



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

ML307 ENVIRONMENTAL MANAGEMENT AND SUSTAINABILITY

SUBJECT CODE	CATEGOR Y	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assesme nt*	END SEM University Exam	Teachers Assesme nt*				
ML-307	Compulsory	Environmental Management and Sustainability	60	20	20	0	0	4	0	0	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

***Teacher's Assessment** shall be based upon following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective

1. To create awareness towards various environmental problems.
2. To create awareness among students towards issues of sustainable development.
3. To expose students towards environment friendly practices of organizations.
4. To sensitize students to act responsibly towards environment.

Examination Scheme

The internal assessment of the students' performance will be done out of 40 Marks. The semester Examination will be worth 60 Marks. The question paper and semester exam will consist of two sections A and B. Section A will carry 36 Marks and consist of five questions, out of which student will be required to attempt any three questions. Section B will comprise of one or more cases / problems worth 24 marks.

Course Outcomes

1. The course will give students an overview of various environmental concerns and practical challenges in environmental management and sustainability.
2. Emphasis is given to make students practice environment friendly behavior in day-to-day activities.

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COURSE CONTENT

Unit I: Introduction to Environment Pollution and Control

1. Pollution and its types (Air, Water, and Soil): Causes, Effects and Control measures
2. Municipal Solid Waste: Definition, Composition, Effects
3. Electronic Waste: Definition, Composition, Effects
4. Plastic Pollution: Causes, Effects and Control Measures

Unit II: Climate Change and Environmental Challenges

1. Global Warming and Green House Effect
2. Depletion of the Ozone Layer
3. Acid Rain
4. Nuclear Hazards

Unit III: Environmental Management and Sustainable Development

1. Environmental Management and Sustainable Development: An overview
2. Sustainable Development Goals (17 SDGs)
3. Significance of Sustainable Development
4. Environment Friendly Practices At Workplace and Home (Three Rs' of Waste Management, Water Conservation, Energy Conservation)

Unit IV: Environmental Acts

1. The Water (Prevention and Control of Pollution) Act, 1974: Objectives, Definition of Pollution under this act, Powers and Functions of Boards
2. The Air (Prevention and Control of Pollution) Act, 1981: Objectives, Definition of Pollution under this act, Powers and Functions of Boards
3. The Environment (Protection) Act, 1986: Objectives, Definition of important terms used in this Act, Details about the act.
4. Environmental Impact Assessment: Concept and Benefits

Unit V: Role of Individuals, Corporate and Society

1. Environmental Values
2. Positive and Adverse Impact of Technological Developments on Society and Environment
3. Role of an individual/ Corporate/ Society in environmental conservation
4. Case Studies: The Bhopal Gas Tragedy, New Delhi's Air Pollution, Arsenic Pollution in Ground Water (West Bengal), Narmada Valley Project, Cauvery Water Dispute, Fukushima Daiichi Disaster (Japan), Ozone Hole over Antarctica, Ganga Pollution, Deterioration of Taj Mahal, Uttarakhand flash floods

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Suggested Readings:

1. Rogers, P.P., Jalal, K.F., Boyd, J.A. (Latest Edition). **An Introduction to Sustainable Development.** Earthscan
2. Kalam, A.P.J. (Latest Edition). **Target 3 Billion: Innovative Solutions Towards Sustainable Development.** Penguin Books
3. Kaushik, A. and Kaushik (Latest Edition). **Perspectives in Environmental Studies.** New Delhi: New Age International Publishers.
4. Dhameja, S.K. (Latest Edition). **Environmental Studies.** S.K. Kataria and Sons. New Delhi
5. Bharucha, E. (Latest Edition). **Environmental Studies for Undergraduate Courses.** New Delhi: University Grants Commission.
6. Wright, R. T. (Latest Edition). **Environmental Science: towards a sustainable future.** New Delhi: PHL Learning Private Ltd.
7. Rajagopalan, R. (Latest Edition). **Environmental Studies.** New York: Oxford University Press.

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Choice Based Credit System (CBCS) in the light of NEP-2020

B. Tech (CSE/ IT) - All Programs

SEMESTER- IV (2025-29)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS401N	DCC	Data Base Management Systems	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability:

1. To differentiate among the various database systems according to their function.
2. To understand the process to develop database model and database design.
3. To understand managing a database using Structured Query Language.
4. To expand an understanding of necessary DBMS concepts such as: Database Transactions, Database Security, Integrity, Concurrency.
5. To understand and build a straightforward database system and show competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Construct conceptual data models by identifying the entities and relationships.
2. Evaluate the normality of a logical data model and correct any anomalies.
3. Develop physical data models for relational database management systems.
4. Implement relational databases using RDBMS
5. Work as a valuable member of a database design and implementation team.

SYLLABUS

UNIT I

10 HOURS

Introduction: Concept & Overview of DBMS, Three Schema Architecture of DBMS, Database Approach v/s Traditional File Accessing Approach, Advantages of Database Systems, Data Models, Schema and Instances, Data Independence, Data Base Language and Interfaces, Functions of DBA and Designer, Database Users.

Entity-Relationship Model: Basic concepts, Design Issues, Mapping Constraints, Keys, Entity- Relationship Diagram, Weak Entity Sets and Extended E-R features. ER Diagram to Relational Table conversion.

UNIT II

9 HOURS

Relational Model: Structure of Relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Joins and its type. Integrity Constraints. Referential Integrity, Intension and Extension.

UNIT III

8 HOURS

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SQL and PL/SQL: SQL commands, Set operations, Aggregate Functions, Null Values, Domain Constraints, Assertions, Views, Nested Sub Queries, Stored Procedures and Triggers, Database Security, Application development using PLSQL.

Relational Database Design: Functional Dependency, Database Anomalies, Normalization and its forms, Multi-Valued Dependencies, 4NF, Join Dependency, 5NF.

UNIT IV

9 HOURS

Transaction and Concurrency Control: Physical Data Structures, Query Optimization, Transaction Model properties, State Serializability, Concurrency control protocols, Multiple Granularities, Granularity of Data Item. Multi version schemes, Database Recovery Methods, Recovery in Multi-Database System and Database Backup and Recovery from Catastrophic Failure

UNIT V

9 HOURS

File Organization and Index Structure: File & Record Concept, placing file records on Disk, Types of Records, Types of Single-Level Index, Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree. Mongo DB, NoSQL types, Features and tools.

TEXTBOOKS:

1. H. F. Korth and A. Silberschatz, *Database System Concepts*, 7th ed. New York, NY, USA: McGraw-Hill Education, 2019.

REFERENCE:

1. R. Ramakrishnan and J. Gehrke, *Database Management Systems*, 3rd ed. New York, NY, USA: McGraw-Hill Education, 2003.
2. A. Kahate, *Introduction to Database Management Systems*. New Delhi, India: Pearson Education India, 2006.
3. C. J. Date, *An Introduction to Database Systems*, 8th ed. Boston, MA, USA: Pearson Education, 2004.
4. I. Bayross, *SQL, PL/SQL: The Programming Language of Oracle*, 4th rev. ed. New Delhi, India: BPB Publications, 2010.
5. R. Elmasri and S. B. Navathe, *Fundamentals of Database Systems*, 7th ed. Harlow, U.K.: Pearson Education, 2016.
6. S. Kedar, *Database Management System*. Pune, India: Technical Publications, 2009.

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7. R. Chopra, *Database Management System (DBMS): A Practical Approach*. New Delhi, India: S. Chand Publishing, 2017.

LIST OF PRACTICALS

1. Design a Database and create required tables. For e.g. Bank, College Database.
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for table and record handling like implementing INSERT statement, using SELECT and INSERT together, DELETE, UPDATE, TRUNCATE statements and DROP, ALTER statements.
4. Write the queries for Retrieving Data from a Database Using the WHERE clause, using Logical Operators in the WHERE clause, Using IN, BETWEEN, LIKE, ORDER BY, GROUP BY and HAVING Clause, Using Aggregate Functions and Combining Tables Using JOINS.
5. Write the query for implementing the following functions: MAX (), MIN (), AVG (), COUNT ().
6. Write the query to implement the concept of Integrity constraints.
7. Write the query to create the views.
8. Perform the queries for triggers.
9. Perform the following operation for demonstrating the insertion, updating and deletion using the referential integrity constraints.
10. Write the query for creating the users and their role. Using GRANT and REVOKE operations.
11. Develop a small application for a patient admitted in a hospital which has capability of inserting, deleting, updating, the patient record. The application should also be able to search the patients' record by its id.

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BTCS302N	DCC	Analysis & Design of Algorithms	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability:

1. To learn algorithm analysis techniques.
2. To critically analyse the efficiency of alternative algorithmic solutions for the same problem
3. To understand the limitation of algorithm power.
4. To understand different algorithm design techniques.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Design algorithms for a given problem using standard algorithm design techniques.
2. Explain different standard algorithm design techniques, namely, divide & conquer, greedy, dynamic programming, backtracking and branch & bound.
3. Analyze and compare the efficiency of various algorithms of a given problem.
4. Identify the types of problem, formulate, analyze and compare the efficiency of algorithms.

SYLLABUS

UNIT I

10 HOURS

Algorithms Designing: Algorithms, Analyzing Algorithms, Asymptotic Notations, Heap Sort, Sorting and Searching Algorithms and their Analysis in terms of Space and Time Complexity.

Divide and Conquer: General Method, Binary Search, Merge Sort, Quick Sort, Selection Sort, Strassen's Matrix Multiplication Algorithms.

UNIT II

9 HOURS

Greedy Method: General Method, fractional, Knapsack Problem, Job Sequencing with Deadlines, Minimum-Cost Spanning Tree - Prim's and Kruskal's algorithm, Single Source Shortest Paths.

UNIT III

8 HOURS

Dynamic Programming: General Method, Optimal Binary Search Trees, 0/1 Knapsack, multistage graph, Traveling Salesperson Problem, All Pairs Shortest Paths.

UNIT IV

7 HOURS

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

Branch and Bound: General Method, 0/1 Knapsack Problem, Traveling Salesperson Problem.

UNIT V

8 HOURS

NP Hard and NP Complete Problems: Basic Concepts, Cook's Theorem, NP Hard Graph and NP Scheduling Problems, Some Simplified NP Hard Problems.

TEXTBOOKS:

1. E. Horowitz, S. Sahni, and S. Rajasekaran, *Fundamentals of Computer Algorithms*, 2nd ed. New Delhi, India: Universities Press (India) Pvt. Ltd., 2008.

REFERENCE:

1. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, *Introduction to Algorithms*, 4th ed. Cambridge, MA, USA: MIT Press, 2022.
2. D. E. Knuth, *The Art of Computer Programming, Vol. 1: Fundamental Algorithms*, 3rd ed. Boston, MA, USA: Addison-Wesley, 1997.
3. S. E. Goodman and S. T. Hedetniemi, *Introduction to the Design and Analysis of Algorithms*. New York, NY, USA: McGraw-Hill, 1977.
4. S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani, *Algorithms*. New Delhi, India: Tata McGraw-Hill, 2006.
5. Massachusetts Institute of Technology, "Design and Analysis of Algorithms (6.046J/18.410J)," *MIT OpenCourseWare*, 2005. [Online]. Available: <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2005/>
6. Stanford University, T. Roughgarden, "Algorithms: Design and Analysis, Part I & II," *Stanford Online/YouTube*, 2011. [Online]. Available: <https://www.youtube.com/playlist?list=PLoROMvodv4rO1NB9TD4iUZ3qghGEGtqNX>

LIST OF PRACTICALS

1. Write a program for Iterative and Recursive Binary Search.
2. Write a program for Merge Sort.
3. Write a program for Quick Sort.

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BTCS302N	DCC	Analysis & Design of Algorithms	60	20	20	30	20	3	0	2	4

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4. Write a program for Strassen's Matrix Multiplication
5. Write a program for minimum spanning trees using Kruskal's algorithm.
6. Write a program for minimum spanning trees using Prim's algorithm.
7. Write a program for single sources shortest path algorithm.
8. Write a program for Floyd-Warshall algorithm.
9. Write a program for traveling salesman problem.
10. Write a program for Hamiltonian cycle problem.

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B.Tech – CSE(ICS)

SEMESTER-IV (2025-29)

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BTDSE410N	DSE	Fundamental of Information Security	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability:

1. Understand fundamentals of Information Security.
2. Understand the social impact of Information Security.
3. Understand the security parameters of Information.
4. Understand various techniques used to provide security

COURSE OUTCOMES:

Upon completion of the subject, students will be able:

1. To understand the basics of Information Security.
2. To understand the basics of DBMS Security.
3. To understand the basics of Operating System Security.
4. To understand the security policies in networks.

SYLLABUS

UNIT I

9 HOURS

Overview of Information Security: Introduction, Critical Characteristics of Information, Principles of Information Security: Confidentiality, Integrity, and Availability; Security violation and threats; Assumptions and Trust; Security Assurance, Implementation and Operational Issues; Security Life Cycle.

UNIT II

9 HOURS

Access Control Models: Discretionary, mandatory, roll-based, and task-based models, unified models, access control algebra, temporal and spatio-temporal models. **Security Policies and Standards:** Confidentiality policies, integrity policies, hybrid policies, non-interference and policy composition, international standards.

UNIT III

9 HOURS

Security Systems Design: Design principles, representing identity, control of access and information flow, confinement problem. Security Assurance: Building systems with assurance, formal methods, evaluating systems.

UNIT IV

9 HOURS

Malicious logic, vulnerability analysis, auditing, intrusion detection. Applications: Network security, operating system security, user security, program security. Data privacy and security, introduction to digital forensics, enterprise security specification.

UNIT V

9 HOURS

Case Study: Operating Systems Security: Security Architecture, Analysis of Security in Linux/Windows.

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BTDSE410N	DSE	Fundamental of Information Security	60	20	20	30	20	3	0	2	4

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Database Security: Security Architecture, Enterprise security, Database auditing.

TEXTBOOKS:

- 1 Security Engineering, Ross Anderson.
- 2 Computer Security: Art and Science, M. Bishop, Pearson Education
- 3 Information Security: Principles and Practice, M. Stamp

REFERENCE:

1. Security in Computing, C.P. Pfleeger, S.L. Pfleeger, J. Margulies

LIST OF PRACTICALS

1. Study of different wireless network components and features of any one of the Mobile Security Apps.
2. Study of the features of firewall in providing network security and to set Firewall Security in Windows.
3. Steps to ensure Security of any one web browser (Mozilla Firefox/Google Chrome).
4. Study of different types of vulnerabilities for hacking websites/Web Applications.
5. Analysis of the Security Vulnerabilities of E-commerce services
6. Analysis of the security vulnerabilities of E-Mail Applications
7. Study of Network Security fundamentals - Ethical Hacking, Social Engineering practices.
8. Analysis of the Sniffing and Spoofing tools and attacks.
9. Study of Web-Based Password Capturing.
10. Install and update software packages
11. Study of the Anti-Intrusion Technique.

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BTDSE423M	DSE	Information Storage and Management	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. An ability to understand various storage architecture & technologies.
2. An ability to understand various technologies used to provide backup & recovery.
3. An ability to understand various techniques used to provide security.
4. Ability to identify information storage system requirements.
5. An ability to develop policy for information storage system.
6. An ability to develop policy for backup& recovery.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Describe & apply storage technologies.
2. Identify storage technologies that provide cost effective IT solutions for medium to large scale businesses & data centers.
3. Manage Virtual Server & Storage between Remote locations.
4. Design analysis and managing clusters of resources

SYLLABUS

UNIT I

10 HOURS

Introduction: Digital data and its types, Information storage, Key characteristics of data center, Evolution of computing platforms. Introduction to storage technology: Data Proliferation, evolution of various storage technologies, Overview of storage infrastructure components, Information life Cycle Management, Data categorization.

UNIT II

9 HOURS

Storage System Architecture: Intelligent disk subsystems overview, Contrast of integrands modular array, Component Architecture of Intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing, Front end to host storage provisioning, mapping and operation.

UNIT III

8 HOURS

Introduction to network storage: JBOD, DAS, NAS, SAN & CAS evolution and comparison, Applications, Elements, Connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN.

UNIT IV

9 HOURS

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SEMESTER- IV (2025-29)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE423M	DSE	Information Storage and Management	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Hybrid storage solutions and virtualization: memory, network, server, storage & appliances. Datacenters concepts & requirements, Backup and disaster recovery. Industry Management standards, standard framework applications, Key management metrics

UNIT V

9 HOURS

Information storage on clouds: concept of cloud, cloud computing, storage on cloud, Cloud benefits, Cloud computing evolution. Application & services on cloud, cloud service providers, cloud deployment models, Essential characteristics of cloud computing.

TEXTBOOKS:

1. G. Somasundaram and A. Shrivastava, Eds., *ISM: Storing, Managing, and Protecting Digital Information*. New Delhi, India: Wiley India, 2011.
2. Saurabh, *Cloud Computing: Insight into New Era Infrastructure*. New Delhi, India: Wiley India, 2012.

REFERENCE:

1. U. Troppens, W. Mueller-Friedt, R. Erkens, R. Wolafka, and N. Haustein, *Storage Networks Explained: Basics and Application of Fibre Channel, SAN, NAS, iSCSI, InfiniBand, and FCoE*. Hoboken, NJ, USA: Wiley, 2011.
2. B. Sosinsky, *Cloud Computing Bible*. Hoboken, NJ, USA: Wiley India, 2011.

LIST OF PRACTICALS

1. Understand working of different storage devices.
2. Perform different steps for data backup and recovery.
2. Analyze various techniques to provide security to data.
3. Understand different policies for information storage and management.
4. Demonstrate how to manage Virtual Server and Storage between remote locations.
5. Understand physical structure and components of hard disc.
6. Analyze how information storage on cloud is performed.

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BTDSE421M	DSE	Computer Graphics and Multimedia	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. Understood basic concepts of computer graphics.
2. Extract the various computer graphics hardware and display technologies.
3. Evaluate various algorithms for scan conversion and filling of basic objects and their comparative analysis.
4. Acquire knowledge about drawing basic shapes such as lines, circle, ellipse, polygon.
5. Remembering knowledge about two- and three-dimensional transformations.
6. Analyze the line and polygon clipping algorithms of the basic shapes.
7. Understood the various Multimedia Operation and file formats

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Apply basic concepts of computer graphics.
2. Able to perform processing of basic shapes by various processing algorithms /techniques.
3. Design two and three-dimensional graphics.
4. Analyze all the types of clipping algorithms for line and polygon.
5. Apply the acquire knowledge about Visible Surface Detection methods, Illumination Models and Surface Rendering.
6. Able to perform various types of color model implication.
7. Acquire knowledge to apply advanced techniques such as fractals, introduction to open GL and Multimedia Systems.

SYLLABUS

UNIT I

9 HOURS

Introduction to Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, CRT color monitors, Beam Penetration CRT, The Shadow - Mask CRT, DVST, Graphics input devices, Graphics software and standards.

UNIT II

10 HOURS

Points and Lines, DDA line drawing algorithm, Bresenham's drawing algorithm, Mid-point Circle drawing algorithm, Mid-point circle drawing algorithm, Mid-point Ellipse drawing algorithm, Parametric Cubic Curves: -

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Bezier and B-Spline curves, Filled Area Primitives: -Scan line polygon fill algorithm, Pattern fill algorithm Inside-Outside Tests, Boundary fill algorithms, Flood fill algorithms

UNIT III

10 HOURS

2D transformation: Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogenous coordinate system, Matrices Transformation, Composite Transformation.

3D transformations: translation, rotation, scaling. Parallel & Perspective Projection, Types of Parallel & Perspective Projection. Composite transformations Projections, Back Surface detection method Depth Buffer method Scan line method BSP tree method, Area Subdivision method.

UNIT IV

8 HOURS

Windowing & Clipping: World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping, Cohen Sutherland, Midpoint Line clipping algorithms, Polygon Clipping: Sutherland –Hodgeman, Weiler-Atherton algorithms.

Basic Illumination Model, Diffuse reflection, Specular reflection, Phong Shading Gourand shading, ray tracing, color models like RGB, YIQ, CMY, HSV.

UNIT V

9 HOURS

Multimedia System: An Introduction, Multimedia hardware, Multimedia System Architecture. Data & File Format standards. i.e RTF, TIFF, MIDI, JPEG, DIB, MPEG, Audio: digital audio, MIDI, processing sound, sampling, compression. Video: Avi, 3GP, MOV, MPEG, compression standards, compression through spatial and temporal redundancy. Multimedia Authoring.

TEXTBOOKS:

1. J. F. Hughes, A. Van Dam, M. McGuire, D. F. Sklar, J. D. Foley, S. K. Feiner, and K. Akeley, *Computer Graphics: Principles and Practice*, 3rd ed. Boston, MA, USA: Addison-Wesley Professional, 2013.

REFERENCE:

1. J. D. Foley, A. Van Dam, S. K. Feiner, and J. F. Hughes, *Computer Graphics: Principles and Practice*, 2nd ed. New Delhi, India: Pearson Education, 2003.

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2. D. Hearn and M. P. Baker, *Computer Graphics*, 3rd ed. New Delhi, India: Prentice Hall of India, 2007.
3. D. F. Rogers, *Procedural Elements for Computer Graphics*, 2nd ed. New Delhi, India: Tata McGraw-Hill, 1985.
4. J. Jeffcoate, *Multimedia in Practice: Technology and Applications*. New Delhi, India: PHI Learning, 1998.
5. D. Hillman, *Multimedia Technology and Applications*. Albany, NY, USA: Delmar Cengage Learning, 1998.

LIST OF PRACTICALS

1. Implement DDA Line Drawing algorithm .
2. Implement Bresenham's line drawing algorithm.
3. Implement Mid-Point circle drawing algorithm.
4. Implement Mid-Point ellipse drawing algorithm.
5. Implement cubic Bezier curve.
6. Implement a menu-driven program for 2D transformations.
7. Implement Line clipping algorithm using Cohen-Sutherland
8. Implement Polygon Clipping using Sutherland Hodgeman.
9. Implement Scan line fill algorithm.
10. Study of Multimedia and Program for Flash

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B. Tech CSE (ICS-NCSS)

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BTIT507N	SEC	Programming with Python	0	0	0	60	40	0	0	4	2

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COURSE OBJECTIVES:

The student will have ability to:

1. To develop proficiency in creating based applications using Python Programming Language.
2. To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
3. To be able to do testing and debugging of code written in Python.
4. To be able to draw various kinds of plots using PyLab.
5. To be able to use generators for generating series like fibonacci.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to apply technical knowledge and perform specific technical skills, including:

1. Ability to create robust applications using the Python programming language.
2. Ability to test and debug applications written using Python programming language.
3. Ability to create applications for solving computational problems using the Python Programming Language.

SYLLABUS

UNIT I

6 HOURS

Introduction to Python: The basic elements of Python, Branching programs, Strings and Input, Iteration. Functions, Scoping and Abstraction: Functions and Scoping, Specifications, Recursion, Global variables, Modules, Files.

UNIT II

6 HOURS

Testing and Debugging: Testing, Debugging. Structured Types, Mutability and Higher order Functions: Tuples, Lists and Mutability, Functions as Objects, Strings, Tuples and Lists, Dictionaries.

UNIT III

6 HOURS

Exceptions and assertions: Handling exceptions, Exceptions as a control flow mechanism, Assertions. Classes and Object-oriented Programming: Abstract Data Types and Classes, Inheritance, Encapsulation and information hiding.

UNIT IV

6 HOURS

NumPy and Pandas: Python list vs NumPy arrays, creating a NumPy Array, Basic ndarray, Shape of NumPy array, Size of NumPy array, Random numbers in ndarray, The Shape and Reshaping of NumPy Array, Dimensions of NumPy array, Reshaping a NumPy array, Flattening a NumPy array, Transpose of a NumPy array, Indexing and Slicing of NumPy Array.

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Pandas Series, Pandas Data Frames, Common Operations in Pandas, How to Deal With Missing Data in Pandas, How To Merge Data Frames in Pandas, How To Join Data Frames in Pandas, How to Concatenate Data Frames in Pandas. Data Input and Output in Pandas, How to Save Pandas Data Frames. Data visualization

UNIT V

6 HOURS

Matplotlib: Matplotlib Introduction, Line Chart, Scatter Plot , Bar Graph, Histogram, Subplots , Pie Chart , Pyplot, Matplotlib with Pandas and Numpy. Specify Color, Markings and Line Styles, Adjust Thickness, Label Tilt, and Legend.

TEXTBOOKS:

1. E. Matthes, *Python Crash Course*, 3rd ed. San Francisco, CA, USA: No Starch Press, 2023.
2. Sweigart, *Automate the Boring Stuff with Python*, 3rd ed. San Francisco, CA, USA: No Starch Press, 2025.

REFERENCE:

1. L. Ramalho, *Fluent Python*, 2nd ed. Sebastopol, CA, USA: O'Reilly Media, 2022.
2. B. Slatkin, *Effective Python: 125 Specific Ways to Write Better Python*, 3rd ed. Boston, MA, USA: Addison-Wesley, 2024.
3. W. McKinney, *Python for Data Analysis*, 3rd ed. Sebastopol, CA, USA: O'Reilly Media, 2022.
4. D. Beazley and B. K. Jones, *Python Cookbook*, 3rd ed. Sebastopol, CA, USA: O'Reilly Media, 2013.

LIST OF PRACTICALS

1. Write a Python Program to Print Hello world!
2. Write a program to demonstrate different number data types in Python.
3. Write a program to perform different Arithmetic Operations on numbers in Python.
4. Write a Program to Swap Two Variables.
5. Write a Program to Convert Celsius to Fahrenheit.
6. Write a Program to Find the Largest Among Three Numbers.
7. Write a Program to Check Prime Number.
8. Write a Program to Find the Factorial of a Number.
9. Write a Program to Print the Fibonacci sequence.
10. Write a program to create, append, and remove lists in python.
11. Write a program to demonstrate working with tuples in python.
12. Write a program to demonstrate working with set in python.
13. Write a program to demonstrate working with dictionaries in python.
14. Write a program to find reverse of given number using function.
15. Write a python Program to call data member and function using classes and objects

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16. Write a program to read 3 subject marks and display pass or failed using class and object.
17. Write a program in Python to handle user defined exception for given problem
18. Write a program using a Numpy module to create an array and check the following:
 - a. Type of array b. Axes of array c. Shape of array c. Type of elements in array
19. Write a python program to concatenate the data frames with two different objects
20. Write a Python program to Demonstrate how to Draw a Scatter Plot, Bar Graph and Pie Chart using Matplotlib.

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