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**Question Paper Code: U1302**

M.E. DEGREE EXAMINATION, DEC 2025

First Semester

Computer Science and Engineering

21PCS102 – ADVANCED DATABASE TECHNOLOGY

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 20 = 100 Marks)

1. (a) Given a scenario where a large-scale database system needs to handle a high volume of read and write operations simultaneously, how would you design the I/O subsystem to maximize parallelism? Discuss the use of data partitioning, parallel disk access, and caching strategies in your design. CO2-App (20)

Or

- (b) You are developing a commit protocol for a distributed database that handles high-volume financial transactions. How would you design the commit protocol to minimize latency while ensuring data consistency and fault tolerance? Discuss the trade-offs involved in your approach. CO2-App (20)

2. (a) Evaluate the use of active databases in modern applications such as e-commerce, real-time analytics, and IoT systems. How do active rules enhance functionality in these domains, and what challenges do they present? Provide specific examples and solutions. CO4 Eva (20)

Or

- (b) Design an active database system for a healthcare application that requires automated monitoring and alerting based on patient data. Describe how you would use active rules to implement this system and discuss the potential pitfalls and how to avoid them. CO4-Eva (20)

3. (a) A software company wants to design an object database for a customer relationship management (CRM) system. How would you use object identity and encapsulation of operations to manage customer data efficiently? CO2-App (20)

Or

- (b) A financial institution wants to use XPath to generate a report summarizing all transactions that exceed a certain amount from an XML document. Write an XPath expression to achieve this and explain how XPath facilitates this type of query. CO1-U (20)
4. (a) Explain the challenges associated with location and handoff management in mobile databases. How do these challenges impact the performance and reliability of mobile applications? CO1 U (20)
- Or
- (b) Explain how location-dependent data distribution can enhance the performance of mobile databases. What are the key factors to consider when implementing location-based data distribution strategies? CO1 U (20)
5. (a) Design a cloud-based data storage solution for a company that needs to handle large volumes of user-generated content, such as images and videos. Describe how you would select and configure cloud storage services to optimize performance, scalability, and cost-efficiency. CO2 App (20)
- Or
- (b) Develop a plan for integrating cloud storage with an on-premises database system for a hybrid data architecture. Describe the process for data synchronization, how you will ensure data consistency, and the strategies you will use to manage data transfers. CO2 App (20)