SIR C R REDDY COLLEGE OF ENGINEERING, ELURU
[AUTONOMOUS]
Approved by AICTE & Permanently Affiliated to JNTUK, Kakinada
Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF INFORMATION TECHNOLOGY

B.Tech.–II Year I Semester

S.No.	Category	Title	L	T	P	Credits
1	BS&H	Discrete Mathematics & Graph Theory	3	0	0	3
2	BS&H	Universal human values – understanding harmony and Ethical human conduct	3	0	0	3
3	Engineering Science	Digital Logic &Computer Organization	3	0	0	3
4	Professional Core	Advanced Data Structures& Algorithms	3	0	0	3
5	Professional Core	Object Oriented Programming Through Java	3	0	0	3
6	Professional Core	Advanced Data Structures Lab	0	0	3	1.5
7	Professional Core	Object Oriented Programming Through Java Lab	0	0	3	1.5
8	Skill Enhancement course	Python Programming	0	1	2	2
9	Audit Course	Environmental Science	2	0	0	-
Total			**16**	**2**	**8**	**20**

B.Tech.–II Year II Semester

S.No.	**Category**	**Title**	**L**	**T**	**P**	**Credits**
1	Management Course-I	Optimization Techniques	2	0	0	2
2	Engineering Science/ Basic Science	Probability & Statistics	3	0	0	3
3	Professional Core	Operating Systems	3	0	0	3
4	Professional Core	Database Management Systems	3	0	0	3
5	Professional Core	Software Engineering	3	0	0	3
6	Professional Core	Operating Systems & Software Engineering Lab	0	0	3	1.5
7	Professional Core	Database Management Systems Lab	0	0	3	1.5
8	Skill Enhancement Course	Python with DJango	0	1	2	2
9	BS&H	Design Thinking & Innovation	1	0	2	2
Total			**15**	**1**	**10**	**21**
Mandatory Community Service Project Internship of 08weeks duration during summer vacation						

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DEPARTMENT OF INFORMATION TECHNOLOGY

II B. TECH I SEMESTER: IT

DISCRETE MATHEMATICS & GRAPH THEORY

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
2	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:

Upon successful completion of the course, the student will be able to		
CO1	Build skills in solving mathematical problems.	K3
CO2	Comprehend mathematical principles and logic.	K4
CO3	Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software.	K6
CO4	Manipulate and analyze data numerically and/or graphicallysing appropriate Software.	K3
CO5	How to communicate effectively mathematical ideas/results verbally or in writing	K1

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CO-PO MAPPING:

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	-

UNIT–I:

Mathematical Logic-1

Propositional Calculus:

Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms- Disjunctive Normal Form, Conjunctive Normal Form, Principal Disjunctive Normal Form, Principal Conjunctive Normal Form, Ordering and Uniqueness of Normal Forms.

UNIT-II:

Predicate Calculus

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

Sets: Operations on Sets, Principle of Inclusion-Exclusion, Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams.

UNIT-III:

Functions and Recurrence Relations

Functions: Bijective, Composition, Inverse, Permutation, and Recursive Functions, Lattice and its Properties.

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 Relation

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UNIT-IV:

Graph Theory

Basic Concepts, Graphs, 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, Trees and It's Properties, Spanning Trees, Prim's and Kruskal's Algorithms, Breadth-First Search(B F S) and Depth- First Search (D F S).

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Trembly and P. Manohar, Tata Mc Graw Hill.
2. Elements of Discrete Mathematics–A Computer Oriented Approach, C. L. Liuand D. P. Mohapatra, 3rd Edition, Tata Mc Graw Hill.
3. Theory and Problems of Discrete Mathematics, Schaum's Outline Series, Seymour Lipschutz and Marc Lars Lipson, 3rd Edition, Mc Graw 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, P H I.
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, Tata Mc Graw Hill.

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DEPARTMENT OF INFORMATION TECHNOLOGY

II B. TECH I SEMESTER: IT

UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	0	0	3	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	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.
2	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.
3	To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	Know the essentials of human values and skills, self-exploration, happiness and prosperity	K2
CO2	Understand and fulfill the role of a human being in maintaining harmony in self.	K2
CO3	Apply the role of a human being in ensuring harmony within the family and society	K3
CO4	Identify the role of a human being in ensuring harmony in nature.	K3
CO5	Distinguish between ethical and unethical practices and start working out the strategy to actualize a harmonious environment wherever they work	K4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

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

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

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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

a. 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

b. 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. *JeevanVidya: EkParichaya*, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. *Human Values*, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. *The Story of Stuff* (Book).
4. *The Story of My Experiments with Truth* - by Mohandas Karamchand Gandhi
5. *Small is Beautiful* - E. F Schumacher.
6. *Slow is Beautiful* - Cecile Andrews

7. *Economy of Permanence* - J C Kumarappa
8. *Bharat Mein Angreji Raj* – PanditSunderlal
9. *Rediscovering India* - by Dharampal
10. *Hind Swaraj or Indian Home Rule* - by Mohandas K. Gandhi
11. *India Wins Freedom* - Maulana Abdul Kalam Azad
12. *Vivekananda* - Romain Rolland (English)
13. *Gandhi* - Romain Rolland (English)

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 students 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-Introduction%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
https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

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DEPARTMENT OF INFORMATION TECHNOLOGY

II B. TECH I SEMESTER: IT

DIGITAL LOGIC & COMPUTER ORGANIZATION

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Understand fundamental concepts of digital logic and computer organization.
2	Learn Boolean algebra and its role in logic circuit design.
3	Analyze and design combinational and sequential circuits.
4	Explore computer architecture and organization principles.
5	Gain insight into memory hierarchy, I/O organization, and CPU design.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Understand** the number systems, Boolean algebra, and logic gates.	K2
CO2	**Analyze** combinational and sequential circuits using fundamental digital logic principles	K4
CO3	**Understand** the basics of computer organization and architecture.	K2
CO4	**Analyze** the organization, structure, and functioning of various types of memory systems, evaluating their roles and performance in computer architecture	K4
CO5	**Understand** the data transfer between devices and optimization of I/O systems for efficient data access and processing.	K2

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	2	-	-	-	-	-	-	-	-	2
CO2	3	3	3	-	3	-	-	-	-	-	-	-	-	2
CO3	3	2	2	-	3	-	-	-	-	-	-	-	-	2
CO4	3	2	2	-	3	-	-	-	-	-	-	-	-	2
CO5	3	2	2	-	3	-	-	-	-	-	-	-	-	2

Unit I:

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

Digital Logic Circuits: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplifications (up to 5 variables).

Unit II:

Digital Logic Circuits: Combinational Circuits: Decoders, Encoders, Multiplexers, De-Multiplexers.

Sequential Circuit: Flip-Flops-SR, D, JK, T, Master-Slave, Registers, Shift Registers, Binary counters, Ripple counters.

Unit III:

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

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

Unit IV:

Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Micro programmed Control, Parallel processing challenges – Flynn's classification – SISD, MIMD, SIMD, SPMD

Memory Organization: Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Secondary Storage

Unit V:

Input/output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces – PCI Bus, SCSI Bus, USB.

LEARNING RESOURCES

Text Books:

1. Digital Design, 6thEdition, M. Morris Mano, Pearson Education, 2018.
2. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 6thedition, McGraw Hill,2023.
3. Computer Systems Architecture, M. Moris Mano, 3rdEdition, Pearson, 2017.

Reference Books:

1. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson, 2022.
2. Computer Organization and Design, David A. Paterson, John L. Hennessy, Elsevier, 2004.
3. Fundamentals of Logic Design, Roth, 5thEdition, Thomson, 2003.

Online Learning Resources:

1. https://nptel.ac.in/courses/106/103/106103068/

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DEPARTMENT OF INFORMATION TECHNOLOGY

II B. TECH I SEMESTER: IT

ADVANCED DATA STRUCTURES AND ALGORITHMS

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Provide Knowledge on the time and space complexity of algorithms and advanced data structures.
2	Introduce Non Linear Data structures and their Operations
3	Provide knowledge on various algorithm design techniques such as Divide and Conquer, Greedy method and Dynamic Programming.
4	Demonstrate the algorithm design techniques like Backtracking and Branch and Bound to solve the problems
5	Provide knowledge on NP Hard and NP Complete Problems

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	Understanding Fundamentals of the time and space complexity of algorithms.	K2
CO2	Apply Non Linear Data structures and their Operations	K3
CO3	Develop Divide and Conquer, Greedy and Dynamic programming Algorithms for various problems	K3
CO4	Apply Back Tracking and Branch and Bound techniques to solve problems.	K3
CO5	Apply the theory of NP-hard and NP-complete problems.	K3

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	1	1	1
CO2	3	3	3	-	-	-	-	-	-	-	-	-	1	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	1	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	1	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-	1	-

SYLLABUS

Unit I:

Introduction: Definition- Algorithm, Algorithm Specification- Pseudo code Conventions, Recursive Algorithm, Performance Analysis– Space Complexity, Time Complexity, Asymptotic Notations.

Trees: AVL Trees–Creation, Insertion, Deletion Operations and Applications, B-Trees – Creation, Insertion, Deletion Operations and Applications, Heap Trees (Priority Queues)– Min and Max Heaps, Operations and Applications, Quad Trees, Splay Trees.

Unit II:

Graphs: Terminology, Representations, Elementary Graph Operations- BFS and DFS, Connected Components and Biconnected Components, Applications.

Divide and Conquer: The General Method, Binary Search, Quick Sort, Merge Sort, Strassen's Matrix Multiplication, and Convex Hull.

Unit III:

Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum cost Spanning Trees, Single Source Shortest Paths.

Dynamic Programming: The General Method, All pairs Shortest Paths, Single Source Shortest Paths– General Weights, Optimal Binary Search Trees, 0/1Knapsack, Travelling Salesperson problem

Unit IV:

Backtracking: The General Method, The 8-Queens Problem, Sum of Subsets problem, Graph Coloring, Hamiltonian cycles.

Branch and Bound: The General Method, 0/1Knapsack Problem, Travelling Sales Person Problem.

Unit V:

NP Hard and NP Complete Problems: Basic Concepts- Nondeterministic Algorithm, The classes NP Hard and NP Complete, Cook's theorem.

NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP).

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LEARNING RESOURCES

Text Books:

1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni Sartaj; Mehta, Dinesh,2 Edition Universities Press
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni and Rajasekharam, Galgotia publications Pvt. Ltd.

Reference Books:

1. Data Structures and program designing C,RobertKruse, Pearson Education Asia
2. An introduction to Data Structures with applications, Trembley & Sorenson, Mc Graw Hill
3. The Art of Computer Programming, Vol.1: Fundamental Algorithms Donald EKnuth, Addison-Wesley, 1997
4. Fundamentals of Data Structures in C++: Horowitz Sahni & Mehta Galgottia Pub

E-Resources:

1. https://www.tutorialspoint.com/advanced_data_structures/index.asp
2. http://peterindia.net/Algorithms.html

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DEPARTMENT OF INFORMATION TECHNOLOGY

II B. TECH I SEMESTER:IT

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	To identify Java language components and how they work together in applications.
2	To learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries and collections.
3	To learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling, file I/O in Java applications.
4	To understand how to design applications with threads in Java.
5	To understand how to use JDBC APIs for program development.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Apply** basic Object Oriented Programming Concepts in Java.	K3
CO2	**Apply** the concept of Arrays, Collections and Strings to formulate and solve Computer Science problems.	K3
CO3	**Apply** the concepts of Inheritance, Interfaces and Packages for developing reusable programs.	K3
CO4	**Apply** the concepts of Multithreading and Exception Handling to build an efficient and error free code.	K3
CO5	**Use** File Input/output Streams and JDBC to manage data effectively.	K3

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	-	-	-	-	-	-	-	2	2	2	2
CO2	3	2	2	-	-	-	-	-	-	-	2	2	2	2
CO3	3	2	2	-	-	-	-	-	-	-	2	2	2	2
CO4	3	3	2	-	-	-	-	-	-	-	2	2	2	2
CO5	2	3	3	-	-	-	-	-	-	-	2	2	3	2

UNIT I:

Introduction to OOP: Basic concepts of OOP, Differences between Procedural and Object-Oriented Programming, Advantages of OOP, Applications of OOP.

Introduction to JAVA: Structure of JAVA, Features of JAVA, Data Types, Operators, JAVA Tokens, Control Structures.

Classes & Objects: Introduction, Class Declaration, Class Members, Declaration of Class and Objects, Access Control for Class Members, Static Variables and Methods, User input to programs, Command Line Arguments, Method overloading, this keyword.

UNIT II:

Constructors: Types of constructors and Constructor Overloading.

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Two-dimensional Arrays and Variable Size Arrays, Sorting and Searching in Arrays, Arrays as Vectors.

Collections: Array List, Hash Map, Hash Set and Dictionary

String Handling in Java: Introduction, Methods in String class, String Constant Pool and String Buffer class, Wrapper classes, Type Conversion.

UNIT III:

Inheritance: Introduction, Single inheritance, Multi-level inheritance, Hierarchical Inheritance, Method Overriding, Super Keyword, Final Keyword and Abstract Classes.

Interfaces: Introduction, Declaration of Interface, Implementing Multiple Inheritance, Extending interfaces, Adapter classes.

Packages: Introduction, Defining Package, Java. util Classes and Interfaces, Java. lang Classes, Importing Packages, Sub Packages, Access Modifiers.

UNIT IV:

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords try, catch, throw, throws and finally Blocks, Multiple Catch Statements, Custom Exceptions, Nested try and catch Blocks.

Multithreaded Programming: Introduction, Thread Life Cycle, Extending Thread class, Implementing Runnable interface, Thread Priorities, Thread Synchronization.

UNIT V:

File IO: Introduction, Hierarchy of Stream classes, File Handling in Java, Java File Reader Class, Java File Writer Class, Byte Streams, Character streams.

Java Database Connectivity: Introduction, Structure of JDBC, JDBC Architecture, Types of JDBC Drivers, JAVA Database connection programs for ORACLE (create, insertion, deletion, retrieving).

LEARNING RESOURCES

TEXT BOOKS:

1. The complete Reference Java, 12th edition (2022), Herbert Schildt, Publisher: McGraw Hill
2. Jdbc Api Tutorial and Reference 3E (2003), by Maydene, Jon Ellis (Author), Jonathan Bruce (Author), Publisher: Addison-Wesley Professional..

REFERENCES:

1. Introduction to java programming, 9th edition (2014) by Y Daniel Liang, Publisher: Pearson
2. JAVA one step ahead, 1stedition (2017) Anitha Seth, B.L.Juneja, Oxford.
3. Programming with Java: A Primer 6E (2019) By Balagurusamy, Publisher: TMH.

E-Resources and other Digital Material:

1. www.javatpoint.com
2. www.w3schools.com
3. www.tutorialspoint.com
4. www.geeksforgeeks.org

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SIR C R REDDY COLLEGE OF ENGINEERING, ELURU [AUTONOMOUS]

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DEPARTMENT OF INFORMATION TECHNOLOGY

II B. TECH I SEMESTER: IT

ADVANCED DATA STRUCTURES LAB

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		---	----	3	1.5	30	70	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Acquire practical skills in constructing and managing Data structures.
2	Apply the popular algorithm design methods in problem-solving scenarios.
3	Demonstrate a familiarity with major algorithms and data structures.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Implement** various Tree data structures and Graphs.	K3
CO2	**Implement** Divide and Conquer techniques on various problems.	K3
CO3	**Apply** the dynamic Programming and greedy techniques on various problems.	K3
CO4	**Implement** Back tracking and Branch-and-Bound approaches on various problems.	K3

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	-	-	-	-	-	-	-	-	-	1	1	1
CO2	3	3	3	-	-	-	-	-	-	-	-	-	1	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	1	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	1	-
Avg	**3**	**2.5**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**

Week-1:

1. Write a program to perform various insertion operations and deletion operations in an AVL tree

Week-2:

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

Week-3:

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

Week-4:

4. Implement BFT and DFT for given graph, when graph is represented by Adjacency Matrix.

Week-5:

5. Implement BFT and DFT for given graph, when graph is represented by Adjacency Lists

Week-6:

6. Write a program for finding the biconnected components in a given graph.

Week-7:

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

Week-8.

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

Week-9:

9. Implement Job Sequencing with deadlines using Greedy strategy.

Week-10:

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

Week-11:

11. Implement N-Queens Problem Using Backtracking.

Week-12:

12. Implement Travelling Sales Person problem using Branch and Bound approach.

CONTENT BEYOND SYLLABUS:

13. Implementation of Double Hashing Technique.

Reference Books:

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

Online Learning Resources:

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

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DEPARTMENT OF INFORMATION TECHNOLOGY

II B. TECH I SEMESTER: IT

OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
				3	1.5	30	70	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Practice object-oriented programming In the Java programming language.
2	Implement Classes, Objects, Methods, Inheritance, Collections, Runtime Polymorphism.
3	Illustrate inheritance, Exception handling mechanism, implement Packages.
4	Construct Threads, File I/O, JDBC Connectivity.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Construct** Basic programs using object-oriented programming principles such as classes, objects, constructors, and polymorphism	K3
CO2	**Apply** the concepts of Inheritance, Packages, exception handing, multi-threading and File I/O to develop reusable programs.	K3
CO3	**Develop** java application to interact with database by using relevant JDBC Driver.	K3

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	2	-	-	-	-	-	3	2	-	3
CO2	3	2	2	-	3	-	-	-	-	-	3	3	-	3
CO3	3	3	3	-	3	-	-	-	-	-	3	3	-	3
Avg	3	2.33	2	-	2.66						3	2.66		3

Week-1:

1. Write a JAVA program to display default value of all primitive data type of JAVA
2. Write a java program that display the roots of a quadratic equation ax2 +bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

Week-2:

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

Week-3:

1. Write a JAVA program to implement this keyword.
2. Write a JAVA program to implement constructor overloading.

Week-4:

1. Write a JAVA program to search for an element in a given list of elements using binary search
2. Write a JAVA program to sort for an element in a given list of elements using bubble sort.

Week-5:

1. Write a JAVA program to implement Operations on Array list.
2. Write a JAVA program to implement Operations on Hash map.

Week-6:

1. Write a JAVA program to implement Operations on Dictionary.
2. Write a JAVA program to implement String Operations.
3. Write a JAVA program to implement String Buffer class.

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Week-7:

1. Write a JAVA program to implement Single Inheritance
2. Write a JAVA program to implement multi-level Inheritance
3. Write a JAVA program for abstract class to find areas of different shapes

Week-8:

1. Write a JAVA program that implements Runtime polymorphism (Method Overriding)
2. Write a JAVA program to implement "super" keyword.
3. Write a JAVA program to implement multiple Inheritance using Interface.

Week-9:

1. Write a JAVA program to implement simple Packages.
2. Write a JAVA program to implement sub-Packages.

Week-10.

1. Write a JAVA program for creation of Java Built-in Exceptions
   i) Arithmetic Exception. ii) ArrayIndexOutofBoundsException
   iii) NumberFormatException. iv) NullPointerException
2. Write a JAVA program Illustrating Multiple catch clauses
3. Write a JAVA program to implement user defined xception.

Week-11:

1. 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 thethird 1 0 display "Welcome" every 3 seconds,(Repeat the same by implementing Runnable)
2. Write a JAVA program to implement Runnable Interface.
3. Write a program to implement priorities to Thread.

Week-12:

1. Write a JAVA program to implement Thread Synchronization (Multiplication tables)
2. Write a JAVA program to copy contents of file into another using Byte Oriented IO and Character Oriented IO.

Week-13:

1. Write a java program that connects to a database using JDBC in ORACLE
2. Write a java program to connect to a database using JDBC and insert values into it.
3. Write a java program to connect to a database using JDBC and delete values from it

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CONTENT BEYOND SYLLABUS:

1. Write a Java program that connects a database using JDBC in MySQL and apply various operations on it.

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DEPARTMENT OF INFORMATION TECHNOLOGY

II B.TECH I SEMESTER: IT

PYTHON PROGRAMMING (SKILL ENHANCEMENT COURSE)

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
	SEC	2	0	2	1.5	30	70	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Introduce core programming concepts of Python programming language.
2	Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
3	Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

COURSE OUTCOMES:

S.No	Outcome	Knowledge Level
1	**Demonstrate** the ability to perform various operations on built-in data types and manipulate strings effectively.	K3
2	**Implement** modular programming concepts using functions and modules to solve computational problems	K3
3	**Implement** file handling operations and object-oriented programming concepts in Python to manipulate data and perform computational tasks.	K3
4	**Apply** data science methods and techniques to analyze and process real-time data.	K3

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3: Substantial, 2: Moderate, 1: Slight)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	1	2	-	-	-	-	-	-	-	2	2
CO2	3	3	3	2	2	-	-	-	-	-	-	-	3	2
CO3	3	3	3	2	3	-	-	-	-	-	-	-	3	3
CO4	3	3	3	3	3	2	-	-	-	-	-	-	3	3
Avg	3	2.75	2.75	2	2.5	2							2.75	2

UNIT-I:

Introduction to Python Programming Language, History of Python Programming Language, Installing and Using Jupyter Notebook, **Python Interpreter and Execution Model.**

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif…else, Nested if statement, **Looping Statements**: while Loop, for Loop, **Loop Control Statements**: continue and break Statements, Catching Exceptions Using try and except Statement: **Basic exception handling, Using finally block.**

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 Operatorsiv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operatorsviii) Identity Operators

5. **Write a program to check if a given string is a palindrome.**
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.

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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, **Nested Lists**.

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.
7. **Write a program to demonstrate operations on a nested list.**

UNIT-III:

Dictionaries: Creating Dictionary, Accessing and Modifying key value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, **Dictionary Comprehensions**, del Statement.

Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

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 sum all the items in a given dictionary.
5. **Write a program to demonstrate dictionary comprehensions.**

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

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.

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 add, transpose and multiply two matrices.
5. 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.
6. Write a Python program to demonstrate multiple inheritance.

UNIT-V:

Introduction to Data Science:

NumPy:

Introduction to NumPy, Creating NumPy Arrays, Array Attributes, Array Operations, Mathematical Functions, Array Concatenation

Pandas:

Introduction to Pandas, Series, DataFrame, Reading and Writing Data, Data Manipulation, Handling Missing Data.

Sample Experiments:

1. Create a 1D NumPy array and calculate the sum, mean, and standard deviation of its elements.
2. Create a 3x3 NumPy array and extract the first row, second column, and the element at the second row and third column.
3. Create a Pandas Series and compute the sum, mean, and maximum value of its elements.
4. Create a Pandas DataFrame with columns "Name," "Marks," and "Grade." Filter and display students who scored more than 80 marks.
5. Read a CSV file, fill missing values with the mean of the respective column, and display the first 5 rows of the cleaned DataFrame.

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 B. TECH I SEMESTER: IT
ENVIRONMENTAL SCIENCES

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	To make the students to get awareness on environment
2	To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
3	To save earth from the inventions by the engineers
4	To create awareness among the people about the social issues, environmental protection acts
5	To understand the impact of developmental activities on environment

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Understand** the importance of environment & availability of resources	K2
CO2	**Understand** different environmental challenges induced due to anthropogenic activities as well as nature.	K2
CO3	**Analyze** the solutions to the environmental problems for the sake of healthy life by protecting our natural resources.	K4
CO4	**Create** awareness on the social issues, environmental protection acts	K5
CO5	**Understand** the environmental impact of developmental activities.	K2

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1							3							
CO2							3							
CO3						1	3							
CO4							3	2						
CO5							3				1			

SYLLABUS:

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 of an ecosystem.–Structure and function of an ecosystem–Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids–Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem. b. Grass land 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 ., 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 landslides

UNIT–IV Social Issues and the Environment: From Unsustainable to Sustainable development– Urban problems related to energy – Water conservation, rain water harvesting, and 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 – Wastrel 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 AL legislation–Public awareness.

UNIT–V Human Population And The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmers. – 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 swami,“ Environmental Studies”, Pearson education 3. S.AzeemUnnisa,“Environmental Studies”Academic Publishing)

2.K.Raghavan Nambiar,“Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabu s”, Scitech Publications (India), Pvt.Ltd.

Reference Books:

1. Deeksha Dave and E.SaiBabaReddy, “Text book of Environmental Science”,Cengage Publications.

2. M.AnjiReddy,“Text book of Environmental Sciences and Technology”,BSPublication.

3. J.P.Sharma, Comprehensive Environmental studies ,Laxmi publications.

4. J.GlynnHenry and GaryW.Heinke, “Environmental Sciences and Engineering” ,Prentice Hall of India Private limited 5. G.R.Chatwal,“A Text Book of Environmental Studies” Himalaya Publishing House 6. Gilbert M.Masters and WendellP.Ela,“Introduction to Environmental Engineering and Science, Prentice Hall of India Private limited

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DEPARTMENT OF INFORMATION TECHNOLOGY

II B.TECH II SEMESTER: IT

OPTIMIZATION TECHNIQUES

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
--	--	3	0	0	3	30M	70 M	3 Hrs.

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

CO	Course Outcomes description	Cognitive Level
CO1	State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.	K2
CO2	Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution	K3
CO3	Solve transportation and assignment problem by using Linear programming Simplex method.	K3
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	K3
CO5	Apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution.	K3

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	-

SYLLABUS

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.

Text books:

1. "Engineering optimization: Theory and practice" , S.S. Rao , New Age International (P)Limited, 3rd

edition,1998.
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 B. TECH II SEMESTER:IT

PROBABILITY AND STATISTICS

COURSE OBJECTIVES:

The main objective of the course is to:	
1	To familiarize the students with the foundations of probability and statistical methods.
2	To impart probability concepts and statistical methods in various applications Engineering.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	Classify the concepts of data science and its importance	K2
CO2	Interpret the association of characteristics and through correlation and regression tools	K4
CO3	Apply discrete and continuous probability distributions.	K3
CO4	Design the components of a classical hypothesis test	K3
CO5	Infer the statistical inferential methods based on small and large sampling tests.	K4

CO-PO MAPPING:

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

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UNIT I: Descriptive Statistics and Methods for Data Science

Statistics Introduction, Population vs Sample, Collection of Data –types of data – Primary and Secondary Data, Types of Variables: Dependent and Independent, Measures of Central Tendency, Measures of Variability, Skewness(absolute measures) and Kurtosis.

UNIT II: Correlation and Regression

Correlation: Correlation Coefficient, Rank Correlation. Linear Regression: Straight Line, Regression Coefficients and Properties. Curve Fitting: Principle of least squares, Fitting of straight line, Parabolic curves and Exponential curves.

UNIT III: Probability & Distributions

Probability, Conditional Probability and Bayes' Theorem, Random Variables – Discrete and Continuous Random Variables, Distribution Functions: Probability Mass Function (PMF), Probability Density Function (PDF), Cumulative Distribution Function (CDF), Mathematical Expectation and Variance, Binomial, Poisson, Uniform, and Normal Distributions.

UNIT IV: Sampling Theory

Introduction – Population and Samples – Sampling distribution of Means and Variance — Maximum likelihood estimate, Maximum error of estimate – Central limit theorem (without proof), Point and Interval estimations ,Estimation using t, Chi-square, 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 and Small Samples: Single and Difference of Means, Single and Two Proportions, Ratio of Variance.

TEXT BOOKS

1.**Miller and Freunds**, *Probability and Statistics for Engineers*, 7th Edition, Pearson, 2008.

2.**S.C. Gupta and V.K. Kapoor**, *Fundamentals of Mathematical Statistics*, 11th Edition, Sultan Chand & Sons Publications, 2012.

REFERENCES

1.**Shron L. Myers, Keying Ye, Ronald E. Walpole**, *Probability and Statistics for Engineers and Scientists*, 8th Edition, Pearson, 2007.

2.**Jay L. Devore**, *Probability and Statistics for Engineering and the Sciences*, 8th Edition, Cengage.

3.**Sheldon M. Ross**, *Introduction to Probability and Statistics for Engineers and Scientists*, 4th Edition, Academic Foundation, 2011.

4.**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 B. TECH II SEMESTER: IT

OPERATING SYSTEMS

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Students will learn how Operating System is Important for Computer System.
2	To make aware of different types of Operating System and their services.
3	To learn different process scheduling algorithms, synchronization, Deadlock Techniques to achieve better performance of a computer system.
4	To learn virtual memory concepts and secondary storage memory.
5	Illustrate Security and Protection Mechanism in Operating System.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to		
CO1	**Understand** the basic principles, services of operating systems.	K2
CO2	**Analyze** the Various process scheduling Algorithms to improve the system throughput.	K4
CO3	**Analyze** the memory management strategies in OS to optimize the memory utilization.	K4
CO4	**Analyze** the mechanisms used for process synchronization, deadlock prevention and detection.	K4
CO5	**Apply** various file allocation methods, fundamentals of Protection techniques in OS to secure data integrity and accessibility.	K3

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	-	2	-	-	-	-	-	-	-	-	-	-	2
CO2	3	3	2	-	-	-	-	-	-	-	-	-	-	2
CO3	3	3	2	-	-	-	-	-	-	-	-	-	-	2
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	3
CO5	3	3	2	-	-	-	-	-	-	-	-	2	-	3

UNIT I

Introduction to Operating Systems: Overview of Operating systems, Types of operating systems, operating systems concepts, operating systems services, User and Operating System Interface, Computing environments, Free and Open-Source Operating Systems, Introduction to System calls, System programs, System calls types and Operating system Design and Implementation.

UNIT-II:

Process Management – The process, Process concepts, Process State Diagram, Process control block, Operations on Processes, Process Scheduling- Scheduling Queues, Schedulers, Inter process Communication,

Multithreading: Threads, Multithreading models, Thread libraries, threading issues.

Process Scheduling- Basic Concepts, Scheduling Criteria, and Scheduling Algorithms FCFS, SJF,SRTF, Priority and Round Robin, Multi-level Queue and Multi-level Feedback queue scheduling algorithms.

UNIT-III:

Memory Management: Introduction, Swapping, Contiguous Memory Allocation and Frame Allocation methods, Paging, structure of the Page Table, Segmentation.

Virtual Memory Management: Virtual Memory, Demand Paging, Page-Replacement Algorithms and Thrashing.

UNIT-IV:

Concurrency control: Process Synchronization, The Critical- Section Problem, Petersons Solution, MUTEX, Semaphores, Monitors, Classical Problems of Synchronization.

Principles of Deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock.

UNIT-V:

File system implementation - The concept of a file, Access Methods, File operations Directory structure, File system mounting, file sharing, File system structure, allocation methods and free- space management.

Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers,

Protection and Security: Goals of protection, Principles and domain of protection, Access matrix,

Access control, Introduction to Program threats, System and network threats, Cryptography for security,
Case Studies: IOS and ANDROID.

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:

https://nptel.ac.in/courses/106/106/106106144/
http://peterindia.net/OperatingSystems.html

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DEPARTMENT OF INFORMATION TECHNOLOGY

II B. TECH II SEMESTER: IT

DATABASE MANAGEMENT SYSTEMS

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Introduce database management systems and to give a good formal foundation.
2	Introduce the concepts of SQL as a universal Database language and to give a good formal foundation on the relational model of data and usage of Relational Algebra.
3	Demonstrate the principles behind systematic database design approaches by covering conceptual design.
4	Demonstrate the principles behind systematic database design approaches by covering logical design through normalization.
5	Provide an overview of physical design of a database system by discussing Transaction Processing, Concurrency Control and Recovery Protocols.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Understand** the basic concepts of database management systems.	K2
CO2	**Apply** SQL or Relational Algebra operations to find solutions for a given application.	K3
CO3	**Apply** E-R and Relational models for creating databases.	K3
CO4	**Apply** normalization techniques to improve database design.	K3
CO5	**Analyze** a real time scenario to use Conceptual and Relational data models for designing the database.	K4

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	**2**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**2**	**-**	**2**	**-**	**2**	**2**
CO3	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**
CO4	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**
CO5	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**

UNIT I:

INTRODUCTION TO DATABASES:

Characteristics of the Database Approach, Advantages of using the DBMS Approach, A Brief History of Database Applications, Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System environment, Centralized and Client-Server Architecture for DBMSs.

UNIT II:

RELATIONAL MODEL:

The Relational Model Concepts, Relational Model Constraints and Relational Database Schemas.

Basic SQL: SQL Data Definition and Data Types, Specifying Constraints in SQL, Basic retrieval Queries in SQL, INSERT, DELETE AND UPDATE Statements in SQL.

Complex SQL: More complex SQL retrieval queries Advanced Queries, Specifying constraints as Assertions and Actions as Triggers, Views in SQL.

Relational Algebra: Unary Relational Operations: Select and Project, Relational Algebra Operations.

Binary Relational Operations: Join and Division, Examples of Queries in Relational Algebra.

UNIT III:

CONCEPTUAL DATA MODELING:

High-Level Conceptual Data Models for Database Design, A Sample Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types, Refining the ER Design, ER Diagrams, Naming Conventions and Design Issues, Relationship Types of Degree Higher Than Two. Relational Database Design Using ER-to- Relational Mapping.

Case Study: Conversion of an ER Diagram to Relations.

UNIT IV:

DATABASE DESIGN THEORY AND NORMALIZATION:

Normal forms based on Primary Keys, General definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multi valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

Case Study: Apply Normalization to Employee Organization.

UNIT V:

Transaction Processing: Introduction, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability & Serializability, Transaction Support in SQL.

Introduction to Concurrency Control: Two-Phase Locking Techniques for concurrency control: Types of Locks and System Lock Tables, Guaranteeing Serializability by Two-Phase Locking.

Introduction to Recovery Protocols: Recovery Concepts, No- UNDO/REDO Recovery Based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging.

LEARNING RESOURCES

TEXT BOOKS:

1. Fundamentals of Database Systems, Ramez Elmasri,ShamkantB. Navathe, Seventh edition, Pearson.

REFERENCES:

1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH.
2. Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan,TMH.

e-Resources and other Digital Material:

1. https://nptel.ac.in/courses/106/105/106105175/
2. https://onlinecourses.nptel.ac.in/noc21_cs04/
3. https://nptel.ac.in/courses/106/106/106106093/

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DEPARTMENT OF INFORMATION TECHNOLOGY

II B. TECH II SEMESTER: IT

SOFTWARE ENGINEERING

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	To introduce various software process models.
2	To understand the types of software requirements and SRS document.
3	To know the different software design and architectural styles.
4	To learn the Software Testing strategies, Implementation issues used in software development.
5	To know about quality control and maintenance.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Understand** basic concepts of software engineering, evolution of software and Notable changes in software development Practices.	K2
CO2	**Apply** Software Project Management techniques and Requirements Analysis And Specification	K3
CO3	**Design** Scalable, modular and user-friendly systems using structured and function-oriented approaches.	K4
CO4	**Implement** different Coding And Testing techniques and Software Reliability And Quality Management	K3
CO5	**Apply** Software Maintenance and Software Reuse techniques	K3

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	2	-	-	2	2	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	2	3	-	-	2
CO3	3	2	3	-	-	-	-	2	2	2	3	-	-	2
CO4	3	2	3	-	2	-	-	2	2	2	-	-	-	2
CO5	3	-	2	-	2	-	-	2	2	2	-	-	-	2
Avg	**3.00**	**2.33**	**2.50**	**-**	**2.00**	**-**	**-**	**2.00**	**2.00**	**2.00**	**3.00**	**-**	**-**	**2.00**

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.

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.

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.

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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:

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.

LEARNING RESOURCES

Text Books:

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

Reference Books:

1. Software Engineering, Ian Sommerville,10thEdition, 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_012605895063871 48827_shared/overview
3) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003 904735_shared/overview

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	DEPARTMENT OF INFORMATION TECHNOLOGY

II B. TECH II SEMESTER: IT

OPERATING SYSTEMS & SOFTWARE ENGINEERING LAB

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		---	----	3	1.5	30	70	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Provide insights into system calls, file systems, semaphores
2	Develop and debug CPU Scheduling algorithms, page replacement algorithms, thread Implementation
3	Implement Bankers Algorithms to Avoid the Dead Lock
4	Acquire the generic software development skill through various stages of software life cycle
5	Generate test cases for software testing

COURSE OUTCOMES:

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Upon successful completion of the course, the student will be able to:		
CO1	Students will comprehend the functionality of basic UNIX commands and system calls, gaining foundational knowledge for operating system programming.	K2
CO2	Students will implement and simulate CPU scheduling algorithms, memory management techniques, and standard UNIX commands, demonstrating practical application of operating system concepts in real-world scenarios.	K3
CO3	Students will perform requirement analysis, prepare SRS documents, and develop diagrams such as E-R, DFD, CFD, and structured charts for real-world applications, demonstrating an understanding of software engineering principles.	K2
CO4	Students will estimate effort using models like COCOMO and FP-oriented estimation, create UML diagrams, and design test cases for diverse applications, showcasing their ability to design and evaluate software systems systematically.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	3	-	-	-	-	-	-	-	3	2
CO2	3	-	3	3	-	-	-	-	3	-	-	-	3	3
CO3		3	3	-	-	2	-	-	-	2	-	-	2	3
CO4	-	-	3	-	3	-	-	3	3	-	-	-	2	3
Avg	**3**	**2.5**	**3**	**3**	**3**	**2**	**-**	**3**	**3**	**2**	**-**	**-**	**2.5**	**2.75**

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

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Sample Experiments in Operating Systems:

1. Practicing of Basic UNIX Commands like cat, cal, cp, date, find, ls, grep, etc…,
2. Write programs using the following UNIX operating system calls fork, exec, getpid, exit, wait, close, stat, opendir and readdir
3. Write a C program to print process ID, parentID, group ID and user ID.
4. Simulate the following CPU scheduling algorithms
5. a)FCFS b)SJF c)Priority d)Round Robin
6. Control the number of ports opened by the operating system with
    a. a)Semaphore b) Monitors.
7. Write a program to illustrate concurrent execution of threads using pthreads library.
8. Write a program to solve producer-consumer problem using Semaphores.
9. Implement the following memory allocation methods for fixed partition
    a. a)First fit b) Worst fit c) Best fit
10. Simulate the following page replacement algorithms
    a. a)FIFO b) LRU c) LFU
11. Simulate Paging Technique of memory management.
12. Implement Bankers Algorithm for Dead Lock avoidance and prevention
13. Simulate the following file allocation strategies
    a. a)Sequential b)Indexed c)Linked
14. 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 (Flipcart, Amazon)
6) Design the test cases for a Mobile Application (Consider any example from Appstore)
7) Design and Implement ATM systm through UML Diagrams

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DEPARTMENT OF INFORMATION TECHNOLOGY

II B. TECH II SEMESTER: IT

DATABASE MANAGEMENT SYSTEMS LAB

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
				3	1.5	30	70	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Populate and query a database using SQL DDL/DML Commands
2	Declare and enforce integrity constraints on a database
3	Writing Queries using advanced concepts of SQL
4	Programming PL/SQL including procedures, functions, cursors and triggers
5	Develop DBMS project using PHP & MYSQL

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	Apply SQL commands to create**,** alter**,** and drop tables, define constraints, and insert data into tables.	K3
CO2	Apply aggregate functions, grouping data, filtering grouped results, and creating and managing views	K3
CO3	Apply PL/SQL programming techniques, including exception handling, transaction control, and Creating procedures, functions, and triggers.	K3
CO4	Develop Java programs to connect to databases using JDBC.	K3
CO5	Implement DBMS Project using HTML,PHP & MYSQL	K3

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	-	3	-	-	-	-	-	-	-	3	-
CO2	3	3	3	-	3	-	-	-	-	-	-	-	3	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	-
CO4	3	3	3	-	3	-	-	-	-	-	-	-	3	-
CO5	3	2	3	-	3	-	-	-	2	2	3	2	-	3
Avg	**3**	**2.8**	**3**	**3**	**3**	**-**	**-**	**-**	**2**	**2**	**3**	**2**	**3**	**3**

Week-1:

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

Week-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.

Week-3:

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

Week-4:

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

Week-5:

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.

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

Week-6:

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

Week-7:

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

Week-8:

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

Week-9:

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

Week-10:

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

Week-11:

Write a Java program that connects to a database using JDBC insert values into it and delete values from it.

Week-12:

Create DBMS Sample project using HTML, PHP & MYSQL (Ex: Insert & Retrieve Student records from front end i.e HTML/PHP)

CONTENT BEYOND SYLLABUS:

Implementation of Different Types of Joins

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SIR C R REDDY COLLEGE OF ENGINEERING, ELURU [AUTONOMOUS]

Approved by AICTE & Permanently Affiliated to JNTUK, Kakinada

Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF INFORMATION TECHNOLOGY

II B. TECH II SEMESTER: IT

SKILL ENHANCEMENT COURSE:PYTHON WITH DJANGO LAB

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		---	1	2	2	30	70	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	**Develop** interactive web applications using Python libraries and frameworks.
2	**Implement** web scraping and HTTP handling using BeautifulSoup4 and Requests.
3	**Design** secure and responsive web interfaces using Django and Bootstrap.
4	**Deploy** Django web applications to cloud platforms such as Heroku.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	Explain the functionalities of various Python libraries such as Tkinter, Flask, BeautifulSoup4, and Django used in web development.	K2
CO2	Develop interactive GUI and web applications using frameworks like Tkinter, Flask, and Django.	K3
CO3	Integrate user authentication, session management, and database operations within Django-based applications.	K3
CO4	Analyze Django's MVC/MTV architecture and compare it with other Python web frameworks for building scalable solutions.	K4
CO5	Deploy Django web applications to cloud platforms such as Heroku and manage version control using GitHub.	K6

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	2	-	-	3	2
CO2	3	3	3	2	2	-	-	-	-	2	-	-	2	3
CO3	3	3	3	2	2	-	-	-	-	2	-	-	2	3
CO4	3	2	2	3	-	-	-	-	-	2	-	-	3	2
CO5	3	2	3	2	3	-	-	-	2	2	-	2	2	2
Avg	3.0	2.4	2.75	2.25	2.25	-	-	-	2.0	2.0	-	2.0	2.4	2.4

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.

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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

DatabaseMigrations,FetchDataFromDatabase,DisplayingDataOnTemplates,AddingCondition OnData,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.

UNIT-V: 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 StaticRoot, 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 applications easily with Django 2.0”,2ndEdition 2018, Packt Publishing.

2. 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 B.TECH II SEMESTER: IT

DESIGN THINKING & INNOVATION

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		1	0	2	2	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Bring awareness on innovative design and new product development.
2	Make the students to understand the basics of design thinking.
3	Familiarize the role of reverse engineering in product development.
4	Train how to identify the needs of society and convert into demand.
5	Introduce product planning and product development process.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Define** the importance of Design thinking mindset for identifying contextualized problems.	K1
CO2	**Understand** the implications in product development.	K2
CO3	**Apply** the design thinking techniques for solving problems in various sectors.	K3
CO4	**Apply** the necessary activities towards solving the problem through Ideation and Prototyping.	K3
CO5	**Apply** the solutions and refine them based on the user feedback.	K3

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

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

SYLLABUS

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.

Design Thinking Process: Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking, Design vs. Design thinking, Problem solving, the need of design thinking; an approach to design thinking**,** Design thinking Process model.

Case Studies: General, Engineering and Service applications

Activities: Identify a Project and explore a brief design.

UNIT II: EMPATHIZE AND DEFINE

Design thinking phases, how to empathize, Role of empathy in design thinking, the purpose of empathy maps, Things to be done prior to empathy mapping, Activities during and after the session, Understanding empathy tools: Customer Journey Map, Personas.

Define- Methods of Define Phase: Storytelling, Critical items diagrams, Define success.

Activities: Apply the methods of empathizing and Define Phases Finalize the problem statement.

UNIT III:IDEATION

Challenges in idea generation, Visualize, Empathize, and Ideate method, Importance of visualizing and empathizing before ideating, Applying the method**,** Create Thinking**,** Generating Design Ideas**,** Lateral Thinking**,** Analogies**,** Brainstorming**,** Mind mapping**,** National Group Technique**,** Synectic's**,** Development of work**,** Analytical Thinking**,** Group Activities.

Ideation Tools: How Might We? Storyboard, Brainstorming. What is design innovation? A mindset for innovation**,** and asking "What if?" asking "What wows?" and "What works?"

Activities- Apply the methods of Ideate Phase: Generate Lots of Ideas.

UNIT IV: PROTOTYPING

What is a prototype? - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype.

Activities: Apply the Methods of the Prototype Phase: Create prototypes for selected ideas.

UNIT V: TESTING PROTOTYPES

Prototyping for digital products: What's unique for digital products, Preparation; Prototyping for physical products: What's unique for physical products, Preparation; Testing prototypes with users. Create a Pitch-Plan for scaling up-Road map for Implementation, Fine-tuning and Submission of the project report

Activities: Collect feedback; Iterate and improve the ideas.

Present your solution using the Storytelling method.

LEARNING RESOURCES

Text Books:

1. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins Publishers Ltd.

2. IdrisMootee, Design Thinking for Strategic Innovation,2013, John Wiley & Sons Inc.

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.

e- Resources and other Digital Material:

1. https://nptel.ac.in/courses/110/106/110106124/
2. https://nptel.ac.in/courses/109/104/109104109/
3. https://swayam.gov.in/nd1 noc19 mg60/preview
4. https://onlinecourses.nptel.ac.in/noc22 de16/preview