	-	-	-	-	-	-	-	2.00
CO6	2.00	3.00	3.00	3.00	-	-	-	-	-	-	-	2.00

	PSO1	PSO2
CO1	2.00	2.00
CO2	2.00	3.00
CO3	3.00	2.00
CO4	2.00	2.00
CO5	3.00	3.00
CO6	2.00	2.00

List of Experiments:

Exercise 1: Array Manipulation

i. Write a program to reverse an array.
ii. C Programs to implement the Searching Techniques – Linear & Binary Search
iii. C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

Exercise 2: Linked List Implementation

i. Implement a singly linked list and perform insertion and deletion operations.
ii. Develop a program to reverse a linked list iteratively and recursively.
iii. Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications

i. Create a program to detect and remove duplicates from a linked list.
ii. Implement a linked list to represent polynomials and perform addition.
iii. Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation

i. Implement a doubly linked list and perform various operations to understand its properties and applications.
ii. Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise 5: Stack Operations

i. Implement a stack using arrays and linked lists.
ii. Write a program to evaluate a postfix expression using a stack.
iii. Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations

i. Implement a queue using arrays and linked lists.
ii. Develop a program to simulate a simple printer queue system.
iii. Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications

i. Use a stack to evaluate an infix expression and convert it to postfix.
ii. Create a program to determine whether a given string is a palindrome or not.
iii. Implement a stack or queue to perform comparison and check for symmetry.

Exercise 8: Binary Search Tree

i. Implementing a BST using Linked List.
ii. Traversing of BST.

Exercise 9: Hashing

i. Implement a hash table with collision resolution techniques.
ii. Write a program to implement a simple cache using hashing.

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, Susan Anderson-Freed, 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 by Robert Sedgewick

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DEPARTMENT OF INFORMATION TECHNOLOGY

I Year- II Semester	Course Code: BT24BS1210	L	T	P	C
		0	0	1	0.5
HEALTH AND WELLNESS, YOGA AND SPORTS (Common to All branches of Engineering)					

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

Course Outcomes: After completion of the course the student will be able to

CO1: Understand the importance of yoga and sports for Physical fitness and sound health.

CO2: Demonstrate an understanding of health-related fitness components.

CO3: Compare and contrast various activities that help enhance their health.

CO4: Assess current personal fitness levels.

CO5: Develop Positive Personality.

CO6: Describe the history of sports, Ancient and Modern Olympics

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	2	-	-

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

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

Activities:

i) Organizing health awareness programmes in community

ii) Preparation of health profile

iii) Preparation of chart for balance diet for all age groups

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

Activities: Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

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

Activities:

i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc. Practicing general and specific warm up, aerobics

ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

Reference Books:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022

2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice

3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993

4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.

2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.

3. Institutes are required to provide sports instructor / yoga teacher to mentor the students. Evaluation

Guidelines:

1. Evaluated for a total of 100 marks.

2. A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.

PROGRAM STRUCTURE

B. Tech.-II Year I SEMESTER						
Course Code	**Course Title**	**Course Component**	**Total Number of contact hours**			**Credits (C)**
			Lecture (L)	**Tutorial (T)**	**Practical (P)**	
BT24BS2105	Discrete Mathematics & Graph Theory	BS&H	3	0	0	3
BT24HS2101	Universal Human Values – Understanding Harmony and Ethical Human Conduct	BS&H	2	1	0	3
BT24EC2107	Digital Logic & Computer Organization	ES	3	0	0	3
BT24CS2101	Advanced Data Structures &Algorithm Analysis	PC	3	0	0	3
BT24CS2102	Object Oriented Programming Through Java	PC	3	0	0	3
BT24CS2103	Advanced Data Structures& Algorithm Analysis Lab	PC	0	0	3	1.5
BT24CS2104	Object Oriented Programming Through Java Lab	PC	0	0	3	1.5
BT24CS2105	Python Programming Lab	PC	0	1	2	2
BT24BS2106	Environmental Science	MC	2	0	0	-
		Total	**16**	**2**	**8**	**20**

B. Tech.-II Year II SEMESTER						
Course Code	**Course Title**	**Course Component**	**Total Number of contact hours**			**Credits (C)**
			Lecture(L)	**Tutorial(T)**	**Practical (P)**	
BT24BS2204	Optimization Techniques	MC-1	2	0	0	2
BT24BS2202	Probability & Statistics	ES/BS	3	0	0	3
BT24CS2201	Operating Systems	PC	3	0	0	3
BT24CS2202	Database Management Systems	PC	3	0	0	3
BT24CS2203	Software Engineering	PC	3	0	0	3
BT24IT2201	Operating Systems & Software Engineering Lab	PC	0	0	3	1.5
BT24CS2205	Database Management Systems Lab	PC	0	0	3	1.5
BT24IT2202	Python with Django Lab	SEC	0	1	2	2
BT24ME2207	Design Thinking & Innovation	ES	1	0	2	2
		Total	**15**	**1**	**10**	**21**

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - I Semester	Course Code: BT24BS2105	L	T	P	C
		3	0	0	3

DISCRETE MATHEMATICS AND GRAPH THEORY

Course Objectives:

- To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
- To introduce a wide variety of applications.
- The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

Course Outcomes:

At the end of the course students will be able to

CO1: Build skills in solving mathematical problems (L3).

CO2: Comprehend mathematical principles and logic (L4).

CO3: Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software (L6).

CO4: Manipulate data numerically sing appropriate Software (L3).

CO5: Analyze data graphically sing appropriate Software (L4).

CO6: Understand the concept of spanning trees in graph (L2).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	3.00	2.00	-	-	-	-	2.00	-	-	-	2.00
CO2	3.00	3.00	1.00	-	-	-	-	2.00	-	-	-	2.00
CO3	3.00	3.00	2.00	-	-	-	-	2.00	-	-	-	2.00
CO4	3.00	3.00	2.00	-	-	-	-	2.00	-	-	-	-
CO5	3.00	2.00	1.00	-	-	-	-	2.00	-	-	-	2.00
CO6	3.00	3.00	2.00	-	-	-	-	2.00	-	-	-	2.00

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

UNIT–I: Mathematical Logic:

Propositional Calculus: 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, Consistency of Premises, Indirect Method of Proof, Predicate Calculus: Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

UNIT-II: Set Theory:

Sets: Operations on Sets, Principle of Inclusion-Exclusion, Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams, Functions: Bijective, Composition, Inverse, Permutation, and Recursive Functions, Lattice and its Properties.

UNIT-III: Combinatorics and Recurrence Relations:

Basis of Counting, Permutations, Permutations with Repetitions, Circular and Restricted Permutations, Combinations, Restricted Combinations, Binomial and Multinomial Coefficients and Theorems.**Recurrence Relations:** Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

UNIT-IV: Graph Theory:

Basic Concepts, Graph Theory and its Applications, Subgraphs, Graph Representations: Adjacency and Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs,

Unit-V: Multi Graphs

Multigraphs, Bipartite and Planar Graphs, Euler's Theorem, Graph Coloring and Covering, Chromatic Number, Spanning Trees, Prim's and Kruskal's Algorithms, BFS and DFS Spanning Trees.

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L.Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill.
3. Theory and Problems of Discrete Mathematics, Schaum's Outline Series, Seymour Lipschutz and Marc Lars Lipson, 3rd Edition, McGraw Hill.

REFERENCE BOOKS:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L.Mott, A. Kandel and T. P.

Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby and Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.
4. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition,

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - I Semester	Course Code: BT24HS2101	L	T	P	C
		2	1	0	3

UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

Course Objectives:

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Course Outcomes:

At the end of the course students will be able to

CO1: Define the terms like Natural Acceptance, Happiness and Prosperity (L1, L2).
CO2: Identify one's self, and one's surroundings (family, society nature) (L1, L2).
CO3: Apply what they have learnt to their own self in different day-to-day settings in real life
CO4: Relate human values with human relationship and human society (L4).
CO5: Justify the need for universal human values and harmonious existence (L5).
CO6: Develop as socially and ecologically responsible engineers (L3, L6).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	3.00	3.00	-	2.00	-	3.00
CO2	-	-	-	-	-	-	-	3.00	2.00	2.00	-	3.00
CO3	-	-	-	-	-	-	-	3.00	2.00	-	-	2.00
CO4	-	-	-	-	-	-	3.00	3.00	2.00	2.00	-	3.00
CO5	-	-	-	-	-	-	3.00	3.00	-	-	-	3.00
CO6	-	-	-	-	-	3.00	3.00	2.00	2.00	-	-	2.00

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

Course Topics

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1- hour duration.

Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions. The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT I: Introduction to Value Education (6 lectures and 3 tutorials for practice session)

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 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 Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial *3:* Practice Session PS3 Exploring Natural Acceptance

UNIT II: Harmony in the Human Being (6 lectures and 3 tutorials for practice session)

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 Session PS4 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 Session PS5 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 PS6 Exploring Harmony of self with the body

UNIT III: Harmony in the Family and Society (6 lectures and 3 tutorials for practice session)

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 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 Session PS9 Exploring Systems to fulfil Human Goal

UNIT IV: Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)

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 PS10 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 Session PS11 Exploring Co-existence in Existence.

UNIT V: Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values

Lecture 24: Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 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 Session PS13 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 Session PS14 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

READINGS:

Textbook and Teachers Manual

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

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the student explore the important or critical elements. In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-

exploration. Scenarios may be used to initiate discussion. The student is encouraged to take up" ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values. It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department. Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources:

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-troduction%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-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf
4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf
5. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf
7. https://fdp-si.aicte- india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf
8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human- values/chapter-5-

holistic-understanding-of-harmony-on-professional-ethics/62490385

9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

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D.N.R. COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous)
BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202

DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - I Semester	Course Code: BT24EC2107	L	T	P	C
		3	0	0	3

DIGITAL LOGIC & COMPUTER ORGANIZATION

Course Objectives:

The main objectives of the course is to

- provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals
- Describe memory hierarchy concepts
- Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices

Course Outcomes:

At the end of the course students will be able to

CO1: Learn different number systems and basic structure of computer system (L3)

CO2: Demonstrate the arithmetic algorithms (L4)

CO3: Explain the basic concepts of digital components and processor organization (L3)

CO4: Explain the generations of control signals of computer (L3)

CO5: Demonstrate the memory organization (L4)

CO6: Describe the concepts of parallel processing and different buses (L3)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	2.00	1.00	-	-	-	-	-	-	-	-	-
CO2	1.00	-	-	2.00	-	-	-	-	-	-	-	-
CO3	1.00	2.00	2.00	-	-	-	-	-	-	-	-	-
CO4	3.00	-	3.00	1.00	-	-	-	-	-	-	-	-
CO5	3.00	2.00	-	3.00	-	-	-	-	-	-	-	-
CO6	3.00	1.00	2.00	2.00	-	-	-	-	-	-	-	-

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	2
CO6	-	3

UNIT – I:

Data Representation: Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes

Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers

UNIT – II:

Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters

Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von- Neumann Architecture

UNIT – III:

Computer Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations

Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control

UNIT – IV:

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

UNIT – V:

Input / Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces

Textbooks:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 6th edition, McGraw Hill
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education.
3. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.

Reference Books:

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - I Semester	Course Code: BT24CS2101	L	T	P	C
		3	0	0	3

ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS

Course Objectives:

The main objectives of the course are to

- provide knowledge on advance data structures frequently used in Computer Science domain
- Develop skills in algorithm design techniques popularly used
- Understand the use of various data structures in the algorithm design

Course Outcomes:

At the end of the course students will be able to

CO1: Analyze worst-case running times of algorithms using asymptotic analysis (L4).

CO2: Apply Divide-and-conquer paradigm and explain when an algorithmic design situation calls for it (L3).

CO3: Apply Greedy Method paradigm (L3).

CO4: Develop dynamic programming algorithms for various real time applications (L6).

CO5: Illustrate and apply backtracking algorithms, further able to understand non-deterministic algorithms (L3).

CO6: Solve NP Completeness of problems (L5).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	3.00	3.00	-	3.00	-	-	-	-	-	-	-
CO2	-	2.00	3.00	-	-	-	-	-	-	-	-	-
CO3	2.00	-	-	2.00	-	-	-	-	-	-	-	-
CO4	-	-	2.00	3.00	-	-	-	-	-	-	-	-
CO5	2.00	-	-	-	3.00	-	-	-	-	-	-	-
CO6	-	3.00	-	3.00	2.00	-	-	-	-	-	-	-

	PSO1	PSO2
CO1	3.00	-
CO2	-	2.00
CO3	-	3.00
CO4	2.00	-
CO5	1.00	2.00
CO6	2.00	-

UNIT – I:

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 – II:

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

UNIT – III:

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 – IV:

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 – V:

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

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. Abdul Bari, Introduction to Algorithms (youtube.com)

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - I Semester	Course Code: BT24CS2102	L	T	P	C
		3	0	0	3

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Objectives:

The learning objectives of this course are to:

- identify Java language components and how they work together in applications
- Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
- learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
- understand how to design applications with threads in Java
- understand how to use Java APIs for program development

Course Outcomes:

At the end of the course students will be able to

CO1: Realize the concept of object oriented programming & Java programming constructs (L2).

CO2: Describe the basic concept of java such as operators, classes, objects (L2).

CO3: Describe the basic concept of java such as inheritance, packages, enumeration and various keywords (L2).

CO4: Apply the concepts of exception handling and Input / Output operations (L3).

CO5: Design the applications of Java & Java applet (L6)

CO6: Analyze & design the concept of Event handling and abstract window toolkit (L6)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	2.00	2.00	1.00	-	-	-	-	-	-	-	-
CO2	3.00	2.00	2.00	1.00	-	-	-	-	-	-	-	-
CO3	3.00	2.00	3.00	2.00	-	-	-	-	-	-	-	-
CO4	3.00	1.00	2.00	2.00	-	-	-	-	-	-	-	-
CO5	2.00	3.00	3.00	-	-	-	-	-	-	-	-	-
CO6	1.00	2.00	2.00	2.00	-	-	-	-	-	-	-	-

	PSO1	PSO2
CO1	2.00	-
CO2	2.00	-
CO3	-	-
CO4	-	-
CO5	-	2.00
CO6	-	-

UNIT I

Object Oriented Programming: Basic concepts, Principles, **Program Structure in Java:** Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style. **Data Types**, Variables, and Operators: Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf () Method, Static Variables and Methods, Attribute Final. **Introduction to Operators**, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators. **Control Statements**: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator? Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.

UNIT II

Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this. **Methods:** Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT III

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three- dimensional Arrays, Arrays as Vectors. **Inheritance:** Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance. **Interfaces:** Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT IV

Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto- boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class. **Exception Handling:** Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions. **Java I/O and File:** Java I/O API,

standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java(Text Book 2)

UNIT V

String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer. **Multithreaded Programming:** Introduction, need for Multiple Threads Multithreaded Programming for Multi-Core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads. **Java Database Connectivity:** Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, Result Set Interface

Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events (Text Book 3)

Text Books:

1. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
2. Joy with JAVA, Fundamentals of Object Oriented Programming, DebasisSamanta, MonalisaSarma, Cambridge, 2023.
3. JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

References Books:

1. The complete Reference Java, 11thedition, Herbert Schildt, TMH
2. Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

Online Resources:

1. https://nptel.ac.in/courses/106/105/106105191/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01288046454768816347_shared/overview

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - I Semester	Course Code: BT24CS2103	L	T	P	C
		0	0	3	1.5

ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS LAB

Course Objectives:

The objectives of the course are to

- acquire practical skills in constructing and managing Data structures
- apply the popular algorithm design methods in problem-solving scenarios

Course Outcomes:

At the end of the course students will be able to

CO1: Analyze algorithms and determine algorithm correctness and time efficiency classes (L4)

CO2: Develop Programs for implementing trees and their traversal operations (L6)

CO3: Apply algorithm design techniques (L3)

CO4: Apply Greedy, divide and conquer algorithms (L3)

CO5: Develop dynamic programming algorithms for various real-time applications (L6)

CO6: Illustrate and apply backtracking algorithms, further able to understand non-deterministic algorithms (L4)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	3.00	3.00	3.00	3.00	-	-	-	-	-	-	2.00
CO2	-	3.00	3.00	-	-	-	-	-	-	-	-	3.00
CO3	3.00	-	-	3.00	3.00	-	-	-	-	-	-	2.00
CO4	-	3.00	3.00	3.00	-	-	-	-	-	-	-	3.00
CO5	3.00	-	-	-	3.00	-	-	-	-	-	-	3.00
CO6	3.00	3.00	-	3.00	3.00	-	-	-	-	-	-	2.00

	PSO1	PSO2
CO1	3.00	3.00
CO2	-	3.00
CO3	-	3.00
CO4	3.00	-
CO5	3.00	3.00
CO6	3.00	-

Experiments covering the Topics:

- Operations on AVL trees, B-Trees, Heap Trees
- Graph Traversals
- Sorting techniques
- Minimum cost spanning trees
- Shortest path algorithms
- 0/1 Knapsack Problem
- Travelling Salesperson problem
- Optimal Binary Search Trees
- N-Queens Problem
- Job Sequencing

Sample Programs:

1. 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.
2. Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.
3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.
4. Implement BFT and DFT for given graph, when graph is represented by

a) Adjacency Matrix b) Adjacency Lists

5. Write a program for finding the biconnected components in a given graph.
6. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).
7. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.
8. Implement Job Sequencing with deadlines using Greedy strategy.
9. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.
10. Implement N-Queens Problem Using Backtracking.
11. Use Backtracking strategy to solve 0/1 Knapsack problem.
12. 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/

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - I Semester	Course Code: BT24CS2104	L	T	P	C
		0	0	3	1.5

OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Course Objectives:

The aim of this course is to

- Practice object-oriented programming in the Java programming language
- Implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
- Illustrate inheritance, Exception handling mechanism, JDBC connectivity
- Construct Threads, Event Handling, implement packages, Java FX GUI

Course Outcomes:

At the end of the course students will be able to

CO1: Apply control structures and operators for writing basic python programs (L3).

CO2: List various python data structure concepts and apply them to solve real world problems (L3).

CO3: Develop functions and examine various file handling techniques and apply them to solve real world problems (L6).

CO4: Build simple Modules used for solving real world Problems (L6).

CO5: Analyze object oriented concepts in Python (L4).

CO6: Develop, test various GUI application (L6).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	2.00	1.00	2.00	2.00							2.00
CO2	3.00	2.00	2.00	2.00	3.00							3.00
CO3	3.00	2.00	3.00	2.00	2.00							2.00
CO4	3.00	3.00	1.00	2.00	3.00							3.00
CO5	3.00	2.00	3.00	2.00	2.00							3.00
CO6	3.00	3.00	3.00	2.00	3.00							2.00

	PSO1	PSO2
CO1	3.00	3.00
CO2	2.00	2.00
CO3	1.00	1.00
CO4	3.00	3.00
CO5	1.00	1.00
CO6	3.00	3.00

Experiments covering the Topics:

- Object Oriented Programming fundamentals- data types, control structures
- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces

  Files, I/O streams, Java FX GUI

Sample Experiments:

Exercise – 1:

a) Write a JAVA program to display default value of all primitive data type of JAVA

b) Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminate D and basing on value of D, describe the nature of root.

Exercise – 2

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b) Write a JAVA program to sort for an element in a given list of elements using bubble sort

c) Write a JAVA program using String Buffer to delete, remove character**.**

Exercise - 3

a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.

b) Write a JAVA program implement method overloading.

c) Write a JAVA program to implement constructor.

d) Write a JAVA program to implement constructor overloading.

Exercise - 4

a) Write a JAVA program to implement Single Inheritance

b) Write a JAVA program to implement multi-level Inheritance

c) Write a JAVA program for abstract class to find areas of different shapes

Exercise - 5

a) Write a JAVA program give example for "super" keyword.

b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

c) Write a JAVA program that implements Runtime polymorphism

Exercise - 6

a) Write a JAVA program that describes exception handling mechanism

b) Write a JAVA program Illustrating Multiple catch clauses

c) Write a JAVA program for creation of Java Built-in Exceptions

d) Write a JAVA program for creation of User Defined Exception

Exercise - 7

a) Write a JAVA program that creates threads by extending Thread class. First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display

"Welcome" every 3 seconds, (Repeat the same by implementing Runnable)

b) Write a program illustrating **is Alive** and **join ()**

c) Write a Program illustrating Daemon Threads.

d) Write a JAVA program Producer Consumer Problem

Exercise – 8

a) Write a JAVA program that import and use the user defined packages

b) Without writing any code, build a GUI that display text in label and image in an Image View (use JavaFX)

c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

Exercise – 9

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - I Semester	Course Code: BT24CS2105	L	T	P	C
		0	1	2	2

PYTHON PROGRAMMING (SKILL ENHANCEMENT COURSE)

Course Objectives:

The main objectives of the course are to

- Introduce core programming concepts of Python programming language.
- Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
- Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

Course Outcomes:

At the end of the course students will be able to

CO1: Develop essential programming skills in computer programming concepts like datatypes, containers (L3)

CO2: Apply the basic of programming in the Python Language (L3)

CO3: Apply ode tasks related to conditional executions and loops (L3)

CO4: Apply coding tasks related to fundamental notations and techniques used in object oriented programming (L3)

CO5: Design and implement a program to solve a real world problem (L6)

CO6: Create a database connectivity in python programming language (L6)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	2.00	3.00	-	2	-	-	-	-	-	-	2.00
CO2	3.00	3.00	3.00	-	2	-	-	-	-	-	-	2.00
CO3	3.00	3.00	3.00	-	2	-	-	-	-	-	-	2.00
CO4	3.00	2.00	2.00	-	2	-	-	-	-	-	-	2.00
CO5	3.00	3.00	3.00	-	3	-	-	-	-	-	-	2.00
CO6	3.00	2.00	2.00	-	2	-	-	-	-	-	-	2.00

	PSO1	PSO2
CO1	3.00	3.00
CO2	2.00	2.00
CO3	3.00	3.00
CO4	2.00	2.00
CO5	3.00	3.00
CO6	3.00	3.00

UNTI-I:

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupiter Notebook. Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language. Control Flow Statements: if statement, if-else statement, if...elseif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Demonstrate the following Operators in Python with suitable examples.
   i) Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators
5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.

UNIT-II:

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:

1. Write a program to define a function with multiple return values.
2. Write a program to define a function using default arguments.
3. Write a program to find the length of the string without using any library functions.
4. Write a program to check if the substring is present in a given string or not.
5. Write a program to perform the given operations on a list:
   i. Addition ii. insertion iii. slicing
6. Write a program to perform any 5 built-in functions by taking any list.

UNIT-III:

Dictionaries: Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement. Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple () Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, using zip () Function, Sets, Set Methods, Frozen set.

Sample Experiments:

1. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
2. Write a program to count the number of vowels in a string (No control flow allowed).
3. Write a program to check if a given key exists in a dictionary or not.
4. Write a program to add a new key-value pair to an existing dictionary.
5. Write a program to sum all the items in a given dictionary.

UNIT-IV:

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Sample Experiments:

1. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
2. Python program to print each line of a file in reverse order.
3. Python program to compute the number of characters, words and lines in a file.
4. Write a program to create, display, append, insert and reverse the order of the items in the array.
5. Write a program to add, transpose and multiply two matrices.
6. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

UNIT-V:

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

1. Python program to check whether a JSON string contains complex object or not.
2. Python Program to demonstrate NumPy arrays creation using array () function.
3. Python program to demonstrate use of ndim, shape, size, dtype.
4. Python program to demonstrate basic slicing, integer and Boolean indexing.
5. Python program to find min, max, sum, cumulative sum of array
6. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:

a) Apply head () function to the pandas data frame

b) Perform various data selection operations on Data Frame

7. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

Reference Books:

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

Online Learning Resources/Virtual Labs:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - I Semester	Course Code: BT24BS2106	L	T	P	C
		2	0	0	-

ENVIRONMENTAL SCIENCE

Course Objectives:

To make the students to get awareness on environment

- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

Course Outcomes:

At the end of the course students will be able to

CO1: Grasp multidisciplinary nature of environmental studies and various renewable and non-renewable resources (L3).

CO2: Understand flow and bio-geo-chemical cycles and ecological pyramids (L2).

CO3: Understand various causes of pollution and solid waste management (L2).

CO4: Understand the various causes of pollution and its related preventive measures (L4).

CO5: About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation

CO6: Casus of population explosion, value education and welfare programmes (L3).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	2.00	3.00	-	-	3.00	2.00	-	2.00	2.00	-	3.00
CO2	3.00	2.00	-	-	-	3.00	2.00	-	3.00	3.00	-	3.00
CO3	3.00	-	-	-	-	2.00	3.00	-	2.00	2.00	-	3.00
CO4	2.00	-	2.00	-	-	2.00	3.00	-	2.00	2.00	-	3.00
CO5	2.00	2.00	2.00	-	-	2.00	3.00	-	2.00	2.00	-	3.00
CO6	2.00	2.00	2.00	-	-	3.00	3.00	-	2.00	2.00	-	2.00

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

UNIT–I:

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness. Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems–Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies– Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. –Energy resources:

UNIT–II:

Ecosystems: Concept to fan ecosystem. –Structure and function of an ecosystem–Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids–Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grass and ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation: Introduction Definition: genetic, species and ecosystem diversity–Bio-geographical classification of India–Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts– Endangered and endemic species of India –Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT–III:

Environmental Pollution: Definition, Cause, effects and control measures of:

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and land- slides.

UNIT–IV:

Social Issues and the Environment: From Unsustainable to Sustainable development– Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions–Climate change, global warming, acid-rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wastel and reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act–Wild life Protection Act–Forest Conservation Act–Issues involved in enforcement of environment allegislation–Public awareness.

UNIT–V:

Human Population and The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education–HIV/AIDS–Women and Child Welfare–Role of information Technology in Environment and human health–Case studies. Field Work: Visit to a local area to document environmental assets River/ forest grassland/ hill/ mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds–river, hills lopes, etc.

Text books:

1. Text book of Environmental Studies for Undergraduate Courses ErachBharucha for University Grants Commission, Universities Press.
2. Palani swamy, “Environmental Studies”, Pearson education
3. S. Azeem Unnisa, “Environmental Studies” Academic Publishing Company
4. K. Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India), Pvt. Ltd.

Reference Books:

1. Deeksha Dave and E. Sai Baba Reddy, “Text book of Environmental Science”, Cengage Publications.
2. M. Anji Reddy, “Text book of Environmental Sciences and Technology”, B S Publication.
3. J. P. Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”, Prentice Hall of India Private limited
5. G. R. Chatwal, “A Text Book of Environmental Studies” Himalaya Publishing House

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year-II Semester	Course Code: BT24BS2204	L	T	P	C
		2	0	0	2
OPTIMIZATION TECHNIQUES					

Course Objectives:

- To define an objective function and constraint functions in terms of design variables, and then state the optimization problem.
- To state single variable and multi variable optimization problems, without and with constraints.
- To explain linear programming technique to an optimization problem, define slack and surplus variables, by using Simplex method.
- To state transportation and assignment problem as a linear programming problem to determine simplex method.
- To study and explain nonlinear programming techniques, unconstrained or constrained, and define exterior and interior penalty functions for optimization problems.

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

CO1: State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.

CO2: Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.

CO3: Apply and Solve transportation and assignment problem by using Linear programming Simplex method.

CO4: Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions

CO5: Formulate and apply Dynamic programming technique to inventory control, production planning, ngineering design problems etc. to reach a final optimal solution from the current optimal solution.

	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12
CO1	3	2	2	1	2	-	-	-	-	1	-	1
CO2	3	3	2	2	2	-	-	-	-	1	-	2
CO3	3	3	3	2	3	-	-	-	-	1	-	2
CO4	3	3	3	3	3	-	-	-	-	1	-	3
CO5	3	3	3	3	3	-	-	-	-	1	-	3

	PSO1	PSO2
CO1	3	2
CO2	3	3
CO3	3	3
CO4	3	3
CO5	3	3

UNIT I: Introduction and Classical Optimization Techniques:

Statement of an Optimization problem, design vector, design constraints, constraint surface, objective function, objective function surfaces, classification of Optimization problems. Classical Optimization Techniques: Single variable Optimization, multi variable Optimization without constraints, necessary and sufficient conditions for minimum/maximum, multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers, multivariable Optimization with inequality constraints, Kuhn – Tucker conditions

UNIT II: Linear Programming :

Standard form of a linear programming problem, geometry of linear programming problems, definitions and theorems, solution of a system of linear simultaneous equations, pivotal reduction of a general system of equations, motivation to the simplex method, simplex algorithm.

UNIT III: Transportation Problem:

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method, testing for optimality of balanced transportation problems, Special cases in transportation problem.

UNIT IV: Nonlinear Programming:

Unconstrained cases, One – dimensional minimization methods: Classification, Fibonacci method, Univariate method, steepest descent method. Constrained cases– Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method, Basic approaches of Interior and Exterior penalty function methods,

UNIT V: Dynamic Programming:

Dynamic programming multistage decision processes, types, concept of sub optimization and the principle of optimality, computational procedure in dynamic programming, examples illustrating the calculus method of solution, examples illustrating the tabular method of solution.

Textbooks:

1. "Engineering optimization: Theory and practice", S. S.Rao, New Age International (P) Limited,

2. "Introductory Operations Research", H.S. Kasene& K.D. Kumar, Springer (India), Pvt.LTd.

Reference Books:

1. "Optimization Methods in Operations Research and systems Analysis", by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.

2. Operations Research, Dr.S.D.Sharma, Kedarnath, Ramnath& Co

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year- II Semester	Course Code: BT24BS2202	L	T	P	C
		3	0	0	3
PROBABILITY AND STATISTICS					

Course Objectives:

- To familiarize the students with the foundations of probability and statistical methods
- To impart probability concepts and statistical methods in various applications Engineering

Course Outcomes: Upon successful completion of this course, the student should be able to

CO1: Classify the concepts of data science and its importance (L2)

CO2: Interpret the association of characteristics and through correlation and regression tools (L4)

CO3: Apply discrete and continuous probability distributions (L3)

CO4: Design the components of a classical hypothesis test (L6)

CO5: Infer the statistical inferential methods based on small and large sampling tests (L4)

CO6: Infer the statistical inferential methods based on large sampling tests (L4)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	2.00	-	-	-	-	-	-	-	-	-	2.00
CO2	3.00	2.00	-	-	-	-	-	-	-	-	-	2.00
CO3	3.00	2.00	-	-	-	-	-	-	-	-	-	2.00
CO4	3.00	2.00	-	-	-	-	-	-	-	-	-	2.00
CO5	3.00	2.00	-	-	-	-	-	-	-	-	-	2.00
CO6	3.00	2.00	-	-	-	-	-	-	-	-	-	2.00

	PSO1	PSO2
CO1	-	-
CO2	-	-
CO3	-	-
CO4	-	-
CO5	-	-
CO6	-	-

Unit – I: Descriptive statistics and methods for data science:

Data science – Statistics Introduction – Population vs Sample –Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability – Skewness – Kurtosis.

UNIT – II: Correlation and Regression:

Correlation – Correlation coefficient – Rank correlation. Linear Regression: Straight line – Multiple Linear Regression - Regression coefficients and properties – Curvilinear Regression: Parabola – Exponential – Power curves.

UNIT – III: Probability and Distributions:

Probability– Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution functions – Probability mass function, Probability density function and Cumulative distribution functions – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

UNIT – IV: Sampling Theory:

Introduction – Population and Samples – Sampling distribution of Means and Variance (definition only) – Point and Interval estimations – Maximum error of estimate – Central limit theorem (without proof) – Estimation using t, χ^2 and F-distributions.

UNIT – V: Tests of Hypothesis:

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors –

Level of significance – One tail and two-tail tests – Test of significance for large samples and

Small Samples: Single and difference means – Single and two proportions – Student's t- test,

F-test, χ^2 -test.

Text Books:

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

Reference Books:

- Shron L. Myers, Keying Ye, Ronald E Walpole, Probability and Statistics Engineers and the Scientists,8th Edition, Pearson 2007.
- Jay l. Devore, Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage. • Sheldon M. Ross, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.
- Johannes Ledolter and Robert V. Hogg, Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010.

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - II Semester	Course Code: BT24CS2201	L	T	P	C
		3	0	0	3

OPERATING SYSTEMS

Course Objectives:

The main objectives of the course are to make student

- Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection
- Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
- Illustrate different conditions for deadlock and their possible solutions.

Course Outcomes

Upon successful completion of this course, the student should be able to

CO1: Describe various generations of Operating Systems and functions of Operating Systems (L2).

CO2: Describe the concept of program, process and thread (L2).

CO3: Analyze various CPU Scheduling Algorithms and compare their performance (L4).

CO4: Solve Inter Processes Communication problems using Mathematical Equations by various methods (L3).

CO5: Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page Replacement Techniques (L5).

CO6: Outline File Systems in Operating System like UNIX / Linux and Windows (L4).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2.00	2.00	2.00	2.00	-	-	-	-	-	-	-	-
CO2	3.00	3.00	3.00	2.00	-	-	-	-	-	-	-	-
CO3	3.00	2.00	2.00	2.00	-	-	-	-	-	-	-	-
CO4	3.00	3.00	2.00	2.00	-	-	-	-	-	-	-	-
CO5	2.00	3.00	3.00	2.00	-	-	-	-	-	-	-	-
CO6	2.00	2.00	2.00	2.00	-	-	-	-	-	-	-	-

	PSO1	PSO2
CO1	2.00	2.00
CO2	2.00	2.00
CO3	2.00	2.00
CO4	-	2.00
CO5	2.00	2.00
CO6	-	-

UNIT - I

Operating Systems Overview: Introduction, operating system functions, operating systems operations, Computing environments, Free and Open-Source Operating Systems. **System Structures:** Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, operating system Design and Implementation, operating system structure, Building and Booting an Operating System, Operating system debugging

UNIT - II

Processes: Process Concept, Process scheduling, Operations on processes, Inter-process communication.

Threads and Concurrency: Multithreading models, Thread libraries, Threading issues. **CPU Scheduling:** Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.

UNIT – III

Synchronization Tools: The Critical Section Problem, Peterson's Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization. **Deadlocks:** system Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

UNIT - IV

Memory-Management Strategies: Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping. **Virtual Memory Management:** Introduction, Demand paging, Copy-on-write, Page replacement, Allocation of frames, Thrashing. **Storage Management:** Overview of Mass Storage Structure, HDD Scheduling.

UNIT - V

File System: File System Interface: File concept, Access methods, Directory Structure; File system **Implementation:** File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management; File-System Internals: File-System Mounting, Partitions and Mounting, File Sharing.

Protection: Goals of protection, Principles of protection, Protection Rings, Domain of protection, Access matrix.

Text Books:

1.Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.

2.Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson , 2016

Reference Books:

1.Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018

2.Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013

Online Learning Resources:

1.https://nptel.ac.in/courses/106/106/106106144/

2.http://peterindia.net/OperatingSystems.html/

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - II Semester	Course Code: BT24CS2202	L	T	P	C
		3	0	0	3

DATABASE MANAGEMENT SYSTEMS

Course Objectives:

The main objectives of the course are to

- Introduce database management systems and to give a good formal foundation on the relational model of data and usage of Relational Algebra
- Introduce the concepts of basic SQL as a universal Database language
- Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
- Provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques

Course Outcomes

Upon successful completion of this course, the student should be able to

CO1: Determine the basic concept and applications of database system (L3)

CO2: Describe the data models and schemes in Database Management Systems (L3)

CO3: Understand the relational databases system using relational operators in queries (L2)

CO4: Use SQL standard language queries on database (L6)

CO5: Analysis the functional dependencies and design of database (L4)

CO6: Apply the issues of managing the data such as efficiency, privacy, security and ethical responsible (L3)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3.00	2.00	-	-	-	-	-	-	-	-
CO3	-	-	2.00	3.00	-	-	-	-	-	-	-	-
CO4	2.00	2.00	2.00	-	3.00	-	-	-	-	-	-	-
CO5	1.00	-	-	-	3.00	-	-	-	-	-	-	-
CO6	2.00	3.00	-	3.00	-	-	-	-	-	-	-	-

	PSO1	PSO2
CO1	-	2.00
CO2	2.00	3.00
CO3	2.00	3.00
CO4	-	3.00
CO5	3.00	-
CO6	-	-

UNIT I:

Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

UNIT II:

Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus.

BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).

UNIT III:

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

UNIT IV:

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd Normal Form(BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).

UNIT V:

Transaction Concept: Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

Introduction to Indexing Techniques: B+ Trees, operations on B+Trees, Hash Based Indexing:

Text Books:

1) Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For

Chapters 2, 3, 4)

2) Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan,TMH (For Chapter 1 and Chapter 5)

Reference Books:

1) Introduction to Database Systems, 8thedition, C J Date, Pearson.
2) Database Management System, 6th edition, RamezElmasri, Shamkant B. Navathe, Pearson
3) Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

Web-Resources:

1) https://nptel.ac.in/courses/106/105/106105175/
2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview

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BALUSUMUDI, BHIMAVARAM, W.G. Dist., A.P., PIN-534 202

DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - II Semester	Course Code: BT24CS2203	L	T	P	C
		2	1	0	3

SOFTWARE ENGINEERING

Course Objectives:

The objectives of this course are to introduce

- Software life cycle models, Software requirements and SRS document.
- Project Planning, quality control and ensuring good quality software.
- Software Testing strategies, use of CASE tools, Implementation issues, validation & verification procedures.

Course Outcomes

Upon successful completion of this course, the student should be able to

CO1: Explain software engineering principles involved in the building large software programs and process of requirement specification and requirements validations (L2).

CO2: Explain the concepts of ability and the Cost of Change and development of Use Cases, Building the requirement model (L2)

CO3: Analyze Requirements Analysis and System models for designing patterns (L4).

CO4: Skills to Design, implement, and execute test cases at the Unit and Integration Level (L5).

CO5: Evaluate the importance of software maintenance and complexities involved in software evaluation (L6).

CO6: Apply estimation techniques, scheduling project activities and compute pricing and Compare conventional and agile software methods (L3)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	2.00	2.00	2.00	2.00						2.00	2.00
CO2	1.00	1.00	1.00	2.00	2.00						2.00	2.00
CO3	2.00	2.00	2.00	3.00	3.00						2.00	2.00
CO4	2.00	3.00	3.00	3.00	3.00						3.00	3.00
CO5	2.00	2.00	1.00	3.00	2.00						1.00	2.00
CO6	3.00	2.00	2.00	2.00	2.00						2.00	3.00

	PSO1	PSO2
CO1	2.00	2.00
CO2	2.00	2.00
CO3	2.00	2.00
CO4	3.00	3.00
CO5	2.00	2.00
CO6	3.00	3.00

UNIT I:

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 II:

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 III:

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 (Text Book 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 IV:

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 V:

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, 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.

Text Books:

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

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - II Semester	Course Code: BT24IT2201	L	T	P	C
		0	0	3	1.5

OPERATING SYSTEMS & SOFTWARE ENGINEERING LAB

Course Objectives:

The main objectives of the course are to

- Provide insights into system calls, file systems, semaphores,
- Develop and debug CPU Scheduling algorithms, page replacement algorithms, thread implementation
- Implement Bankers Algorithms to Avoid the Dead Lock

Course Outcomes:

Upon successful completion of this course, the student should be able to

CO1: Apply basic UNIX commands and system calls for process and file handling.

CO2: Implement CPU scheduling and memory management algorithms.

CO3 : Analyze and implement thread synchronization and inter-process communication using semaphores/monitors.

CO4: Simulate file allocation strategies and page replacement algorithms.

CO5: Apply software engineering principles to perform requirement analysis, effort estimation, and testing.

CO6: Create UML, DFD, ER diagrams for software modeling and design.

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

	PSO1	PSO2
CO1	3.00	2.00
CO2	3.00	2.00
CO3	-	-
CO4	2.00	2.00
CO5	-	-
CO6	2.00	-

Experiments covering the Topics:

- UNIX fundamentals, commands & system calls
- CPU Scheduling algorithms, thread processing
- IPC, semaphores, monitors, deadlocks
- Page replacement algorithms, file allocation strategies
- Memory allocation strategies
- Software Requirement Specification, DFD, CFD
- Software estimation, UML diagrams, test case design Sample Experiments:

Sample Experiments in Operating Systems:

1. Practicing of Basic UNIX Commands.
2. Write programs using the following UNIX operating system calls fork, exec, getpid, exit, wait, close, stat, opendir and readdir
3. Simulate UNIX commands like cp, ls, grep, etc.,
4. Simulate the following CPU scheduling algorithms

a) FCFS b) SJF c) Priority d) Round Robin

5. Control the number of ports opened by the operating system with

a) Semaphore b) Monitors.

6. Write a program to illustrate concurrent execution of threads using pthreads library.
7. Write a program to solve producer-consumer problem using Semaphores.
8. Implement the following memory allocation methods for fixed partition

a) First fit b) Worst fit c) Best fit

9. Simulate the following page replacement algorithms

a) FIFO b) LRU c) LFU

10. Simulate Paging Technique of memory management.
11. Implement Bankers Algorithm for Dead Lock avoidance and prevention
12. Simulate the following file allocation strategies

    a) Sequential b) Indexed c) Linked

13. Download and install nachos operating system and experiment with it Sample Experiments in

Software Engineering:

1) Perform the following, for the following experiments:

    i. Do the Requirement Analysis and Prepare SRS

    ii. Draw E-R diagrams, DFD, CFD and structured charts for the project.

    a. Course Registration System

b. Students Marks Analyzing System

c. Online Ticket Reservation System

d. Stock Maintenance

2) Consider any application, using COCOMO model, estimate the effort.

3) Consider any application, calculate effort using FP oriented estimation model.

4) Draw the UML Diagrams for the problem a, b, c, d.

5) Design the test cases for e-Commerce application (Flipkart, Amazon)

6) Design the test cases for a Mobile Application (Consider any example from Appstore)

7) Design and Implement ATM system through UML Diagrams.

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - II Semester	Course Code: BT24CS2205	L	T	P	C
		0	0	3	1.5

DATABASE MANAGEMENT SYSTEMS LAB

Course Objectives:

This Course will enable students to

- Populate and query a database using SQL DDL/DML Commands
- Declare and enforce integrity constraints on a database
- Writing Queries using advanced concepts of SQL
- Programming PL/SQL including procedures, functions, cursors and triggers

Course Outcomes:

Upon successful completion of this course, the student should be able to

CO1: Utilize SQL to execute queries for creating database and performing data manipulation operations (L6)

CO2: Apply integrity constraints to build efficient databases (L3)

CO3: Apply Queries using Advanced Concepts of SQL (L3)

CO4: Build PL/SQL programs including stored procedures, functions (L6).

CO5: Build PL/SQL programs cursors and triggers (L6).

CO6: Establish the connection between database using JDBC / ODBC (L6)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2.00	3.00	-	2.00	-	-	-	-	-	-	-	-
CO2	2.00	3.00	3.00	3.00	-	-	-	-	-	-	-	-
CO3	2.00	3.00	3.00	2.00	3.00	-	-	-	-	-	-	-
CO4	2.00	3.00	3.00	3.00	2.00	-	-	-	-	-	-	-
CO5	2.00	3.00	3.00	2.00	2.00	-	-	-	-	-	-	-
CO6	2.00	2.00	3.00	2.00	2.00	-	-	-	-	-	-	-

	PSO1	PSO2
CO1	-	2.00
CO2	-	-
CO3	-	-
CO4	2.00	-
CO5	2.00	-
CO6		-

Experiments covering the topics:

- DDL, DML, DCL commands
- Queries, nested queries, built-in functions,
- PL/SQL programming- control structures
- Procedures, Functions, Cursors, Triggers,
- Database connectivity- ODBC/JDBC

Sample Experiments:

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

2.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.

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

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

5.I) Create a simple PL/SQL program which includes declaration section, executable section and exception –

Handling section (Ex. Student marks can be selected from the table and printed for those who secured

First class and an exception can be raised if no records were found)

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

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

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

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

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

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

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

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

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

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

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

Text Books/Suggested Reading:

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - II Semester	Course Code: BT2IT2202	L	T	P	C
		0	1	2	2
PYTHON WITH DJANGO (SKILL ENHANCEMENT COURSE)					

Course Objectives:

The main objectives of the course are to

- Design and build static as well as dynamic web pages and interactive web-based applications
- Web development using Django framework.
- Analyze and create functional website in Django and deploy Django Web Application on Cloud

Course Outcomes:

Upon successful completion of this course, the student should be able to

CO1: Understand and apply Python libraries and frameworks such as Tkinter, Flask, and Beautiful Soup for web-based application development. (L2)

CO2: Develop static and dynamic web pages using Django framework, implementing MVC/MTV architecture and template inheritance. (L3)

CO3: Design and create Django models, perform CRUD operations, and integrate SQLite database with web applications. (L3)

CO4: Implement user authentication, registration, session management, and email configuration using Django's built-in authentication system. (L4)

CO5: Deploy Django-based web applications on cloud platforms such as Heroku and manage version control using GitHub. (L3)

CO6: Demonstrate the ability to build and deploy a full-fledged functional website with login, registration, database operations, and responsive UI using Bootstrap. (L5)

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

	PSO1	PSO2
CO1	-	2.00
CO2	-	-
CO3	-	-
CO4	2.00	-
CO5	2.00	-
CO6	-	-

UNIT I: Python libraries for web development:

Collections-Container datatypes, Tkinter-GUI applications, Requests-HTTP requests, BeautifulSoup4-web scraping, Scrapy, Zappa, Dash, CherryPy, Turbo Gears, Flask, Web2Py, Bottle, Falcon, Cubic Web, Quixote, Pyramid.

Sample Experiments:

1. Write a Python GUI program to import Tkinter package and create a window. Set its title and add a label to the window.
2. Write a Python program that designs a simple login form with labels and Entry widgets, arranging them in a grid using the Grid geometry manager.
3. Write a program using BeautifulSoup4 library for web scraping for a given URL
4. Develop a sample Hello World page using Flask framework
5. Develop a sample web page using CherryPy / Web2Py / Bottle Framework

UNIT II: Introduction to Django Framework

Understanding Django environment, Features of Django and Django architecture, MVC and MTV, Urls and Views, Mapping the views to URLs, Django Template, Template inheritance Django Models, Creating model for site, Converting the model into a table, Fields in Models, Integrating Bootstrap into Django, Creating tables, Creating grids, Creating carousels.

Sample Experiments:

1. Create a Sample “Hello World” Application using Django
2. Create a Login and Registration Page using MVC architecture in Django Framework
3. Create a sample page in Django by integrating BootStrap.
4. Create an application with Tables, grids in Django
5. Create a Django App with Carousels feature.

UNIT III: Integrating Accounts & Authentication on Django

Introduction to Django Authentication System, Security Problem &Solution with Django Creating Registration Form using Django, Adding Email Field in Forms, Configuring email settings, Sending emails with Django, Adding Grid Layout On Registration Page, Adding Page Restrictions, Login Functionality Test and Logout.

Sample Experiments:

1. Create a registration page using Authentication System
2. Create an application in Django to send emails using email settings and Grid Layout
3. Create an application in Django using page restriction / authentication with Login and Logout Functionality

4. Create a sample form using Django Forms

UNIT IV: Connecting SQLite with Django

Database Migrations, Fetch Data From Database, Displaying Data On Templates, Adding Condition On Data, Sending data from url to view, Sending data from view to template, Saving objects into database, Sorting objects, Filtering objects, Deleting objects, Difference between session and cookie, Creating sessions and cookies in Django.

Sample Experiments:

1. Create an app in Django which fetches data from database and show as list and also save objects in database
2. Create an app in Django for performing CRUD operations on records in a database
3. Create an app in Django which uses session management and cookies to store and manage user sessions.

UNITV: Deploying Django Web Application on Cloud

Creating a functional website in Django, Four Important Pillars to Deploy, registering on Heroku and GitHub, Push project from Local System to GitHub, working with Django Heroku, Working with Static Root, Handling WSGI with gunicorn, setting up Database & adding users.

Sample Experiments:

1. Create a website in Django with login, and registration page.
2. Register on GitHub, and Heroku and deploy the website on Heroku with all the functionalities developed.
3. Configure Django to handle static files.

Text books:

1. Martin C.Brown, “Python: The Complete Reference Paper back”, 4th Edition 2018, McGraw Hill Education.
2. Reema Thareja, “Python Programming: Using Problem Solving Approach”, 3rd Edition 2017, Oxford.
3. Daniel Rubio, Apress, ”Beginning Django Web Application Development and Deployment with Python”, 2nd Edition 2017,Apress.

Reference Books:

1. Tom Aratyn, “Building Django 2.0 Web Applications: Create enterprise-grade, scalable Python web
2. applications easily with Django 2.0”,2ndEdition 2018, Packt Publishing.
3. Harry Percival, “Test-Driven Development with Python: Obey the Testing Goat:Using Django, Selenium and JavaScript”,2nd Edition 2019, Kindle Edition.

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DEPARTMENT OF INFORMATION TECHNOLOGY

II Year - II Semester	Course Code: BT24ME2207	L	T	P	C
		1	0	2	2

DESIGN THINKING & INNOVATION

Course Objectives:

The objectives of the course are to

- Bring awareness on innovative design and new product development.
- Explain the basics of design thinking.
- Familiarize the role of reverse engineering in product development.
- Train how to identify the needs of society and convert into demand.
- Introduce product planning and product development process.

Course Outcomes:

CO1: Apply the concepts related to design thinking in real-world scenarios

CO2: Analyze the fundamentals of Design Thinking and its role in innovation

CO3: Develop design thinking techniques to solve complex problems across various industries

C04: Assess the effectiveness of working in a multidisciplinary environment for product innovation

CO5: Evaluate the impact of creativity and innovation on business and product development

C06: Create innovative solutions by integrating design thinking into business processes and entrepreneurship

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3.00	-	2.00	2.00		2.00		2.00	3.00	2.00		2.00
CO2	3.00	-	2.00	2.00		2.00		2.00	3.00	2.00		2.00
CO3	3.00	-	2.00	2.00		2.00		2.00	3.00	2.00		2.00
CO4	3.00	-	2.00	2.00		2.00		2.00	3.00	2.00		2.00
CO5	3.00	-	2.00	2.00		2.00		2.00	3.00	2.00		2.00
CO6	3.00	-	2.00	2.00		2.00		2.00	3.00	2.00		2.00

	PSO1	PSO2
CO1	3.00	-
CO2	3.00	-
CO3	3.00	-
CO4	3.00	-
CO5	3.00	-
CO6	3.00	-

UNIT – I: Introduction to Design Thinking

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT – II: Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development. **Activity:** Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT – III: Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT – IV: Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity: Importance of modeling, how to set specifications, Explaining their own product design.

UNIT – V: Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for startup.

Textbooks:

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.

3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

Online Learning Resources:

- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview

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