



**Shri Vaishnav Vidyapeeth Vishwavidyalaya**  
**Shri Vaishnav Institute Of Information Technology**  
**B.Tech (CSE - Big Data and Cloud Engineering - Impetus Technologies)**  
**Choice Based Credit System (CBCS)-2023-27**

**SEMESTER-IV**

COURSE CODE	CATEGOR Y	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*				
ML307	BS	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 Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**Course Educational Objectives (CEOs):**

**The student will have ability to:**

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

**Course Outcomes (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes

The students will be able to

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.

**SYLLABUS:**

**Unit I:**

**10HRS**

**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:**

**8 HRS**

**Climate Change and Environmental Challenges**

1. Global Warming and Green House Effect
2. Depletion of the Ozone Layer

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3. Acid Rain
4. Nuclear Hazards

**Unit III:**

**9HRS**

**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**

**8HRS**

**Environmental Management and Sustainable Development**

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:**

**7HRS**

**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

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Project, Cauvery Water Dispute, Fukushima Daiichi Disaster (Japan),  
Ozone Hole over Antarctica, Ganga Pollution, Deterioration of Taj Mahal. Uttarakhand flash floods.

**Text Books:**

1. Rogers, P.P., Jalal, K.F. , Boyd, I.A.(Latest Edition) . An Introduction to Sustainable Development. Earthscan.

**References:**

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

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7. Rajagopalan, R. (Latest Edition). Environmental Studies. New York:

Oxford University Press.

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BTCS401N	DCC	Data Base Management Systems	60	20	20	30	20	3	0	2	4

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### Course Educational Objectives (CEOs):

**The student will have ability :**

1. To differentiate among the various database system 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 (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

The 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 a RDBMS
5. Work as a valuable member of a database design and implementation team.

### SYLLABUS:

#### UNIT I

**10HRS**

**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.

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## UNIT II

**9HRS**

**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

**8HRS**

**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

**7HRS**

**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

**8HRS**

**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.

## UNIT-V

**8HRS**

**File Organization and Index Structure:** File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree . Mongo DB, No SQL types, Features and tools.

## Text Books:

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1. Henry F. Korth and Silberschatz Abraham, "Database System Concepts", Mc.GrawHill, 6<sup>th</sup> Edition, 2015.

**References:**

1. Raghu Ramakrishnan and Johannes Gehrke "Database Management Systems" McGraw- Hill Education, 2003.
2. Kahate, Atul "Introduction to Database Management Systems" Pearson Education India, 2006.
3. C J Date, "An Introduction to Database System", Pearson Educations, 8th Edition, 2004
4. Ivan Bayross, "SQL, PL/SQL - The Programming Language of Oracle", BPB Publications 4<sup>th</sup> Revised Edition, 2010.
5. Elmasri, Navathe, "Fundamentals of Database Systems", Pearson Educations 7th Edition, 2016.
6. SeemaKedar, Database Management System, Technical Publications, 2009.
7. Rajiv Chopra, Database Management System (DBMS) A Practical Approach. Kindle Edition, S Chand (December 1, 2010), 2017.

**Suggested 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.

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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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BTIT301N	DCC	Computer Networks	60	20	20	30	20	3	0	2	4

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**Course Educational Objectives (CEOs):**

The student will have ability to:

1. Understand the general overview of the concepts and fundamentals of computer networks.
2. Understand the various components required to build different networks.
3. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

**Course Outcomes (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

The students will be able to

1. Understanding basic computer network technology.
2. Understand the functions of each layer in the OSI and TCP/IP reference model.
3. Obtain the skills of subnetting and routing mechanisms
4. Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

Syllabus:

**UNIT I**

**9HRS**

Introduction :Importance of Computer Networks, Classifications & Types. Layered Architecture: Protocol hierarchy, Interfaces and Services, Connection Oriented & Connection less Services, ISO- OSI Reference Model, TCP/IP model overview, comparison of TCP/IP and ISO-OSI reference model.

**UNIT II**

**9HRS**

Data Link Layer & MAC Sublayer: Need, Services Provided, Design issues, Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel. Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, MAC Addressing, Binary Exponential Back-off (BEB) Algorithm, Distributed Random Access Schemes/Contention Schemes: for Data Services (ALOHA and Slotted- ALOHA), CSMA, CSMA/CA, CSMA/CD.

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**UNIT III**

**9HRS**

Network Layer: Need, Services Provided, Design Issues, Routing Algorithms and types of Routing Algorithm, IPv4, IPv6, Classful and classless Addressing, Subnetting, Supernetting.

**UNIT IV**

**10HRS**

Transport Layer: Need, Design Issues, Multiplexing and Demultiplexing, transport layer services, UDP, UDP Header Format, Principles of reliable data transfer, TCP, Connection Management, TCP Flow Control, TCP Congestion Control, TCP Header Format, TCP Timer Management, SCTP.

**UNIT V**

**8HRS**

Session layer: Overview, Authentication, Session layer protocols, Presentation layer: Overview, Data conversion, Encryption and Decryption, Presentation layer protocols (LPP, Telnet, X.25 packet Assembler/Disassembler), Application Layer: Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, FTP.

Text Books:

**Andrew S Tanenbaum, Computer Networks, 6th Edition, Pearson Education, 2016.**

References:

1. Behrouz A. Forouzan, TCP/IP-Protocol suite, 4<sup>th</sup> edition, McGraw-Hill, 2010.
2. William Stallings, Data and Computer Communication, 10<sup>th</sup> edition Pearson, 2014.
3. Comer, Internet working with TCP/IP Volume one, Addison-Wesley, 2015.
4. W. Richard Stevens, TCP/IP Illustrated, Volume 1, 2<sup>nd</sup> Edition Addison-Wesley Professional Computing Series.

**Suggested list of Practicals:-**

1. Demonstrate Different Types of Network Equipment's.
2. Color coding standard of CAT 5, 6, 7 and crimping of cable in RJ-45.
3. LAN installations and Configurations.

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4. Experiment with basic Network configuration commands.
5. Write a program for error detection and correction technique.
6. Write a program for framing.
- 7. Write a program for routing algorithm.**
- 8. Socket Programming.**
- 9. Study about different network simulators.**
10. Establish and simulate peer to peer network using packet tracer.
11. Simulate LAN using hub and switch and discuss pros and cons of hub.
12. Router configuration using packet tracer.

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

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**Course Educational Objectives (CEOs):**

The student will have ability to:

1. To learn the algorithm analysis techniques.
2. To critically analyze 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 (COs):**

**After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The students will be able to**

1. Define the basic concepts of algorithms and analyze the performance of algorithms.
2. Explain different standard algorithm design techniques, namely, divide & conquer, greedy, dynamic programming, backtracking and branch & bound.
3. Demonstrate standard algorithms for fundamental problems in Computer Science.
4. Design algorithms for a given problem using standard algorithm design techniques.
5. Analyze and compare the efficiency of various algorithms of a given problem.
6. Identify the limitations of algorithms in problem solving.
7. To identify the types of problem, formulate, analyze and compare the efficiency of algorithms.

**Syllabus:**

**UNIT I**

**10HRS**

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**

**9HRS**

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**

**8HRS**

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

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**SEMESTER-IV**

COURSE CODE	CATEGOR Y	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*				
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.

**UNIT IV**

**7HRS**

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

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

**UNIT V**

**8HRS**

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

**Text Books:**

1. Ellis Horowitz and SartajSahni, "Fundamental of Computer Algorithms", 2<sup>nd</sup> Edition, Galgotia Publication, 2001.

**References:**

1. Thomas H Cormen, Charles E Leiserson and Ronald L Rivest "Introduction to Algorithms", 3<sup>rd</sup> Edition, MIT Press. 2009.
2. Donal E Knuth, "Fundamentals of Algorithms: The Art of Computer Programming" Vol 1, 3<sup>rd</sup> Edition, Pearson Education, 1997.
3. Goodman, S.E. & Hedetniemi, "Introduction to Design and Analysis of Algorithm", Tata McGraw Hill, 1977.
4. S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani, "Algorithms", Tata McGraw Hill, 2006.
5. J.E Hopcroft, J.D Ullman, "Design and analysis of algorithms" TMH Publication.

**Suggested 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.
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.

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
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.

8. Write a program for Floyd-Warshal algorithm.

9. Write a program for traveling salesman problem.

10. Write a program for Hamiltonian cycle problem.

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**SEMESTER-IV**

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

**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 Educational Objectives (CEOs):**

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 (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills, and attitudes.

The students will be able to

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

**Syllabus:**

**UNIT I**

**9HRS**

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**

**10HRS**

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

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**SEMESTER-IV**

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE421M	DSE	Computer Graphics and Multimedia	60	20	20	30	20	2	0	2	3

**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.

Flood fill algorithms

**UNIT III**

**10HRS**

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**

**8HRS**

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**

**9HRS**

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. John F. Hughes, Andries Van Dam, Morgan McGuire ,David F. Sklar , James D. Foley, Steven K. Feiner and Kurt Akeley ,”Computer Graphics: Principles and Practice”, , 3rd Edition, Addison- Wesley Professional,2013.

References:

1. Computer Graphics, C Version, 2e Paperback – 2002
2. Foley, Vandam, Feiner, Huges, “Computer Graphics: Principles & Practice”, Pearson Education, second edition 2003.
3. Judith Jeffcoate, “Multimedia in practice technology and Applications”, PHI, 1998.

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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE421M	DSE	Computer Graphics and Multimedia	60	20	20	30	20	2	0	2	3

**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.

4. David F Rogers, “Procedural elements for Computer Graphics”, Tata McGraw Hill, Second Edition.
5. Foley, VanDam, Feiner and Hughes, “Computer Graphics Principles & Practice in C”, Second edition, Pearson Education.
6. David Hillmaa, “Multimedia Technology & Applications, Delmar, 1998.
7. Donald Hearn and Pauline Baker M, “Computer Graphics”, Prentice Hall, New Delhi, 2007.

**Suggested 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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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE422M	DSE	Principles of Distributed Systems	60	20	20	30	20	2	0	2	3

**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 Educational Objectives (CEOs):**

**The student will have ability to:**

1. Observe the principles, architectures, algorithms and programming models used in distributed system.
2. Analyze state-of-the-art distributed system, such as Google File System.
3. Model and implement sample distributed system.
4. Summarize the functionality of Distributed System.

**Course Outcomes (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

The students will be able to

1. Understand architecture and communication systems in Distributed Systems.
2. Understand synchronization and various election algorithms in Distributed Systems.
3. Discuss different Distributed File System.
4. Evaluate Distributed Shared Memory.
5. Analyze various consistency and replication protocols and methods.
6. Understand various types of Distributed Systems.
7. Determine performance evaluation of various types of Distributed System.

**Syllabus:**

**UNIT I**

**10HRS**

**Characterization of Distributed System:** Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

**System Models:** Introduction, Architectural Models, Fundamental Models.

**UNIT II**

**9HRS**

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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*				
BTDSE422M	DSE	Principles of Distributed Systems	60	20	20	30	20	2	0	2	3

**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.

**Time and Global States:** Introduction, Clocks Events and Process States, Synchronizing Physical Clocks, Logical Time and Logical Clocks, Global States, Distributed Debugging.

**Coordination and Agreement:** Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication, Consensus and Related Problems.

**UNIT III**

**8HRS**

**Inter Process Communication:** Introduction, the API for the Internet Protocols, External Data Representation and Marshalling, Client-Server Communication

**Distributed Computing Paradigms:** Basic Message Passing Model – The Client Server, Message Passing, RPC basics, RPC implementation, RPC communication and issues, Remote Procedure Call Model – RPC in conventional languages and in Java - The Distributed Objects – The Collaborative Application

**UNIT IV**

**7HRS**

**Distributed File Systems:** File system, DFS- definition, Characteristics, Goals, File Service Architecture.

**Name Services:** Introduction, Name Services and the Domain Name System, Directory Services, Case Study of the Global Name Services.

**Distributed Shared Memory:** Introduction, Design and Implementation Issues, Sequential Consistency, Release Consistency, , Other Consistency Models.

**UNIT V**

**8HRS**

**Transactions and Concurrency Control:** Introduction, Transactions, Nested Transactions, Locks, Optimistic Concurrency Control, Timestamp Ordering, Comparison of Methods for Concurrency Control.

**Distributed Transactions:** Introduction, Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency Control in Distributed Transactions, Distributed Deadlocks, Transaction Recovery.

**Text Books:**

1. Distributed Systems, Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen, 3rd Edition 2017, PHI.

**References:**

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Vishwavidyalaya, Indore	Vishwavidyalaya, Indore		



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			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTDSE422M	DSE	Principles of Distributed Systems	60	20	20	30	20	2	0	2	3

**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.

1. Distributed Systems, Concepts and Design, George Coulouris, J Dollimore and Tim Kindberg, Pearson Education, 5<sup>th</sup> Edition. 2017.
2. Distributed Systems, An Algorithm Approach, Sukumar Ghosh, hapman&Hall/CRC, Taylor & Fransis Group, 2014.
3. P. K. Sinha, *Distributed Operating Systems: Concepts and Design*, IEEE press 3<sup>rd</sup> Edition, 2009
4. M. Singhal and N. G. Shivaratri, *Advanced Concepts in Operating Systems*, McGraw-Hill, 2011.

**Suggested list of Practicals:-**

1. Implement concurrent echo client-server application.
2. Implement concurrent day-time client-server application.
3. Incrementing a counter in shared memory.
4. Create CORBA based server-client application.
5. Configuring reliability and security options. Monitor SOAP request and response packets.
6. Analyze parts of it and compare them with the operations (java functions) headers
7. Design XML Schema and XML instance document .

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

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

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**Course Objectives:**

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:**

On completion of the course students will be able to:

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

**Syllabus:**

**Unit-I:**

**10HRS**

**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:**

**9HRS**

**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:**

**8HRS**

**Introduction to network storage:** JBOD, DAS, NAS, SAN & CAS evolution and comparison,

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			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	2	0	2	3

**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.

Applications, Elements, Connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN

**Unit-IV:**

**7HRS**

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

**Unit-V:**

**8HRS**

**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.

**Text Books:**

1. G.Somasundaram & Alok Shrivastava editors, ISM: Storing, Managing, and Protecting Digital Information; Wiley India

**Reference Books:**

1. Saurabh; Cloud Computing: Insight into New era Infrastructure; Wiley India.
2. Ulf Troppens, Wolfgang Mueller-Friedt, Rainer Erkens, Rainer Wolafka, Nils Haustein; Storage Network explained: Basic and application of fiber channels, SAN, NAS, ISES, INFINIBAND and FCOE, Wiley India.
3. Sosinsky, Cloud Computing Bible, Wiley India.

**Suggested list of Practicals:-**

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

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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*				
BTIT410M	SEC	Advanced Concepts in JAVA	0	0	0	30	20	0	0	4	2

**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 Educational Objectives (CEOs):**

The student will have ability to:

1. Understand Event Handling.
2. Understand structured and unstructured queries
3. Design and develop Web applications
4. Designing Enterprise based applications by encapsulating an application's business logic.
5. Designing applications using pre-built frameworks.

**Course Outcomes (COs):**

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The students will be able to

1. Design full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings and JavaFX
2. Learn to access database through Java programs, using SQL and No-SQL
3. Create dynamic web pages, using Servlets and JSP
4. Make a reusable software component, using advanced Frameworks
5. Invoke the remote methods in an application using Remote Method Invocation (RMI)

**SYLLABUS**

**UNIT-I**

**10HRS**

J2EE Event Handling & GUI Design

Event handling, AWT: Windows, Graphics, Text, AWT Controls, Layout Managers, and Menus, Images, GUI Programming with Swing, Exploring Swing, Swing Menu

**UNIT-II**

**9HRS**

Java Servlet

Overview, Servlet Interface, Request, Servlet context, response, Session, Dispatching request, Web Application

**UNIT-III**

**8HRS**

JDBC Standard Extension 2.0

Introduction to databases (SQL ,No - SQL) Connecting to Databases – JDBC principles – Databases access – Interacting – Database search – Database support in Web applications

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**SEMESTER-IV**

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*				
BTIT410M	SEC	Advanced Concepts in JAVA	0	0	0	30	20	0	0	4	2

**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.

MySQL , Model View Controller, JSP , HTML , CSS.

**UNIT-IV**

**7HRS**

ORM and J2EE Frameworks:

Introduction to Frameworks:- Struts, Spring basics, Spring AOP , Introduction to JavaScript and JQuery

**UNIT-V**

**8HRS**

Advance J2EE Topic:

JavaMail 1.2(Sending and Receiving Mail, Mail body design, different components), Java Messaging Service (JMS) 1.0.2 (Architecture, Programming Model, Connection, Session, Producer, Consumer), Java API for XML Parsing (JAXP) 1.1 (Introduction, Parsing and XML, when to use SAX)

**TEXT BOOKS:**

1. Arnold, Ken, James Gosling, and David Holmes. The Java programming language. Addison Wesley Professional, 2005.

**REFERENCES:**

1. Kito D. Mann, “Java Server Faces in Action”,2nd Edition, Dreamtech Press , 4 January 2005.
2. Maydene Fisher, Jon Ellis, Jonathan Bruce, Addison Wesley, “JDBC™ API Tutorial and Reference” Third Edition, Addison Wesley, 11 June 2009).
3. GiulioZambon , “Beginning JSP, JSF and Tomcat”, 2<sup>nd</sup> Edition , Apress ,29 September 2012.
4. AnghelLeonard , “JSF2.0 CookBook” ,3rd Edition , PACKT publication ,2010.
5. Bryan Basham, Kathy Sierra & Bert Bates, “Head First Servlets and JSP” , 3<sup>rd</sup> Edition , O'Reilly Media,2012.

**Suggested list of Practicals:-**

1. How to set up multiple panels, compound borders, combo boxes.
2. Write a Program to implement Event handling.
3. Write a Program to develop Java Servlet and use request and response
4. Write a Program which allows the user to enter data in a jsp form and display in webpage
5. Show basic JDBC operation

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**SEMESTER-IV**

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6. Create Servlet file which contains following function:

- 1) Connect 2) Create Database 3) Create table 4) Insert records into respective table
- 5) Update records of particular table of database 6) Delete records from table
- 7) Delete table and also Database.

7. Write a program to demonstrate Spring.

8. Write a program to demonstrate Spring JDBC operation.

9. Write a program to demonstrate Java Mail functionalities.

10. Write to program to demonstrate JMS queues.

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