ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2024-25

INFORMATION TECHNOLOGY

SEMESTER V

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks					No of Hours for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	Minimum Passing Marks	
1	PCC	**24IT501T**	Database Management System	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**45**	**3**
2	PCC	**24IT501P**	Database Management System Lab	**-**	**-**	**2**	**1**	**-**	**25**	**25**	**50**	**25**	**-**
3	PCC	**24IT502T**	Design and Analysis of Algorithms	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**45**	**3**
4	PCC	**24IT502P**	Design and Analysis of Algorithms Lab	**-**	**-**	**2**	**1**	**-**	**25**	**25**	**50**	**25**	**-**
5	PCC	**24IT503T**	Theory of Computation	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**45**	**3**
6	PEC	**24IT504T**	Program Elective - I	**2**	**-**	**-**	**2**	**10**	**10**	**30**	**50**	**23**	**1.5**
7	PEC	**24IT504P**	Program Elective – I Lab	**-**	**-**	**2**	**1**	-	**25**	**25**	**50**	**25**	**-**
8	VSC	**24IT505P**	Technical Skill Development – II	**-**	**-**	**4**	**2**	**-**	**50**	**-**	**50**	**25**	**-**
9	SEC	**24IT541P**	Career Development – V	**-**	**-**	**2**	**1**	**-**	**50**	**-**	**50**	**25**	**-**
10	MDM	**24IT531M**	MDM – III (Refer the Basket)	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**45**	**3**
			Total	**14**	**-**	**12**	**20**	**90**	**265**	**345**	**700**	**-**	**-**

Program Elective - I	
24IT504T(i)	Gaming Architecture and Programming
24IT504T(ii)	Computer Graphics and Animation

Programl Elective – I Lab	
24IT504P(i)	Gaming Architecture and Programming Lab
24IT504P(ii)	Computer Graphics and Animation Lab

Multidisciplinary Minor – III	
24IT531M	Cloud Applications and Development

Rathan		**July 2026**	**NEP 2.1**	**Applicable for 2026-27**
Chairman - BoS	**Dean – Academics**	**Date of Release**	**Version**	

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT501T	Database Management System	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended	**Students will be able to·**
1. To train the fundamental concepts of database management system, database modeling and design, SQL system implementation techniques. 2. To enable students to model ER diagram for any customized applications. 3. To provide knowledge on distributed databases, concurrency techniques, federated systems and active databases.	1. Apply principles of relational algebra and computing to analyze and solve problems related to database systems. 2. Explain and demonstrate the concepts of data storage, file organization, and data management techniques. 3. Analyze and resolve information system problems using database design principles, normalization, and structured query processing. 4. Design and develop database applications using modern database management tools, technologies, and programming interfaces. 5. Implement advanced SQL features such as complex queries, joins, triggers, procedures, and transactions for efficient database applications.

Unit I : Introduction	**[9Hrs]**
History and motivation for database systems; components of database systems; DBMS functions; Database Architecture, Data Abstraction, Data Independence, Formal relational query languages: Relational Algebra, Tuple Relational calculus, Domain Relational Calculus. Database query languages: Overview of database languages; Introduction to SQL.	
Unit II: Storage and file structure	**[9Hrs]**
Data dictionary storage, Basic concepts of indexing, Ordered indices, B+ Tree index files, B+ Tree indexing, B+ Tree Extensions, Multiple Key Access, Hashed files; signature files; Database efficiency and tuning, Bitmap Indices, Index Definition in SQL.	
Unit III: Data Models	**[9Hrs]**
Entity Relationship Model, Development of ER Diagrams, Extended Entity Relationship Model, Relational database design: Database design; Codd's Relational Database Rules, functional dependency; normal forms; multi-valued dependency; join dependency; SQL: Nested Sub-queries Join Expressions, Views, Integrity Constraints	
Unit IV: Transactions	**[9Hrs]**
Failure and recovery; concurrency control in SQL, Overview of Query Processing, Measures of Query cost, Evaluation of relational algebra expressions, Query equivalence, Query optimization.	
Unit V: Advanced SQL	**[9Hrs]**
Dynamic SQL and Embedded SQL, Functions and Procedures, Triggers. Overview of OODBMS & Distributed DBMS, Introduction to NoSQL Database	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Database System Concepts	Abraham Silberschatz, Henry F. Korth and S. Sudarshan	6th	McGraw Hill (SIE), 2013.
2	Database Systems - Models, Languages, Design and Application Programming	Ramez Elmasri and Shamkant Navathe	6th	Pearson Education
3	Database Systems Concepts	Shio Kumar Singh	2nd	Pearson Education

Reference Books

S.N	Title	Authors	Edition	Publisher
1	An introduction to database systems	C. J. Date	8th	Addison Wesley

Web Resources

1	https://www.tutorialspoint.com/dbms/index.htm
2	https://www.studytonight.com/dbms/introduction-to-sql.php
3	https://www.geeksforgeeks.org/introduction-of-dbms-database-management-system-set-1/

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24IT501P	Database Management System Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended 1. To train the fundamental concepts of database management system, database modeling and design, SQL system implementation techniques. 2. To enable students to model ER diagram for any customized applications. 3. To provide knowledge on distributed databases, concurrency techniques, federated systems and active databases.	**Students will be able to**· 1. Demonstrate and design a database using basic concepts like tables and relationships. 2. Construct SQL queries for data definition, manipulation, and retrieval tasks across multiple tables. 3. Design and implement a database schema for given problem.

Expt. No.	Title of the experiment
1	SQL Database Installation
2	SQL Query to create a Database and perform different operations on it.
3	SQL Query for Relation (Table) Creation and add data into the table then display the relation.
4	SQL Query for Constraints
5	SQL Query for DML commands
6	SQL Query for DCL Commands
7	SQL Query for TCL Commands
8	SQL Query for Join & Set Operations
9	Micro Project

Text Books

S.N	Title	Authors	Edition	Publisher
1	Database System Concepts	Abraham Silberschatz, Henry F. Korth and S. Sudarshan	6th	McGraw Hill (SIE), 2013.
2	Database Systems - Models, Languages, Design and Application Programming	Ramez Elmasri and Shamkant Navathe	6th	Pearson Education
3	Database Systems Concepts	Shio Kumar Singh	2nd	Pearson Education

Reference Books

S.N	Title	Authors	Edition	Publisher
1	An introduction to database systems	C. J. Date	8th	Addison Wesley
2	Database system implementation	H. Garcia et al.	-	Prentice Hall,2000

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Chairman - BoS	Dean – Academics	Date of Release	Version	

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INFORMATION TECHNOLOGY

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT502T	Design and Analysis of Algorithms	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended	**Students will be able to·**
1. Analyze the asymptotic performance of algorithm 2. Apply important algorithmic design paradigms and methods of analysis 3. Solve simple to moderately difficult algorithmic problems arising in applications 4. Able to demonstrate the hardness of simple NP-complete problems	1. Illustrate different approaches for analysis and design of efficient algorithms and Analyze performance of various algorithms using asymptotic notations. 2. Determine and apply various divide & conquer strategies and greedy approaches for solving a given computational problem 3. Demonstrate and solve various real time problems using the concepts of dynamic programming 4. Make use of backtracking and graph traversal techniques for solving real-world problems 5. Recall and Classify the NP-hard and NP-complete problems

Unit I: Introduction to Algorithm **[9Hrs]**

Definition of algorithms and brief explanation about the basic properties of algorithms Recurrence relations, solutions of recurrence relations using technique of characteristic equation, master theorem, Asymptotic notations of analysis of algorithms, worst case, average case and best case, amortized analysis, application of amortized analysis.

Unit II: Greedy and Divide & Conquer Approach **[9Hrs]**

Divide and conquer strategies: Binary search, Stressen's matrix multiplication algorithm, min-max algorithm.
Greedy Approach: Application to job sequencing with deadlines problem, knapsack problem, optimal merge pattern, Huffman code, minimum cost spanning tree using Prim's and Kruskal's algorithm.

Unit III: Dynamic Programming **[9Hrs]**

Dynamic Programming: Basic Strategy, Multistage graph (forward and backward approach), Longest Common Subsequence, Optimal Binary Search Tree, 0/1 Knapsack problems, Travelling Salesman problem, single source shortest path using Bellman-Ford algorithm, all pair shortest path using Floyd- Warshall algorithm

Unit IV: Backtracking Algorithm **[9Hrs]**

Basic Traversal and Search Techniques: Breadth first search and depth first search, connected components.
Backtracking: Basic strategy, N-Queen Problem and their Analysis (4 & 8-Queen), graph coloring, Hamiltonian cycles.

Unit V: Computational Complexity **[9Hrs]**

NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, Cook's theorem, decision and optimization problems, graph based problems on NP Principle.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Introduction to Algorithms	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein	3rd	Prentice Hall of India
2	The Design and Analysis of Computer Algorithms	Alfred V. Aho, John E. Hopcraft, Jeffrey D. Ullman		Pearson education
3	Fundamentals of Computer Algorithms	Horowitz, Sahani, Rajsekharam	2nd	University Press

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Algorithms	Brassard, Bratley		Prentice Hall
2	Design and Analysis of Algorithms	Parag Dave, Himanshu Dave	2nd	Pearson Education
3	Computer Algorithms: Introduction to Design and analysis	Sara Baase and A.V. Gelder	3rd	Pearson Education

Web Resources

1	https://www.geeksforgeeks.org/analysis-of-algorithms/
2	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
3	https://onlinecourses.nptel.ac.in/noc19_cs47/preview
4	https://www.classcentral.com/course/swayam-design-and-analysis-of-algorithms-3984?utm_source

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Chairman - BoS	Dean – Academics	Date of Release	Version	

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24IT502P	Design and Analysis of Algorithms Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
This course is intended 1. Analyze the asymptotic performance of algorithm 2. Apply important algorithmic design paradigms and methods of analysis 3. Solve simple to moderately difficult algorithmic problems arising in applications 4. Able to demonstrate the hardness of simple NP-complete problems	**Students will be able to**· 1. Apply different approaches for analysis and design of efficient algorithms using asymptotic notations. 2. Apply various divide & conquer strategies and greedy approaches for solving a given computational problem 3. Solve various real time problems using the concepts of dynamic programming 4. Make use of backtracking and graph traversal techniques for solving real-world problems

Expt. No.	Title of the experiment
1	Practical based on Binary search algorithms.
2	Practical based on matrix multiplication algorithm
3	Practical based on min-max algorithm
4	Practical based on Huffman code
5	Practical based on Knapsack and Prim's problems
6	Practical based on Traveling Salesman problem
7	Practical based on Bellman- Ford algorithm
8	Practical based on Floyd- Warshall algorithm
9	Micro Project

Text Books

S. N	Title	Authors	Edition	Publisher
1	Introduction to Algorithms	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein	3rd	Prentice Hall of India
2	The Design and Analysis of Computer Algorithms	Alfred V. Aho, John E. Hopcraft, Jeffrey D. Ullman	-	Pearson education
3	Fundamentals of Computer Algorithms	Horowitz, Sahani, Rajsekharam	2nd	University Press

Reference Books

S. N	Title	Authors	Edition	Publisher
1	Fundamentals of Algorithms	Brassard, Bratley	-	Prentice Hall
2	Design and Analysis of Algorithms	Parag Dave, Himanshu Dave	2nd	Pearson Education
3	Computer Algorithms: Introduction to Design and analysis	Sara Baase and A.V. Gelder	3rd	Pearson Education

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT503T	Theory of Computation	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended 1. To introduce Formal Languages, Automata Theory and Abstract models of Computation and Computability, Computational complexities and NP – Completeness. 2. To gain knowledge in computational theory. 3. To realize the theoretical concepts and techniques involved in the software system development	**Students will be able to** 1. Apply the theoretical concepts and techniques in designing the software systems. 2. Identify, analyze, design and formulate problems using computational theory. 3. Demonstrate experiments and interpret data using computational theory. 4. Formulate Push Down Automata and its equivalent CFG. 5. Summarize different decidable and undecidable problems.

Unit I: Automata	**[9Hrs]**
Automata: Strings, Alphabet, Language, Operations, Finite State Machine, definitions, finite automation model, acceptance of strings and languages, on deterministic finite automaton, deterministic finite automaton, equivalence between NFA and DFA, Conversion of NFA into DFA, Finite Automata with Epsilon Transitions	
Unit II: Regular expressions	**[9Hrs]**
Regular expressions: Regular sets, regular expressions, identity rules, manipulation of regular expressions, equivalence between RE and FA, inter conversion, Closure properties of regular sets (proofs not required), regular grammars, right linear and left linear grammars equivalence between regular linear grammar and FA.	
Unit III: Context free grammars	**[9Hrs]**
Context free grammars: Context free Grammars, Derivation trees, Left Most Derivations, Right Most Derivations, Ambiguity in Context-Free Grammars, Normal Forms, Chomsky Normal Form (CNF), Greibach Normal Form (GNF). Pumping Lemma for CFL	
Unit IV: Push Down Automata	**[9Hrs]**
Push Down Automata: Definition of Push Down Automata, Languages of Pushdown Automata, Turing machine: Turing machine, definition, model, design of TM, Computable Functions, recursive enumerable language, types of TM's..	
Unit V: Classes of problems	**[9Hrs]**
Classes of problems: Chomsky hierarchy of languages, linear bounded automata and context sensitive language, decidability of problems, Universal Turing Machine, undecidability of post's correspondence problem. Turing reducibility, definition of P and NP problems, NP complete and NP hard problems.	

Text Books

SN	Title	Authors	Edition	Publisher
1	Theory of Computation	Anuradha A. Puntambekar	1st	Technical Publication
2	Theory of Computation	Dr. O. G. Kakde	1st	Laxmi Publications
3	Introduction to the Theory of Computation	Michael Sipser	2nd	CENGAGE Learning.
4	Theory of Computation	Vivek Kulkarni		Oxford

Reference Books

SN	Title	Authors	Edition	Publisher
1	Introduction to Automata Theory, Languages, and Computation	Hopcroft, John E.;Motwani, Rajeev;Ullman, Jeffrey D.	3rd	Pearson
2	An Introduction to Formal Language & Automata	Peter Linz	3rd	Narosa Publishers

Online Resources

1	https://onlinecourses.nptel.ac.in/noc25_cs70/preview
2	https://www.geeksforgeeks.org/lmn-toc/
3	https://www.tutorialspoint.com/automata_theory/index.htm

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT504T(i)	PE – I Gaming Architecture and Programming	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
The course is intended 1. Discuss and define the terms and principles of game design and development. 2. Select and evaluate programming and scripting languages to develop particular games. 3. Define the structure and duties of the game development team.	**Students will be able to** 1. Illustrate game design principles and describe initial design components. 2. Conduct and Investigate Game Research using different technologies. 3. Apply various game resources in game design and development.

Unit I **[10Hrs]**

Core Game Design: Game design principles, Game design process, Game Genres, Creating the Game Specification, Example Game Spec, Interactivity, Detailed design of Gameplay, Current Methods of Team Management, The Software Factory: Organizing a Software Factory

Unit II **[10Hrs]**

Initial Design: The Beginning. Hardware Abstraction. The Problem Domain. Thinking in Tokens. Use of Technology: The State of the Art. Blue-Sky Research. Reinventing the Wheel. Use of Object Technology, Building Blocks: Reusability in Software, Initial **Architecture Design:** Architectural styles, The Tier System. Architecture Design. Development: The Development Process. Code Quality. Coding Priorities. Debugging and Module Completion. The Seven Golden Gambits. The Three Lead Balloons

Unit III **[10Hrs]**

GAME PROGRAMMING: Game Platforms, Game display Technologies: Tools for game development, User Interface
Building your game: Project Directory Structure, Game Build Process, User interface components, ,2D Drawing concepts, Sprites, Graphics File formats, Initializing Game objects, Game Loop, Cleanup. Loading and Caching Game Resources, 3D Graphics and 3D Engines: 3D Graphics Pipeline,3D Middleware

Text Books

S.N	Title	Authors	Edition	Publisher
1	Game Architecture and Programming	Shankarmani, Jain, Sinha	-	Wiley Publication,
2	Game Coding Complete	Mike Mc Shaffrfy and David Graham,	4th	Cengage Learning

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Game Design	Ernest Adams,Andrew Rollings,	2nd	Pearson Publication
2	Game Architecture and Design	Andrew Rollings and Dave Morris	-	
3	ActionScript 3.0 Game Programming University,	Gary Rosenzweig,	-	Pearson Education.

Online Resources

1	https://www.udemy.com/course/unitycourse2/?couponCode=ST6MT60525G3
2	https://www.udemy.com/course/the-ultimate-guide-to-game-development-with-unity/

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24IT504P(i)	PE – I Gaming Architecture and Programming Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
The course is intended 1. Discuss and define the terms and principles of game design and development. 2. Create a Game using game engine	**Students will be able to** 1. Demonstrate feasibility study and basic design of games using game engine. 2. Plan and construct different stages of game with defined objectives. 3. Design technical architecture of game in a Gameplay

Expt. No.	Title of the experiment
1	To study the Installation of unity game engine and familiarization of GUI.
2	To create character design, Sprites , modifying sprites and transforms objects in the Game scene.
3	To insert assests , saving & loading scenes in the Game scene.
4	To implement collisions, Rigidbodies and physics in gameplay
5	To create Prefabs, Material, Shaders in the Game scene.
6	To insert Audio and use of asset store.
7	Design of button, Text element, slider to the game.
8	Develop Miniproject on single player /multiplayer Game Covering the above aspects.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Game Architecture and Programming	Shankarmani, Jain, Sinha	-	Wiley Publication,
2	Game Coding Complete	Mike Mc Shaffrfy and David Graham,	4th	Cengage Learning

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Fundamentals of Game Design	Ernest Adams,Andrew Rollings,	2nd	Pearson Publication
2	Game Architecture and Design	Andrew Rollings and Dave Morris	-	
3	ActionScript 3.0 Game Programming University,	Gary Rosenzweig,	-	Pearson Education.

SIXTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT504T(ii)	PE – II Computer Graphics and Animation	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended 1. Learn to create 2D and 3D objects. 2. Able to apply various transformations on the 2D and 3D objects. 3. To apply hidden surface removal techniques along with various shading algorithms	**Students will be able to-** 1. Use primitive operations to create 2D and 3D objects and perform various operations thereon. 2. Perform complex 2D and 3D transformations on objects. 3. Implement various hidden surface removal techniques. 4. Relate and apply the features of animation for animated application.

Unit I: Geometry and line generation	**[10Hrs]**
Introduction: Overview of Computer Graphics, graphics systems, Pixels and frame buffers, Types of display devices, Random scan methods, Raster scan methods, DDA and Bresenham's algorithms for line generation, Circle generation algorithm, Antialiasing, **Graphics primitives**: Display files, algorithms for polygon generation, polygon filling algorithms	
Unit II: Graphics primitives & 2D transformations	**[10Hrs]**
2D transformations: translation, scaling, rotation, rotation about arbitrary point, reflections, shearing 3D Transformation, Projections, **3D transformations:** 3D Transformation, parallel and perspective projections	
Unit III: Windowing and clipping	**[10Hrs]**
Windowing and clipping: window, viewport, viewing transformations, point, line and Polygon clipping, window to viewport transformation, NDC (Normalized Device Coordinates), **Visible Surface Detection, Color models:** RGB, CMY, HSV colour Models, **Animation**: Introduction to Animation, History of animation, Types of Animation, Principles of animation	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Computer Graphics	D. Hearn, M.P .Baker	2nd	Pearson Education
2	Principles of Interactive Computer Graphics	W .M. Newman & R.F. Sproul	2nd	McGraw Hill
3	Principles of Multimedia	Rajan Parekh		Tata McGraw-Hill

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Computer Graphics Using Open GL	F.S. Hill	2nd	Pearson Education
2	Fundamentals of Multimedia	Ze-Nian, Li, Mark S. Drew		Pearson Education
3	Computer Graphics	Harington		McGraw Hill

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24IT504P(ii)	PE – II Computer Graphics and Animation Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
The course is intended 1. Learn to create 2D and 3D objects. 2. Able to apply various transformations on the 2D 3. and 3D objects. 4. To apply hidden surface removal techniques 5. along with various shading algorithms	**Students will be able to** 1. Use primitive operations to create 2D and 3D objects and perform 2. various operations thereon. 3. Perform complex 2D and 3D transformations on objects. 4. Implement various hidden surface removal techniques. 5. Relate and apply the features of animation for animated application.

Expt. No.	Title of the experiment
1	To study different Graphics Functions.
2	To display different Images using graphics commands.
3	To implement Digital Differential Analyser Algorithm(DAA) for Line Generation.
4	To implement Bresenham's Algorithm for Line generation.
5	To implement Bresenham's Algorithm for Circle Generation (concentric circles).
6	To implement a Olympic circles generated by Bresenham's Circle generation algorithm.
7	To implement Polygon Filling Algorithm using Floodfill and Boundary Fill Algorithm
8	To Implement Translation ,Rotation,Scaling on 2D Image.
9	To Implement Line Clipping Algorithm using any method.
10	Implementation of 3D Transformation (Rotation,Scaling,Translation)
11	To Study Unity Gaming Software.
12	Design any cartoon animation which is sequence of at least 10-15 frames using any animation tools.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Computer Graphics	D. Hearn, M.P .Baker	2nd	Pearson Education
2	Principles of Interactive Computer Graphics	W .M. Newman & R.F. Sproul	2nd	McGraw Hill
3	Principles of Multimedia	Rajan Parekh		Tata McGraw-Hill

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Computer Graphics Using Open GL	F.S. Hill	2nd	Pearson Education
2	Fundamentals of Multimedia	Ze-Nian, Li, Mark S. Drew		Pearson Education
3	Computer Graphics	Harington		McGraw Hill

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24IT505P	Technical Skill Development – II	-	-	4	2	50	-	50

Course Objectives	Course Outcomes
This course is intended to 1. Apply front-end development skills to build modular, component-based applications using React. 2. Understand the core concepts of HTML, CSS, for developing responsive and interactive web pages. 3. Integrate APIs and handle routing, state, and form processing in dynamic web applications.	**Students will be able to**· 1. Design and implement responsive web interfaces using HTML and advanced CSS concepts. Perform testing in AngularJS 2. Build single-page applications (SPAs) using React with component architecture, hooks, and routing. 3. Integrate REST APIs in React apps and manage state effectively for dynamic data rendering.

Unit I : Advanced CSS	**[10Hrs]**
CSS Flexbox and Grid Layout, Responsive Design with Media Queries, CSS Variables and Custom Properties, Pseudo-classes and pseudo-elements, CSS Animations, Transitions, Key frames Positioning and z-index, Layout design using modern CSS.	
Unit II: Storage and file structure	**[10Hrs]**
React introduction, JSX, Virtual DOM, Functional components and Props, State management with use State, Event handling and conditional rendering, use Effect hook for side effects.	
Unit III: React Advanced Concepts	**[10Hrs]**
React Forms and controlled components, React Router for single-page navigation, API Integration using fetch or Axios, Modular design and component reuse	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Learning React	Alex Banks and Eve Porcello	5th	O'REILLY
2	HTML; CSS: The Complete Reference	Thomas A. Powell,	5th	McGraw Hill

Reference Books

S.N	Title	Authors	Edition	Publisher
1	The Road to learn React	Robin Wieruch	1st	Independently Published
2	Learn AngularJS by one day,complete angular JS guide with example	Krishna Rungta	1st	Independently Published

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24IT541P	Career Development – V	-	-	2	1	50	-	50

Course Objectives	Course Outcomes
To enhance students' aptitude, analytical reasoning, communication, teamwork, and professional presentation skills required for competitive examinations, higher education, and workplace success.	**CO1.** Students will be able to solve problems related to time and work, pipe and cisterns, geometry, mensuration, and analytical puzzles using logical and quantitative reasoning skills. **CO2.** Students will be able to apply concepts of time, speed, and distance and solve coding-decoding and direction sense problems accurately using analytical thinking. **CO3.** Students will be able to perform SWOC analysis, set SMART goals, and deliver effective self-introductions with confidence and professional communication skills. **CO4** Students will be able to conduct company profile presentations and participate effectively in table topic group discussions demonstrating teamwork, critical thinking, and spontaneous speaking skills. **CO5.** Students will be able to demonstrate improved verbal ability, grammar, vocabulary, reading comprehension, and active classroom participation for professional communication.

Unit I (15marks)	**[7Hrs]**
Time and Work, Chain Rule, Pipe and Cistern, Geometry and mensuration **Puzzles:-** Analytical puzzle, Tabular Puzzle, Box or Floor based Puzzle, Rank based Puzzle	
Unit II (10marks)	**[7Hrs]**
Time Speed and Distance:- Basic Problems, Average Speed, Relative Speed, Problems on Trains, Boats and Streams, Escalators, Directions sense Problems Coding and Decoding	
Unit III (5marks)	**[5Hrs]**
SWOC Analysis and SMART Goal Setting - for Personal and Professional Development **Self-Elevator Pitch –** Self Introduction, Confidence Building, and Professional Communication Skills (5marks)	
Unit IV (10marks)	**[6Hrs]**
Company Profile Group Presentation – Research, Team Coordination, and Presentation Techniques (5marks) **Table Topic Group Discussion –** Critical Thinking, Spontaneous Speaking, and Team Interaction	
Unit V (10marks)	**[3Hrs]**
Verbal Ability Quiz – Grammar, Vocabulary Building, and Reading Comprehension for Professional Communication **Continuous Assessment -** Attendance, Individual Engagement & Team Dynamics	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude By R. S. Aggarwal	R.S. Aggarwal		
2	Quantitative Aptitude	Shripad Deo		Allied Publication
3	A Modern Approach to Verbal & Non-Verbal Reasoning	R.S. Aggarwal		

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude for CAT by Arun Sharma	Arun Sharma		
2	Developing Communication Skills	Krishna Mohan & Meera Banerji	2002	
3	Professional Communication Skills	Alok Jain	2006	S Chand & Company Ltd.
4	Personality Development & Soft Skills	Barun Mitra	2019	Cambridge University Oress

		July 2026	NEP 2.1	Applicable for 2026-27
Chairman - BoS	Dean – Academics	Date of Release	Version	

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FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24IT531M	MDM – III Cloud Applications and Development	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended 1. To introduce students to the development of cloud-native applications using modern architectures like microservices and serverless computing. 2. To provide hands-on knowledge of containerization and orchestration using Docker and Kubernetes. 3. To enable students to design and implement Continuous Integration and Continuous Deployment with DevOps tools and practices.	**Students will be able to** 1. To introduce students to the development of cloud-native applications using modern architectures like microservices and serverless computing. 2. To provide hands-on knowledge of containerization and orchestration using Docker and Kubernetes. 3. To enable students to design and implement Continuous Integration and Continuous Deployment (CI/CD) pipelines with DevOps tools and practices. 4. To bridge the gap between application development and operations using automated tools and practices. 5. To prepare students for industry-oriented deployment and operations workflows in real-world cloud environments.

Unit I: Cloud-Native Application	**[9Hrs]**
Principles of cloud-native applications, Microservices architecture: Design patterns and communication.	
Unit II: Application Development	**[9Hrs]**
Serverless computing: Concepts, benefits, limitations, Event-driven architecture in the cloud, Case studies: AWS Lambda, Azure Functions and Google Cloud Functions.	
Unit III: Containers	**[9Hrs]**
Introduction to containerization: Dockers architecture and commands, Creating and managing container images, Dockers Compose and Dockers Hub.	
Unit IV: Kubernetes	**[9Hrs]**
Introduction to Kubernetes: Pods, Deployments, Services, Kubernetes on cloud: GKE, EKS, AKS, Helm basics for package management	
Unit V: DevOps and CI/CD Pipelines	**[9Hrs]**
DevOps lifecycle and principles, Continuous Integration and Delivery concepts, CI/CD tools: Jenkins, GitHub Actions, GitLab, Deployment strategies: Blue-Green, Canary	

Reference Books

S.N	Title	Authors	Edition	Publisher
1.	Cloud Native Java	Josh Long, Kenny Bastani	1st	O'Reilly Media
2.	Docker Deep Dive	Nigel Poulton	4th	Leanpub
3.	Kubernetes Up & Running	Kelsey Hightower, Brendan Burns, Joe Beda	3rd	O'Reilly Media
4.	The DevOps Handbook	Gene Kim, Jez Humble, Patrick Debois, John Willis	2nd	IT Revolution Press

Web Resources:

1	Geeks for Geeks: https://www.geeksforgeeks.org/