| Reg. No. | | | | | | | | | | | | | | | |
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| Question Paper Code | 13532 |
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**B.E. / B.Tech. / M.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025**

Fourth Semester

**Computer Science and Engineering**

(Common to Artificial Intelligence and Data Science, Computer Science and Engineering (IoT), Computer Science and Engineering (Cyber Security), Information Technology, M.Tech. - Computer Science and Engineering & Computer and Communication Engineering)

**20CSPC402 - DATABASE MANAGEMENT SYSTEMS**

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

**PART - A (MCQ) (10 × 1 = 10 Marks)**

Answer ALL Questions

| | | Marks | K – Level | CO |
|---|---|---|---|---|
| 1. | What is the primary purpose of a database management system (DBMS)?<br>(a) Data redundancy (b) Data inconsistency<br>(c) Data integrity and security (d) Data isolation | 1 | K1 | CO1 |
| 2. | In the ER model, a relationship between two entities is called:<br>(a) Entity set (b) Attribute set (c) Relationship set (d) Primary set | 1 | K1 | CO1 |
| 3. | Dependency preservation in database normalization ensures which from the following:<br>(a) Functional dependencies are not lost during decomposition<br>(b) Data is encrypted<br>(c) Data is indexed<br>(d) Data redundancy is increased | 1 | K1 | CO2 |
| 4. | Which of them belong to Normal Form<br>(a) 1st NF (b) 2nd NF (c) 3rd NF (d) All of the mentioned | 1 | K1 | CO2 |
| 5. | Which of the following is NOT one of the ACID properties of a transaction?<br>(a) Atomicity (b) Consistency (c) Durability (d) Compatibility | 1 | K1 | CO3 |
| 6. | A deadlock occurs when<br>(a) Multiple transactions are allowed to run concurrently<br>(b) Two or more transactions are waiting for each other to release a lock<br>(c) Transactions execute serially without concurrency<br>(d) Transactions violate the consistency property | 1 | K1 | CO3 |
| 7. | In sequential file organization, the records are stored in sequential order based on_____<br>(a) primary key (b) search key of each record (c) foreign key (d) column name | 1 | K1 | CO4 |
| 8. | Which of the following RAID levels uses large stripes meaning that one can read records from any single drive and allows using of overlapped I/O for read operations?<br>(a) RAID 0 (b) RAID 2 (c) RAID 3 (d) RAID 4 | 1 | K1 | CO4 |
| 9. | In static or external hashing .....is a unit of storage containing one or more records.<br>(a) Bucket (b) Stack (c) List (d) Array | 1 | K1 | CO5 |
| 10. | _____ is an example of a complex data type.<br>(a) Name (b) Age (c) marital status (d) Address | 1 | K1 | CO6 |

**PART - B (12 × 2 = 24 Marks)**

Answer ALL Questions

| | | | | |
|---|---|---|---|---|
| 11. | Why is DBMS preferred over the File Processing System? | 2 | K1 | CO1 |
| 12. | List the types of data model. | 2 | K1 | CO1 |
| 13. | Define Functional Dependency. | 2 | K1 | CO2 |
| 14. | Why is the Fourth Normal Form more desirable than BCNF? | 2 | K1 | CO2 |
| 15. | What are the various isolation levels? | 2 | K1 | CO3 |
| 16. | Define starvation. | 2 | K1 | CO3 |

| | | | | | |
|---|---|---|---|---|---|
| 17. | Compare fixed length record and variable length records. | | 2 | K2 | CO4 |
| 18. | What is the need for concurrency? | | 2 | K1 | CO4 |
| 19. | Classify B Tree and B+ Tree Index. | | 2 | K2 | CO5 |
| 20. | Compare Static Hashing and Dynamic Hashing. | | 2 | K2 | CO5 |
| 21. | Summarize Objects and Literals. | | 2 | K2 | CO6 |
| 22. | List the features of OQL. | | 2 | K1 | CO6 |

**PART - C (6 × 11 = 66 Marks)**

Answer ALL Questions

| | | | | | |
|---|---|---|---|---|---|
| 23. | a) | Explain the basic architecture of a database management system with the help of a neat block diagram. | 11 | K2 | CO1 |
| | | **OR** | | | |
| | b) | Demonstrate an E-R diagram for the registrar's office of the following scenario. A university registrar's office maintains data about the following entities :<br>(1) courses, including number, title, credits, syllabus, and prerequisites;<br>(2) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;<br>(3) students, including student-id, name, and program; and<br>(4) Instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled. Document all assumptions that you make about the mapping constraints. | 11 | K2 | CO1 |
| 24. | a) | What is database normalization? Explain in detail about First and Second Normal forms with necessary examples. | 11 | K2 | CO2 |
| | | **OR** | | | |
| | b) | Summarize in detail about the following<br>(i) Non loss decomposition.<br>(ii) Lossy decomposition. | 5<br>6 | K2<br>K2 | CO2<br>CO2 |
| 25. | a) | Compare the types of serializability with an example. | 11 | K2 | CO3 |
| | | **OR** | | | |
| | b) | Explain deadlock avoidance in detail. | 11 | K2 | CO3 |
| 26. | a) | Classify the Concurrency Control techniques in detail. | 11 | K2 | CO4 |
| | | **OR** | | | |
| | b) | Illustrate the different levels of RAID systems in detail and highlight their configurations, advantages, and disadvantages. | 11 | K2 | CO4 |
| 27. | a) | Construct B+ Tree for the following set of key values (2,3,5,7,11,17,19,23,29,31) Assume that the tree is initially empty and values are added in ascending order. Construct B+ tree for the cases where the number of pointers that fit one node is four. After creation of B+ tree perform following series of operations :<br>(a) Insert 9. (b) Insert 10. (c) Insert 8. (d) Delete 23. (e) Delete 19. | 11 | K3 | CO5 |
| | | **OR** | | | |
| | b) | Develop the different hashing techniques in detail and explain how each method works. | 11 | K3 | CO5 |
| 28. | a) | Explain the architecture of distributed databases. What are the major components and how do they interact? | 11 | K2 | CO6 |
| | | **OR** | | | |
| | b) | Compare the hierarchical model of XML with the relational model. What are the benefits and limitations of using XML for data storage? | 11 | K2 | CO6 |