JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOUMS)
KALIKIRI-517234, ANNAMAYYA (Dt)., A.P., INDIA.
B.TECH.- COMPUTER SCIENCE ENGINEERING
II YEAR COURSE STRUCTURE

B. Tech – II Year I Semester

S.No.	Course code	Title	L	T	P	Credits
1	23ABS13	Discrete Mathematics & Graph Theory	3	0	0	3
2	23AHS04	Universal Human Values - 2 Understanding Harmony and Ethical human conduct	2	1	0	3
3	23AEC05	Digital Logic and Computer Organization	3	0	0	3
4	23ACS05T	Advanced Data Structures & Algorithms Analysis	3	0	0	3
5	23ACS06T	Object-Oriented Programming Through JAVA	3	0	0	3
6	23ACS05P	Advanced Data Structures and Algorithms Analysis Lab	0	0	3	1.5
7	23ACS06P	Object-Oriented Programming Through JAVA Lab	0	0	3	1.5
8	23ACS07	Python programming	0	1	2	2
9	23AHS03	Environmental Science	2	0	0	-
		Total	**16**	**2**	**8**	**20**

B.Tech– II Year II Semester

S.No.	Course code	Title	L	T	P	Credits
1	23AHS05a 23AHS05b 23AHS05c	Managerial Economics and Financial Analysis Organizational Behavior Business Environment	2	0	0	2
2	23ABS15	Probability & Statistics	3	0	0	3
3	23ACS09T	Operating Systems	3	0	0	3
4	23ACS10T	Database Management Systems	3	0	0	3
5	23ACS11	Software Engineering	3	0	0	3
6	23ACS09P	Operating Systems Lab	0	0	3	1.5
7	23ACS10P	Database Management Systems Lab	0	0	3	1.5
8	23ACS12	Full Stack Development-1	0	1	2	2
9	23AHSS3	Design Thinking & Innovation	1	0	2	2
		Total	**15**	**1**	**10**	**21**
	Mandatory Community Service Project Internship of 08 weeks duration during summer vacation					

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B.TECH.- COMPUTER SCIENCE ENGINEERING

Course Code	**DISCRETE MATHEMATICS & GRAPH THEORY**	**L**	**T**	**P**	**C**
23ABS13		**3**	**0**	**0**	**3**

Semester	II B. Tech I Semester (CSE)

Course Objectives:

To expose to the field of discrete mathematics and graph theory, and their applications in computer science engineering.

Course Outcomes (CO): Student will be able to

CO1: Apply mathematical logic and inference theory in problem solving. (L2, L3).

CO2: Understand the concepts and perform the operations related to sets, relations andfunctions. Gain the conceptual background needed and identify structures of algebraic nature. (L3, L5).

CO3: Apply basic counting techniques to solve combinatorial problems. (L3).

CO4: Solve the recurrence relations through various techniques. (L2, L3).

CO5: Apply Graph Theory in solving computer science problems. (L3, L5).

Pre-requisite:	Basic knowledge on sets, operations and functions.

Unit - I	**MATHEMATICAL LOGIC**

Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, functionally complete set of connectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theory of Predicate Calculus.

Unit - II	**SET THEORY**

The Principle of Inclusion- Exclusion, Pigeon hole principle and its application, Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic Systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism.

Unit - III	**ELEMENTARY COMBINATORICS**

Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems.

Unit - IV	**RECURRENCE RELATIONS**

Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generatingfunctions, The Method of Characteristic roots, Solutions of Inhomogeneous, Recurrence Relations.

Unit - V	**GRAPHS**

Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs.

Learning Resources:

Textbooks:

1. J. P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, 35/RP, Tata McGraw-Hill, 2008.

2. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7/e, Tata McGraw-Hill, 2011

Reference Books:

1. J Joe L. Mott, Abraham Kandel and Theodore P. Baker, Discrete Mathematics forComputer Scientists & Mathematicians, 2/e, PHI, 2008.

2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, 7/e, Prentice Hall, 1974.

Web Resources:

1. http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf

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Course Code		L	T	P	C
	UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT	**L**	**T**	**P**	**C**
23A52301	(Common to all Branches)	**2**	**1**	**0**	**3**
Semester	II B. Tech I Sem (CE, EEE, ME, ECE, CSE & FT)				

Course Objectives:

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

Course Outcomes (CO): Student will be able to

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

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

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Learning Resources:

Textbooks 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

    1.

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 Beautifu*l - Cecile Andrews

7. *Economy of Permanence* - J C Kumarappa

8. *Bharat Mein Angreji Raj* – PanditSunderlal

9. *Rediscovering India* - by Dharampal

10. *Hind Swaraj or Indian Home Rule* - by Mohandas K. Gandhi

11. *India Wins Freedom* - Maulana Abdul Kalam Azad

12. *Vivekananda* - Romain Rolland (English)

13. *Gandhi* - Romain Rolland (English)

Web 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%202023.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%202023-25%20Ethics%20v1.pdf

8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385

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

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.

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B.TECH.- COMPUTER SCIENCE AND ENGINEERING

Course Code	DIGITAL LOGIC AND COMPUTER ORGANIZATION	L	T	P	C
23AEC05		**3**	**0**	**0**	**3**

Semester	II Year B.Tech. – I Semester(CSE BRANCH)

Course Objectives: The main objective of the course is to

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

Course Outcomes (CO):

- Differentiate between combinational and sequential circuits based on their characteristics and functionalities. (L2)
- Demonstrate an understanding of computer functional units. (L2)
- Analyze the design and operation of processors, including instruction execution, pipelining, and control unit mechanisms, to comprehend their role in computer systems. (L3)
- Describe memory hierarchy concepts, including cache memory, virtual memory, and secondary storage, and evaluate their impact on system performance and scalability. (L3)
- Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices, including interrupts, DMA, and I/O mapping techniques. (L3)
- Design Sequential and Combinational Circuits (L6)

Unit - I

Data Representation: Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes
Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers

Unit - II

Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters
Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von-Neumann Architecture

Unit - III

Computer Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations
Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control

Unit - IV

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

Unit - V

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

Learning Resources:

Textbooks:

1. Computer Organization, Carl Hamacher, ZvonkoVranesic, SafwatZaky, 6th edition, McGraw Hill, 2023.

 2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education, 2018.

 3. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson, 2022.

Reference Books:

1. Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson, 2017.

 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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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS	L	T	P	C
23ACS05T		3	0	0	3
Semester	II Year B.Tech. – I Semester				

Course Objectives: The main objective of the course is to

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

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

CO1: Illustrate the working of the advanced tree data structures and analyze the complexities of algorithms and recommend appropriate data structures based on the problem being solved
CO2: Understand the Graph data structure, traversals and Divide and Conquer Method
CO3: Understand and apply the concepts of Greedy method and Dynamic Programming for various applications
CO4: Understand and apply the concepts of Backtracking and Branch and Bound concepts for various applications Analyze algorithms with respect to space and time complexities (L4)
CO5: Understand NP Hard and NP Complete problems

Unit - I

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

Unit - II

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

Unit - III

Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Path.
Dynamic Programming: General Method, All pairs shortest paths, Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem

Unit - IV

Backtracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring Problem.
Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Salesperson Problem

Unit - V

NP Hard and NP Complete Problems: Basic Concepts, Cook's theorem (Without Proof)
NP Hard Graph Problems: Clique Decision Problem, Chromatic Number Decision Problem, Traveling Salesperson Decision Problem, NP Hard Scheduling Problems: Job Shop Scheduling

Learning Resources:

Textbooks:

1. Fundamentals of Algorithms in C: Horowitz, Ellis; Sahni, Andrson Freed, 2nd Edition Universities Press
2. Computer Algorithms Ellis Horowitz, Sartaj Sahni,Sanguthevar Rajasekaran 2nd Edition University Press

Reference Books:

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

Online Learning Resources:

1. https://www.tutorialspoint.com/advanced_data_structures/index.asp
2. http://peterindia.net/Algorithms.html
3. Abdul Bari,1. Introduction to Algorithms (youtube.com)

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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	OBJECT-ORIENTED PROGRAMMING THROUGH JAVA	L	T	P	C
(23ACS06T)		3	0	0	3

Semester	II B.Tech – I Semester

Course Objectives: The main objective of the course is to

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

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

CO1: Analyze problems, design solutions using OOP principles, and implement them efficiently in Java. (L4)
CO2: Design and implement classes to model real-world entities, with a focus on attributes, behaviors, and relationships between objects (L4)
CO3: Demonstrate an understanding of inheritance hierarchies and polymorphic behaviour, including method overriding and dynamic method dispatch. (L3)
CO4: Apply Competence in handling exceptions and errors to write robust and fault-tolerant code. (L3)
CO5: Perform file input/output operations, including reading from and writing to files using Java I/O classes, graphical user interface (GUI) programming using JavaFX. (L3)
CO6: Choose appropriate data structure of Java to solve a problem (L6)

Unit - I

Object Oriented Programming: Basic concepts, Principles, Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

Data Types, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, **Introduction to Operators**, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator?:, Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.

Unit - II

Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members,
Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

Unit - III

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super ClassObject Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

Unit - IV

Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Autounboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions.

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

Unit - V

String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings,Comparison, Modifying, Searching; Class String Buffer. **Multithreaded Programming:** Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL
Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet
Interface

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

Learning Resources:

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

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

Online Learning Resources:
1. https://nptel.ac.in/courses/106/105/106105191/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01288046454761816347 _shared/overview

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOUMS)
KALIKIRI-517234, ANNAMAYYA (Dt)., A.P., INDIA.
B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS LAB	L	T	P	C
(23ACS05P)		**0**	**0**	**3**	**1.5**

Semester	**II B.Tech – I Semester**

Course Objectives: The main objective of the course is to

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

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

CO1: Design and develop programs to solve real world problems with the popular algorithm design methods. (L5)

CO2: Demonstrate an understanding of Non-Linear data structures by developing implementing the operations on AVL Trees, B-Trees, Heaps and Graphs. (L2)

CO3: Critically assess the design choices and implementation strategies of algorithms and data structures in complex applications. (L5)

CO4: Utilize appropriate data structures and algorithms to optimize solutions for specific computational problems. (L3)

CO5: Compare the performance of different of algorithm design strategies (L4)

CO6: Design algorithms to new real world problems (L6)

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

Sample Programs:
1. Construct an AVL tree for a given set of elements which are stored in a file. And implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order.
2. Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.
3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.
4. Implement BFT and DFT for given graph, when graph is represented by
     a) Adjacency Matrix   b) Adjacency Lists
5. Write a program for finding the bi-connected components in a given graph.
6. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).
7. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.

8. Implement Job sequencing with deadlines using Greedy strategy.
9. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.
10. Implement N-Queens Problem Using Backtracking.
11. Use Backtracking strategy to solve 0/1 Knapsack problem.
12. Implement Travelling Sales Person problem using Branch and Bound approach.

Reference Books:

1. Fundamentals of Algorithms in C: Horowitz, Ellis; Sahni, Andrson Freed, 2nd Edition Universities Press
2. Computer Algorithms 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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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	OBJECT-ORIENTED PROGRAMMING THROUGH JAVA LAB	L	T	P	C
(23ACS06P)		0	0	3	1.5

Semester	II B.Tech. – I Semester

Course Objectives: The main objective of the course is to

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

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

CO1: Demonstrate a solid understanding of Java syntax, including data types, control structures, methods, classes, objects, inheritance, polymorphism, and exception handling. (L2)

CO2: Apply fundamental OOP principles such as encapsulation, inheritance, polymorphism, and abstraction to solve programming problems effectively. (L3)

CO3: Familiar with commonly used Java libraries and APIs, including the Collections Framework, Java I/O, JDBC, and other utility classes. (L2)

CO4: Develop problem-solving skills and algorithmic thinking, applying OOP concepts to design efficient solutions to various programming challenges. (L3)

CO5: Proficiently construct graphical user interface (GUI) applications using JavaFX (L4)

CO6: Develop new programs for solving typical computer science problems (L6)

Experiments covering the Topics:

- Object Oriented Programming fundamentals- data types, control structures
- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, JavaFX GUI

Sample Experiments:

Exercise – 1:

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

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

Exercise - 2

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

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

c) Write a JAVA program using StringBuffer to delete, remove character.

Exercise - 3

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

b) Write a JAVA program implement method overloading.

c) Write a JAVA program to implement constructor.

d) Write a JAVA program to implement constructor overloading.

Exercise - 4
a) Write a JAVA program to implement Single Inheritance
b) Write a JAVA program to implement multi level Inheritance
c) Write a JAVA program for abstract class to find areas of different shapes

Exercise - 5
a) Write a JAVA program give example for "super" keyword.
b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?
c) Write a JAVA program that implements Runtime polymorphism

Exercise - 6
a) Write a JAVA program that describes exception handling mechanism
b) Write a JAVA program Illustrating Multiple catch clauses
c) Write a JAVA program for creation of Java Built-in Exceptions
d) Write a JAVA program for creation of User Defined Exception

Exercise - 7
a) Write a JAVA program that creates threads by extending Thread class. First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds, (Repeat the same by implementing Runnable)
b) Write a program illustrating **is Alive** and **join ()**
c) Write a Program illustrating Daemon Threads.
d) Write a JAVA program Producer Consumer Problem

Exercise – 8
 a) Write a JAVA program that import and use the user defined packages

b) Without writing any code, build a GUI that display text in label and image in an ImageView (use JavaFX)
c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

Exercise – 9
a) Write a java program that connects to a database using JDBC
b) Write a java program to connect to a database using JDBC and insert values into it.
c) Write a java program to connect to a database using JDBC and delete values from it

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

Reference Books:
1.The complete Reference Java, 11th edition, Herbert Schildt,TMH
2.Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson **Online**

Online Learning Resources:
1. https://nptel.ac.in/courses/106/105/106105191/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547 618816347_shared/overview

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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	PYTHON PROGRAMMING	L	T	P	C
(23ACS07)	**(SKILL ENHANCEMENT COURSE)**	0	1	2	2

Semester	II B.Tech – I Semester

Course Objectives: The main objective of the course is to

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

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

CO1: Classify data structures of Python (L4)

CO2: Apply Python programming concepts to solve a variety of computational problems (L3)

CO3: Understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs (L3)

CO4: Become proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas (L2)

CO5: Exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries (L3)

CO6: Propose new solutions to computational problems (L6)

Unit - I

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

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

Control Flow Statements: if statement, if-else statement, if...elif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

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

Unit - II

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments. **Strings:** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings. **Lists**: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:

    7.Write a program to define a function with multiple return values.

    8. Write a program to define a function using default arguments.

    9.Write a program to find the length of the string without using any library functions.

    10.Write a program to check if the substring is present in a given string or not.

    11.Write a program to perform the given operations on a list:

        i. Addition   ii. Insertion   iii. slicing

    12. Write a program to perform any 5 built-in functions by taking any list.

Unit - III

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

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

Sample Experiments:

    13. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.

    14. Write a program to count the number of vowels in a string (No control flow allowed).

    15. Write a program to check if a given key exists in a dictionary or not.

    16. Write a program to add a new key-value pair to an existing dictionary.

    17. Write a program to sum all the items in a given dictionary.

Unit - IV

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

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

Sample Experiments:

    18. 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.

    19. Python program to print each line of a file in reverse order.

    20. Python program to compute the number of characters, words and lines in a file.

    21. Write a program to create, display, append, insert and reverse the order of the items in the array.

    22. Write a program to add, transpose and multiply two matrices.

    23. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

Unit - V

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

    24. Python program to check whether a JSON string contains complex object or not.

    25. Python Program to demonstrate NumPy arrays creation using array () function.

    26. Python program to demonstrate use of ndim, shape, size, dtype.

    27. Python program to demonstrate basic slicing, integer and Boolean indexing.

28. Python program to find min, max, sum, cumulative sum of array
29. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
    a)   Apply head () function to the pandas data frame
    b)   Perform various data selection operations on Data Frame
30. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

Learning Resources:

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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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code		L	T	P	C
	ENVIRONMENTAL SCIENCE (Common to All Branches of Engineering)	2	0	0	0
(23AHS03)		2	0	0	0

Semester	**II Year B.Tech. – I Semester**

Course Objectives: The main objective of the course is to

- To make the students to get awareness on environment
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life
- To save earth from the inventions by the engineers.
- To understand the problems related to social issues and Wild life protection acts.
- To know the importance of value education and welfare programs.

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

- Grasp multidisciplinary nature of environmental studies and various renewable and non-renewable resources.
- Understand flow and bio-geo chemical cycles and ecological pyramids.
- Understand various causes of pollution and solid waste management and related preventive measures.
- About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
- Cause of population explosion, value education and welfare programs.

Unit - I : Natural Resources   **10Hrs**

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:

Learning outcomes:

At the end of this unit, the students will be able to

- To know the importance of public awareness
- Explain how natural resources should be used.

Unit - II   : Ecosystems & Biodiversity   10Hrs

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.   Grassland ecosystem

    c.   Desert ecosystem

    d.   Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and Its Conservation : Introduction 0 Definition: genetic, species and ecosystem diversity — Bio-geographical classification of India — Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values — Biodiversity at global, National and local levels — India as a mega-diversity nation — Hot-sports of biodiversity — Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts — Endangered and endemic species of India — Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Learning outcomes:

At the end of this unit, the students will be able to

- To get a clear picture of echo systems and their characteristics.
- To get awareness about land degradation, soil erosion and desertification.

Unit – III :Environmental Pollution   8Hrs

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.

Learning outcomes:

At the end of this unit, the students will be able

- To understand the causes, effects and preventive measures of various pollution.
- To understand the various sources of solid waste and preventive measures.
- To know about the different types of disasters and their managerial measures.

Unit–IV: Social Issues and Environment	9 Hrs

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

Learning outcomes:

At the end of this unit, the students will be able to

- To know about the social issues related to environment and their protection acts.
- To know about the various sources of conservation of natural resources.

Unit – V : Human Population and The Environment	8 Hrs

Human Population and The Environment: Population growth, variation among nations. Population explosion — Family Welfare Programs. — Environment and human health — Human Rights — Value Education — HIV/AIDS — Women and Child Welfare — Role of information Technology in Environment and human health — Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain — Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds — river, hill slopes, etc...

Learning outcomes:

At the end of this unit, the students will be able

- To understand population explosion and family welfare programs.

    To identify the natural assets and related case studies.

Learning Resources:

Textbooks:

1. Text book of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press, 2nd Edition, 2013.

2. Palaniswamy, "Environmental Studies", Pearson education, 2nd Edition. 2014.

3. K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd., 2010.

Reference Books:

1. Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications, Revised Edition, 2023.

2. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications, 3rd Edition, 2009.

3. J. G. Henry and G. W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited, 2nd Edition 2007.

4. G.R.Chatwa1, "A Text Book of Environmental Studies" Himalaya Publishing House, 1st edition, 2004.

5. G. M. Masters and W. P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited, 3rd Edition, 2008.

Online Learning Resources:

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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	**Managerial Economics and FinancialAnalysis**	L	T	P	C
23AHS04a		**2**	**0**	**0**	**2**
Semester	**II B. Tech II Semester Common to CE, EEE, CSE, ECE & FT**				

Course Objectives:
- To inculcate the basic knowledge of microeconomics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes (CO): Student will be able to

- Define the concepts related to Managerial Economics, financial accounting and management(L2)
- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets (L2)
- Apply the Concept of Production cost and revenues for effective Business decision (L3)
- Analyze how to invest their capital and maximize returns (L4)
- Evaluate the capital budgeting techniques. (L5)
- Develop the accounting statements and evaluate the financial performance of business entity (L5)

UNIT - I	**MANAGERIAL ECONOMICS**

Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting-Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management

UNIT - II	**PRODUCTION AND COST ANALYSIS**

Introduction – Nature, meaning, significance, functions and advantages. ProductionFunction Least-cost combination– Short run and long run Production Function- Iso-quant's and Iso-costs, Cost & Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

UNIT - III	**BUSINESS ORGANIZATIONS AND MARKETS**

Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT - IV	**CAPITAL BUDGETING**

Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return

(ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT - V	FINANCIAL ACCOUNTING AND ANALYSIS

Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, TrialBalance-Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Learning Resources:

Textbooks:
1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books:
1. Ahuja Hl Managerial economics Schand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	ORGANISATIONAL BEHAVIOUR	L	T	P	C
23AHS04b		**2**	**0**	**0**	**2**

Semester	II B. Tech II Semester Common to CE, EEE, CSE, ECE & FT

Course Objectives:
- To enable student's comprehension of organizational behavior
- To offer knowledge to students on self-motivation, leadership and management
- To facilitate them to become powerful leaders
- To Impart knowledge about group dynamics
- To make them understand the importance of change and development

Course Outcomes (CO): Student will be able to

- Define the Organizational Behaviour, its nature and scope. (L2)
- Understand the nature and concept of Organizational behaviour (L2)
- Apply theories of motivation to analyse the performance problems (L3)
- Analyse the different theories of leadership (L4)
- Evaluate group dynamics (L5)
- Develop as powerful leader (L5)

UNIT - I	INTRODUCTION TO ORGANIZATIONAL BEHAVIOUR

Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective -Understanding Individual Behavior –Attitude -Perception - Learning – Personality.

UNIT - II	MOTIVATION AND LEADING

Theories of Motivation- Maslow's Hierarchy of Needs - Hertzberg's Two Factor Theory - Vroom's theory of expectancy – Mc Cleland's theory of needs–Mc Gregor's theory X and theory Y– Adam's equity theory.

UNIT - III	ORGANIZATIONAL CULTURE

Introduction – Meaning, scope, definition, Nature - Organizational Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management -Evaluating Leader.

UNIT - IV	GROUP DYNAMICS

Introduction – Meaning, scope, definition, Nature- Types of groups - Determinants of group Behaviour - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization– Conflict resolution

UNIT - V	ORGANIZATIONAL CHANGE AND DEVELOPMENT

Introduction –Nature, Meaning, scope, definition and functions- Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization's change and development

Learning Resources:

Textbooks:
3. Luthans, Fred, OrganisationalBehaviour, McGraw-Hill, 12 Th edition

4. P Subba Ran, OrganisationalBehaviour, Himalya Publishing House.

Reference Books:

1. McShane, Organizational Behaviour, TMH
2. Nelson, OrganisationalBehaviour, Thomson.
3. Robbins, P. Stephen, Timothy A. Judge, OrganisationalBehaviour, Pearson.
4. Aswathappa, OrganisationalBehaviour, Himalaya.

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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	BUSINESS ENVIRONMENT	L	T	P	C
23AHS04c		**2**	**0**	**0**	**2**
Semester	II B. Tech II Semester Common to CE, EEE, CSE, ECE & FT				

Course Objectives:
- To make the student to understand about the business environment
- To enable them in knowing the importance of fiscal and monitory policy
- To facilitate them in understanding the export policy of the country
- To Impart knowledge about the functioning and role of WTO
- To Encourage the student in knowing the structure of stock markets

Course Outcomes (CO): Student will be able to

- Define Business Environment and its Importance. (L2)
- Understand various types of business environment. (L2)
- Apply the knowledge of Money markets in future investment (L3)
- Analyze India's Trade Policy (L4)
- Evaluate fiscal and monitory policy (L5)
- Develop a personal synthesis and approach for identifying business opportunities(L5)

UNIT - I	OVERVIEW OF BUSINESS ENVIRONMENT

Introduction – meaning Nature, Scope, significance, functions and advantages. Types- Internal &External, Micro and Macro. Competitive structure of industries -Environmental analysis- advantages & limitations of environmental analysis.

UNIT - II	FISCAL & MONETARY POLICY

Introduction – Nature, meaning, significance, functions and advantages. Public Revenues - Public Expenditure - Evaluation of recent fiscal policy of GOI. Highlights of Budget- Monetary Policy - Demand and Supply of Money –RBI -Objectives of monetary and creditpolicy - Recent trends- Role of Finance Commission.

UNIT - III	INDIA'S TRADE POLICY

Introduction – Nature, meaning, significance, functions and advantages. Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank -Balance of Payments– Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

UNIT - IV	WORLD TRADE ORGANIZATION

Introduction – Nature, Significance, Functions And Advantages. Organization And Structure -Role And Functions Of WTO In Promoting World Trade - GATT -Agreements In The UruguayRound –TRIPS, TRIMS - Disputes Settlement Mechanism - Dumping And Anti-Dumping Measures.

Unit - V	MONEY MARKETS AND CAPITAL MARKETS

Introduction – Nature, meaning, significance, functions and advantages. Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets -

Reforms and recent development – SEBI – Stock Exchanges- Investor protection and role of SEBI, Introduction to international finance.

Learning Resources:

Textbooks:
1. Francis Cherunilam, International Business: Text and Cases, Prentice Hall of India.
2. K. Aswathappa, Essentials of Business Environment: Texts and Cases & Exercises   13thRevised Edition.HPH

Reference Books:
1. K. V. Sivayya, V. B. M Das, Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black, International Business Environment Text and Cases, Prentice Hall ofIndia, New Delhi, India.
3. Chari. S. N, International Business, Wiley India.
4. E. Bhattacharya, International Business, Excel Publications, New Delhi.

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COLLEGE OF ENGINEERING (AUTONOUMS)
KALIKIRI-517234, ANNAMAYYA (Dt)., A.P., INDIA.
B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	PROBABILITY & STATISTICS	L	T	P	C
23ABS15		**3**	**0**	**0**	**3**

Semester	**II B. Tech II Semester (CSE)**

Course Objectives:

To expose to the field of probability and statistics, and their applications in computer science engineering.

Course Outcomes (CO): Student will be able to

CO1: Acquire the knowledge in finding the analysis of categorically and various statistical elementary tools. (L1, L2).

CO2: Develop skills in designing mathematical models involving probability, random variables and the critical thinking in the theory of probability and its applications in real life problems. (L3, L5).

CO3: Apply the theoretical probability distributions like binomial, Poisson, and Normalin the relevant application areas. (L3).

CO4: Analyze to test various hypotheses included in theory and types of errors for largesamples. (L2, L3).

CO5: Apply the different testing tools like t-test, F-test, chi-square test to analyze therelevant real-life problems. (L3, L5).

Pre-requisite:	Basic knowledge on probability, random variables (discrete and continuous), and probability distributions.

Unit - I	**DESCRIPTIVE STATISTICS**

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

Unit - II	**PROBABILITY**

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

Unit - III	**PROBABILITY DISTRIBUTIONS**

Probability distributions: Binomial, Poisson and Normal-their properties. Approximation of the binomial distribution to normal distribution.

Unit - IV	**ESTIMATION AND TESTING OF HYPOTHESIS, LARGE SAMPLE TESTS**

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

Unit - V	**SMALL SAMPLE TESTS**

Student t-distribution (test for single mean, two means and paired t-test), testing of equality ofvariances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

Learning Resources:

Textbooks:

1. Richard A Johnson, Miller & Freund's Probability and Statistics for Engineers, 7/e, Pearson, 2008.

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

Reference Books:

1. S. Ross, a First Course in Probability, 8/e, Pearson Education India, 2002.

2. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill, 2006, New Delhi.

3. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.

Web Resources:

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

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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code		L	T	P	C
	OPERATING SYSTEMS	3	0	0	3
23ACS09T		3	0	0	3

Semester	**II Year B.Tech. – II Semester**

Course Objectives: The main objective of the course is to

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

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

CO1: Describe the basics of the operating systems, mechanisms of OS to handle processes, threads, and their communication. (L1)

CO2: Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection. (L2)

CO3: Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system. (L3)

CO4: Illustrate different conditions for deadlock and their possible solutions. (L2) ☐ Analyze the memory management and its allocation policies. (L4)

Unit - I

Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Free and Open-Source Operating Systems

System Structures: Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Building and Booting an Operating System, Operating system debugging

Unit - II

Processes: Process Concept, Process scheduling, Operations on processes, Inter-process communication.
Threads and Concurrency: Multithreading models, Thread libraries, Threading issues.
CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.

Unit - III

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

Unit - IV

Memory-Management Strategies: Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping. **Virtual Memory Management:** Introduction, Demand paging, Copy-on-

write, Page replacement, Allocation of frames, Thrashing. **Storage Management:** Overview of Mass Storage Structure, HDD Scheduling.

| Unit - V |

File System: File System Interface: File concept, Access methods, Directory Structure; File system Implementation: File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management; File-System Internals: FileSystem Mounting, Partitions and Mounting, File Sharing. **Protection:** Goals of protection, Principles of protection, Protection Rings, Domain of protection, Access matrix.

Learning Resources:

Textbooks:
1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.
2. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson , 2016

Reference Books:
1. Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018
2. Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013

Online Learning Resources:
1. https://nptel.ac.in/courses/106/106/106106144/
2. http://peterindia.net/OperatingSystems.html

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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
(23ACS10T)		3	0	0	3

Semester	II Year B.Tech. – II Semester

Course Objectives: The main objective of the course is to

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

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

CO1: Understand the basic concepts of database management systems (L2)
CO2: Analyze a given database application scenario to use ER model for conceptual design of the database (L4)
CO3: Utilize SQL proficiently to address diverse query challenges (L3).
CO4: Employ normalization methods to enhance database structure (L3)
CO5: Assess and implement transaction processing, concurrency control and database recovery protocols in databases. (L4)

Unit - I

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

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

Unit - II

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

Unit - III

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

Unit - IV

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependencyLossless join and dependency

preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form(BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).

Unit - V

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

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

Learning Resources:

Textbooks:
1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2. Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan,TMH (For Chapter 1 and Chapter 5)

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

Online Learning Resources:
1. https://nptel.ac.in/courses/106/105/106105175/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0127580666728202 2456_shared/overview

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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	SOFTWARE ENGINEERING	L	T	P	C
(23ACS11)		**3**	**0**	**0**	**3**

Semester	**II Year B.Tech. – II Semester**

Course Objectives: The main objective of the course is to

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

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

CO1: Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance (L3)

CO2: Analyze various software engineering models and apply methods for design and development of software projects. (L4)

CO3: Develop system designs using appropriate techniques. (L3)

CO4: Understand various testing techniques for a software project. (L2)

CO5: Apply standards, CASE tools and techniques for engineering software projects (L3)

Unit - I

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

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

Unit - II

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

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

Unit - III

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

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

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

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

Unit - IV

Coding And Testing: Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing**,** Testing object-oriented programs, Smoke testing, and Some general issues associated with testing. **Software Reliability And Quality Management:** Software reliability. Statistical testing, Software quality, Software quality management system, ISO 9000. SEI Capability maturity model. Few other important quality standards, and Six Sigma**.**

Unit - V

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

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

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

Learning Resources:

Textbooks:
1. Fundamentals of Software Engineering, Rajib Mall, 5th Edition, PHI.
2. Software Engineering A practitioner's Approach, Roger S. Pressman, 9th Edition, McGraw Hill International Edition.

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

Online Learning 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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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	OPERATING SYSTEMS LAB	L	T	P	C
(23ACS09P)		0	0	3	1.5

Semester	II Year B.Tech. – II Semester

Course Objectives: The main objective of the course is to

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

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

CO1: Trace different CPU Scheduling algorithms (L2).
CO2: Implement Bankers Algorithms to Avoid the Dead Lock (L3).
CO3: Evaluate Page replacement algorithms (L5).
CO4: Illustrate the file organization techniques (L4).
CO5: Illustrate Inter Process Communication and concurrent execution of threads (L4)

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

Sample Experiments:
1. Practicing of Basic UNIX Commands.
2. Write programs using the following UNIX operating system calls fork, exec, getpid, exit, wait, close, stat, opendir and readdir
3. Simulate UNIX commands like cp, ls, grep, etc.,
4. Simulate the following CPU scheduling algorithms
   a) FCFS b) SJF c) Priority d) Round Robin
5. Control the number of ports opened by the operating system with
   a) Semaphore b) Monitors.
6. Write a program to illustrate concurrent execution of threads using pthreads library.
7. Write a program to solve producer-consumer problem using Semaphores.
8. Implement the following memory allocation methods for fixed partition
   a) First fit b) Worst fit c) Best fit
9. Simulate the following page replacement algorithms
   a) FIFO b) LRU c) LFU
10. Simulate Paging Technique of memory management.
11. Implement Bankers Algorithm for Dead Lock avoidance and prevention
12. Simulate the following file allocation strategies
    a) Sequential b) Indexed c) Linked

Reference 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
3. Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018
4. Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013

Online Learning Resources:

1. https://www.cse.iitb.ac.in/~mythili/os/
2. http://peterindia.net/OperatingSystems.html

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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
(23ACS10P)		0	0	3	1.5

Semester	II B.Tech. – II Semester

Course Objectives: The main objective of the course is to

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

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

CO1: Utilizing Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) commands effectively within a database environment (L3)

CO2: Constructing and execute queries to manipulate and retrieve data from databases. (L3)

CO3: Develop application programs using PL/SQL. (L3)

CO4: Analyze requirements and design custom Procedures, Functions, Cursors, and Triggers, leveraging their capabilities to automate tasks and optimize database functionality (L4)

CO5: Establish database connectivity through JDBC (Java Database Connectivity) (L3)

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

Sample Experiments:
1. Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
4. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

5.
    i. Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
    ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

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

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

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

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

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

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

Text Books/Suggested Reading:

1. Oracle: The Complete Reference by Oracle Press
2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007
3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007

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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	FULL STACK DEVELOPMENT – 1 (Skill Enhancement Course)	L	T	P	C
(23ACS12)		0	1	2	2

Semester	II B.Tech. – II Semester

Course Objectives: The main objective of the course is to

- Make use of HTML elements and their attributes for designing static web pages
- Build a web page by applying appropriate CSS styles to HTML elements
- Experiment with JavaScript to develop dynamic web pages and validate forms

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

CO1: Design Websites. (L6)
CO2: Apply Styling to web pages. (L4)
CO3: Make Web pages interactive. (L6)
CO4: Design Forms for applications. (L6)
CO5: Choose Control Structure based on the logic to be implemented. (L3)
CO6: Understand HTML tags, Attributes and CSS properties (L2)

Experiments covering the Topics:
- Lists, Links and Images
- HTML Tables, Forms and Frames
- HTML 5 and Cascading Style Sheets, Types of CSS
- Selector forms
- CSS with Color, Background, Font, Text and CSS Box Model
- Applying JavaScript - internal and external, I/O, Type Conversion
- JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects ● JavaScript Functions and Events
- Node.js

Sample Experiments:

1. Lists, Links and Images
a. Write a HTML program, to explain the working of lists.
   Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered list and definition lists.
b. Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target Attributes.
c. Create a HTML document that has your image and your friend's image with a specific height and width. Also when clicked on the images it should navigate to their respective profiles.
d. Write a HTML program, in such a way that, rather than placing large images on a page, the preferred technique is to use thumbnails by setting the height and width parameters to something like to 100*100 pixels. Each thumbnail image is also a link to a full sized version of the image. Create an image gallery using this technique

2. HTML Tables, Forms and Frames
a. Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan)
b. Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use <caption> tag to set the caption to the table & also use cell spacing, cell padding, border, rowspan, colspan etc.).

c. Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Use tables to provide a better view).

d. Write a HTML program, to explain the working of frames, such that page is to be divided into 3 parts on either direction. (Note: first frame image, second frame paragraph, third frame hyperlink. And also make sure of using "no frame" attribute such that frames to be fixed).

3. HTML 5 and Cascading Style Sheets, Types of CSS

a. Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>, <footer>, <header>, <main>, <nav>, <section>, <div>, <span> tags.

b. Write a HTML program, to embed audio and video into HTML web page.

c. Write a program to apply different types (or levels of styles or style specification formats) - inline, internal, external styles to HTML elements. (identify selector, property and value).

4. Selector forms

a. Write a program to apply different types of selector forms
   ● Simple selector (element, id, class, group, universal)
   ● Combinator selector (descendant, child, adjacent sibling, general sibling)
   ● Pseudo-class selector
   ● Pseudo-element selector
   ● Attribute selector

5. CSS with Color, Background, Font, Text and CSS Box Model

a. Write a program to demonstrate the various ways you can reference a color in CSS.

b. Write a CSS rule that places a background image halfway down the page, tilting it horizontally. The image should remain in place when the user scrolls up or down.

c. Write a program using the following terms related to CSS font and text:
   i. font-size   ii. font-weight   iii. font-style
   iv. text-decoration   v. text-transformation   vi. text-alignment

d. Write a program, to explain the importance of CSS Box model using
   i. Content   ii. Border   iii. Margin   iv. padding

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

a. Write a program to embed internal and external JavaScript in a web page.

b. Write a program to explain the different ways for displaying output.

c. Write a program to explain the different ways for taking input.

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

7. JavaScript Pre-defined and User-defined Objects

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

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

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

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

e. Write a program using string object properties and methods.

f. Write a program using regex object properties and methods.

g. Write a program using date object properties and methods.

h. Write a program to explain user-defined object by using properties, methods, accessors, constructors and display.

8. JavaScript Conditional Statements and Loops

a. Write a program which asks the user to enter three integers, obtains the numbers from the user and outputs HTML text that displays the larger number followed by the words "LARGER NUMBER" in an information message dialog. If the numbers are equal, output HTML text as "EQUAL NUMBERS".

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

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

d. Write aprogram to print data in object using for-in, for-each and for-of loops

e. Develop a program to determine whether a given number is an 'ARMSTRONG NUMBER' or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is equal to the number i.e.,13 + 53+ 33 = 153]

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

9. JavaScript Functions and Events

a. Design a appropriate function should be called to display

- Factorial of that number
- Fibonacci series up to that number
- Prime numbers up to that number
- Is it palindrome or not

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

- Factorial of that number
- Fibonacci series up to that number
- Prime numbers up to that number
- Is it palindrome or not

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

- Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters)
- Mobile (only numbers and length 10 digits)
- E-mail (should contain format like xxxxxxx@xxxxxx.xxx)

10. Write a program to Node.js Connect Mysql with Node App

- Create a new Node.js Project
- Initialize a new Node.js Project
- Install Mysql Packages
- updated dependencies in package.json file
- Database connection

Learning Resources:

Textbooks:

1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
2. Web Programming with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, 2019 (Chapters 1-11).
3. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.

Online Learning Resources:

1. **https://www.w3schools.com/html**

2. **https://www.w3schools.com/css**

3. **https://www.w3schools.com/js/**

4. **https://www.w3schools.com/nodejs**

5. https://www.w3schools.com/typescript

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOUMS)
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B.TECH.- COMPUTER SCIENCE & ENGINEERING

Course Code	Design Thinking for Innovation	L	T	P	C
		2	0	0	2
23AHSS3	**II Year B.Tech. – II Semester**				

Course Objectives:

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outcomes (CO):	Blooms Level
• Define the concepts related to design thinking.	L1, l2
• Explain the fundamentals of Design Thinking and innovation	L1, L2
• Apply the design thinking techniques for solving problems in various sectors.	L3
• Analyse to work in a multidisciplinary environment	L4
• Evaluate the value of creativity	L5
• Formulate specific problem statements of real time issues	L3, L6

UNIT - I	Introduction to Design Thinking	10 Hrs

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT - II	Design Thinking Process	10 Hrs

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brain storming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT - III	Innovation	8 Hrs

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT - IV	Product Design	8 Hrs

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies

Activity: Importance of modelling, how to set specifications, Explaining their own product design.

UNIT - V	Design Thinking in Business Processes	10 Hrs

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that

redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes

Activity: How to market our own product, About maintenance, Reliability and plan for startup.

Textbooks:

1. Tim Brown, *Change by design*, Harper Bollins (2009)
2. Idris Mootee, *Design Thinking for Strategic Innovation,* 2013, John Wiley & Sons.

Reference Books:
1. David Lee, *Design Thinking in the Classroom,* Ulysses press
2. Shrutin N Shetty, *Design the Future*, Norton Press
3. William Lidwell,*Universal Principles of Design*- Kritinaholden, Jill Butter.
4. Chesbrough.H, T*he Era of Open Innovation* – 2013

Online Learning Resources:

https://nptel.ac.in/courses/110/106/110106124/
https://nptel.ac.in/courses/109/104/109104109/
https://swayam.gov.in/nd1_noc19_mg60/preview