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Total Number of Pages: 02

Course: M.Tech
Sub_Code: P2CTCC01

2nd Semester Regular/Back Examination: 2025-26

SUBJECT: Computer Graphics

BRANCH(S): COMPUTER SCIENCE AND ENGG

Time: 3 Hours

Max Marks: 100

Q.Code: V684

Answer Q1 (Part-I) which is compulsory, any eight from Part-II, and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 Answer the following questions: (2 x 10)

- Explain the working principle of modern display devices. How do these technologies differ in terms of image formation and power efficiency?
- A raster system has a resolution of 1024×768 pixels. If each pixel stores 16 bits of colour information, determine the required frame buffer size in bytes.
- Differentiate between 2D and 3D geometric transformations with respect to translation and rotation.
- What is clipping in computer graphics, and why is it essential in the rendering pipeline?
- Write down the concept of Bi-cubic splines.
- Explain the fundamental concepts of computer animation and their role in generating realistic motion.
- What is isometric projection in computer graphics, and how does it differ from perspective projection?
- Briefly explain how look-up table (LUT) improve computational efficiency and colour representation in display systems.
- What is the fractal dimension, and how does it differ from traditional geometric dimension?
- Write down the concept of Halftoning.

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Explain the working principle of a Cathode Ray Tube (CRT) terminal used in display systems. Discuss its main components, beam scanning mechanism, and how image formation is achieved on the phosphor screen.
- Using Bresenham's circle drawing algorithm, generate all raster points for a circle centered at (0,0) with radius 10 in octants 1 and 2. Show the step-by-step evaluation of the decision parameter and list all corresponding plotted points.
- A polygon has vertices A (2, 2), B (8, 3), C (7, 7), and D (3, 6). Using the scan-line polygon filling algorithm, determine the fill intervals for each scan line from $y = 2$ to $y = 7$. Clearly show the edge intersection calculations and the final filled pixel ranges for each scan line.
- Explain the concepts of Octree representation and Medial Axis representation used in 3D object modelling.

- e) Using the Midpoint Circle Drawing Algorithm, determine the raster points for one octant of a circle centered at (4, -2) with radius 12, for the region where x ranges from 0 to y. Show the step-by-step evaluation of the decision parameter and list all the generated pixel positions.
- f) Explain the concept of shading models in computer graphics. Derive and discuss the Phong illumination model, highlighting ambient, diffuse, and specular components.
- g) What is a convex hull in computer graphics? Briefly describe any one method used to compute it. Also mention its basic application in graphics or image processing.
- h) Compare the operating characteristics of raster refresh systems and vector refresh systems in computer graphics. Highlight key differences in their display mechanism, memory requirements, and suitability for different types of graphics applications.
- i) Differentiate between Perspective and parallel projections.
- j) Explain fractals. Show the first few iterations in the generation of the Koch curve.
- k) State the limitations of Bézier curves in geometric modelling and explain how B-spline curves overcome these limitations.
- l) Explain how zooming and panning are achieved in computer graphics by transforming coordinate reference frames. Describe the role of translation and scaling transformations in this process and discuss how they affect the viewing window and object representation.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 A rectangular object ABCD has vertices A (2, 3), B (6, 3), C (6, 7), and D (2, 7). The window (clipping region) is defined by the coordinates (3, 4), (9, 4), (9, 10), and (3, 10). The corresponding viewport is given by (0, 0), (2, 0), (2, 1), and (0, 1). Determine the viewing (window-to-viewport) transformation matrix. Clearly show all steps involved in computing the scaling and translation factors used in the transformation. **(16)**

Q4 Explain the concept of composite transformations in computer graphics and how multiple transformations are combined using homogeneous coordinates. Derive the matrix representation for the following cases: (i) successive translations by (3, 5) and (-2, 4), (ii) successive rotations of 30° and 45°, (iii) successive scalings by factors (2, 3) and (0.5, 1.5), and (iv) rotation about a pivot point (4, -3) by 60°. Also, briefly explain the importance of transformation order in each case. **(16)**

Q5 **Write Short notes on** **(4 x 4)**

- a) Principle of raster scan displays.
- b) Clipping and mention its purpose in graphics rendering.
- c) Bézier curves and control points.
- d) Homogeneous coordinates in geometric transformations.

Q6 Analyse the painter's algorithm for hidden surface removal. Given are three rectangular planes **(16)**

Plane	Coordinate(x,y)	Z-depth
A	(0,0) (4,0) (4,4) (0,4)	5
B	(1,1) (5,1) (5,5) (1,5)	3
C	(2,2) (6,2) (6,6) (2,6)	1

Use Painters' algorithm to draw final image.

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Course: M.Tech
Sub_Code: P2CTCC02

2nd Semester Regular/Back Examination: 2025-26

SUBJECT: Software Engineering

BRANCH(S): COMPUTER SCIENCE AND ENGG

Time: 3 Hours

Max Marks: 100

Q.Code: V634

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II, and any two from Part-III.

The figures in the right-hand margin indicate marks.

Part-I

Q1 Answer the following questions: (2 x 10)

- Define SDLC and explain its importance.
- Differentiate between Adhoc-based and Control-based design techniques.
- What is the 4P approach in software engineering?
- Explain LOC and COCOMO metrics.
- What is cohesion in software design?
- Define polymorphism with an example.
- What is Booch notation?
- Explain UML sequence diagram.
- What is CRC card?
- Define encapsulation testing.

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Compare waterfall and fountain models.
- Explain process metrics with examples.
- What are architectural design metrics?
- Differentiate between coupling and cohesion metrics.
- Explain inheritance testing with an example.
- What is Rumbaugh's Object Modeling Technique?
- Explain Jacobson's use case model.
- Draw a UML activity diagram for an ATM system.
- What is component-level design?
- Explain risk management in software projects.
- Discuss object-oriented modeling relationships (IsA, HasA, UsesA).
- Explain function point approach in requirement analysis.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** a) Compare SDLC with Unified Process using suitable examples. (8)
b) Prepare a process model for an e-commerce application highlighting phases and deliverables. (8)
- Q4** a) Perform requirement analysis for an ATM system using CRC cards and use case diagrams. (8)
b) Prepare a Software Requirement Specification (SRS) outline for the same. (8)
- Q5** a) Design UML diagrams (class, sequence, and deployment) for a hospital management system. (8)
b) Explain how cohesion and coupling metrics apply to your design. (8)
- Q6** a) Prepare a testing plan for an online banking system covering unit, integration, and system testing. (8)
b) Discuss object-oriented testing approaches (inheritance, polymorphism, encapsulation) with examples. (8)

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Course: M.Tech
Sub_Code: P2CTCC03

2nd Semester Regular/Back Examination: 2025-26
SUBJECT: DISTRIBUTED DATABASE SYSTEM
BRANCH(S): COMPUTER SCIENCE AND ENGG

Time: 3 Hours

Max Marks: 100

Q.Code: V542

Answer Q1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 Answer the following questions: (2 x 10)

- What is checkpoint based recovery in distributed database system?
- What is recoverable schedule? Why recoverability of schedules is desirable?
- What are the phantom deadlocks and their significance to distributed databases?
- What is site autonomy in distributed DBMS? Explain in brief.
- What are the objectives of allocation of fragments?
- What are the two phases of 2PC protocol?
- Define BCNF.
- Define distribution transparency. What are its three dimensions?
- Define A-phantom condition.
- Differentiate between equal join and natural join.

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Mention the features of Centralized and distributed database system.
- Explain database interoperability.
- Consider a failure that occurs during 2PC for a transaction. For each possible failure, explain how 2PC ensures transaction atomicity despite the failure.
- Explain layers of Query processing.
- Explain Levels of data and process distribution in distributed environment.
- What are various types of networks in context to distributed? Explain in brief.
- What is query processing in a relational database? Explain in detail with an example. How does it differ from distributed query processing?
- What are the major Distributed DBMS components? Explain each in detail with proper diagram.
- Explain various transaction states and properties in detail.

- j) Explain the following transparency in detail. (i) Network Transparency, (ii) Replication Transparency, and (iii) Fragmentation Transparency.
- k) How deadlock is possible in 2PL? Explain different deadlock detection and prevention techniques.
- l) What is query optimization? List components of query optimizer software and explain any one from that.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** a) Design a suitable algorithm to achieve synchronous checkpointing in a Distributed Database System environment. (8 x 2)
- b) Discuss in a distributed system, the process of generating a unique global timestamp. Also, Discuss the performance bottlenecks: lost update and dirty read anomaly.
- Q4** a) Mention some features of distributed Ingres and oracle. (8 x 2)
- b) What do you mean by inconsistencies? How to detect and perform resolution of inconsistencies?
- Q5** a) Define Check points and cold restarts. (8 x 2)
- b) With the help of suitable example, justify the following statement i) "Semi join can be used to reduce the cost of a join operation in a distributed environment", ii) "Join operation should be done after selection, projection, and union operations for distributed database systems".
- Q6** a) Explain the various advantages of Distributed Database Systems. Discuss the Transaction Model in Distributed Database Systems. State the termination conditions of a transaction. (8 x 2)
- b) Define Temporal database

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Course: M.Tech
Sub Code: P2CTCC07

2nd Semester Regular/Back Examination: 2025-26

SUBJECT: Data Ware Housing & Data Mining

BRANCH(S): COMPUTER SCIENCE AND ENGG

Time: 3 Hours

Max Marks: 100

Q.Code: V471

Answer Q1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1

Answer the following questions:

(2 x 10)

- Explain the process of KDD.
- Explain Evolution and deviation analysis.
- What is Data Purgin?
- Differentiate between Discovery verses Prediction.
- How Backpropagation Network Works?
- What Are Cubes?
- What is the use of Cleanup & transformation Tools?
- Write short notes on Algorithm Score card.
- Difference between Nearest Neighbor and Clustering.
- Explain how Clustering is used for out layer analysis.

Part-II

Q2

Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)

(6 x 8)

- List two advantages of feature reduction. How dimensionality reduction is achieved using Principal Component Analysis (PCA)?
- Why Fuzzy logic is an important area for Data Mining?
- Explain the Decision Tree Classifier.
- Define outlier. State at least two applications of outlier mining.
- Define Frequent sets, confidence, support, and association rule.
- Define the difference between Shared Memory Architecture and Shared Disk Architecture.
- Explain Server H/W Architecture RISC verses CISC.
- Explain how to map the Data Warehouse to Multi Processor Architecture.
- Define the difference, Business, & Data Warehouse.
- Explain with example, Parallel Processors, and Cluster Systems.
- What do you mean by Distributed Memory Architecture explain briefly.
- Write short notes on (i) Decision Tree (ii) Growing the Tree.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** Explain the ETL cycles' three-layer architecture and explain how ETL Process works in Data Warehouse, with example. (16)
- Q4** Discuss k -Means and k -Mediods algorithm. Illustrate the strength and weakness of k -Means in comparison with the k - Mediods algorithm. (16)
- Q5** How can we find frequent item sets using candidate generation? Discuss the Apriori algorithm with example. How can we further improve the efficiency of Apriori based mining? Justify your answer with respect to hash- based technique and vertical data format. There are 4 transactions in the database given below. Illustrate the Apriori algorithm to find the frequent item sets from the given database. Given the minimum support threshold is 50 %. (16)

Transaction ID	Items Bought
1	Shoes, Shirt, Jacket
2	Shoes,Jacket
3	Shoes, Jeans
4	Shirt, Sweatshirt

- Q6** The following table lists the advertising dollars spent (in thousands) and sales (in millions) for last year by a digital electronics company. If the company were to spend \$ 275,000 on advertising, what would you predict the sales level to be? (16)

Month	Sales	Advertising
January	100	5.5
February	110	5.8
March	112	6
April	115	5.9
May	117	6.2
June	116	6.3
July	118	6.5
August	120	6.6
September	121	6.4
October	120	6.5
November	117	6.7
December	123	6.8

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Course: M.Tech
Sub_Code: P2CTCC11

2nd Semester Regular Examination: 2025-26
SUBJECT: Mobile Computing
BRANCH(S): COMPUTER SCIENCE AND ENGG
Time: 3 Hours
Max Marks: 100
Q.Code: V410

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II, and any two from Part-III.

The figures in the right-hand margin indicate marks.

Part-I

Q1 Answer the following questions: (2 x 10)

- a) Differentiate between wired and wireless communication.
- b) Explain the importance of location management in mobile networks.
- c) Explain the challenges of TCP over wireless networks.
- d) Describe the role of medium access in wireless LANs.
- e) List any two characteristics of Mobile Ad Hoc Networks (MANET).
- f) Explain the purpose of Mobile IP routing.
- g) Explain the importance of energy efficiency in wireless devices.
- h) Explain the challenges caused by mobility in mobile applications.
- i) Explain the need for disconnected operations in mobile systems.
- j) Differentiate between mobile agents and static agents.

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- a) Analyze the performance of different wireless multiple access protocols such as FDMA, TDMA, and CDMA.
- b) Explain the working of cellular systems and location management.
- c) Evaluate the advantages and limitations of cellular systems in mobile communication.
- d) Evaluate the effectiveness of MANETs in dynamic communication environments.
- e) Design a secure wireless LAN architecture for a mobile computing environment.
- f) Compare WLANs and MANETs with suitable examples.
- g) Explain the importance of energy efficiency in mobile computing systems.
- h) Illustrate how mobility affects communication performance in mobile networks.
- i) Evaluate various methods for improving energy efficiency in wireless systems.
- j) Explain disconnected operations of mobile hosts in wireless environments.
- k) Explain the architecture and functions of mobile agents.
- l) Analyze the advantages and limitations of data broadcasting techniques.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** a) Explain the architecture of a cellular communication system with neat diagram. (8)
b) Analyze the problems associated with handoff and roaming in cellular networks. (8)
- Q4** a) Discuss the IEEE standards associated with Wireless LAN technologies. (8)
b) Evaluate the performance of Mobile IP routing in highly dynamic environments. (8)
- Q5** a) Discuss the factors affecting energy consumption in mobile computing devices. (8)
b) Evaluate different mobility models used in mobile computing research. (8)
- Q6** a) Explain different data dissemination techniques used in mobile environments. (8)
b) Analyze the performance issues associated with mobile agent systems. (8)