Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 50427

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Third/Fourth/Fifth/Eighth Semester

Computer Science and Engineering

CS 8492 – DATABASE MANAGEMENT SYSTEMS

(Common to: Computer and Communication Engineering / Mechanical and Automation Engineering / Mechatronics Engineering / Computer Science and Business Systems/ Information Technology)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a data model? Name the categories of data models.
2. Outline referential integrity with an example.
3. Consider a binary relationship set R between two entity sets A and B, name the mapping cardinalities.
4. Outline functional dependency with an example.
5. What are serializable schedules?
6. Name the four conditions for deadlock.
7. Outline the difference between dense index and sparse index.
8. What is a hash function?
9. Outline the difference between homogeneous and heterogeneous distributed database management systems.
10. Outline the motivations of replication in a distributed database environment

PART B — (5 × 13 = 65 marks)

11. (a) Outline equi join, left outer join, right outer join and full outer join with an example. (13)

Or

(b) Outline the aggregate functions in SQL with an example. (13)

12. (a) A university registrar's office maintains data about the following entities: (i) courses, including number, title, credits, syllabus, and prerequisites; (ii) course offerings, including course number, year, semester, section number, instructor, timings, and classroom; (iii) students, including student-id, name, and program; and (iv) 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. Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints. (13)

Or

(b) What is database normalization? Outline first normal form, second normal form and third normal form with an example. (13)

13. (a) (i) What is a transaction? Outline the states a transaction can be in during execution with a diagram. (6)

(ii) Outline the desirable properties of a transaction. (7)

Or

(b) (i) Outline the two phase locking protocol with an example. (7)

(ii) Outline the SQL statements used for transaction control with an example. (6)

14. (a) (i) Elaborate a B+ tree index with an example. (6)

(ii) What is bucket overflow? Outline the reasons for bucket overflow in hashing and outline how to overcome bucket overflow. (7)

Or

(b) What is query processing? Outline the steps in query processing with a diagram. (13)

15. (a) Outline the necessary characteristics a system must satisfy to be considered as an object oriented database. (13)

Or

(b) What are information-retrieval systems? Outline relevance ranking with an example. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Consider the following scenario for a school admission system for higher secondary classes:

A student is admitted to a group. A group can be Mathematics with Biology, Mathematics with Computer Science, Mathematics with Commerce, Mathematics with Commerce and Computer Science etc. Student can be admitted to a group under a quota. Quota can be General, Ex-service man, Sports, etc. The fees each student must pay depends on the group and quota

(i) Model an entity relationship diagram for the school admission system. Identify appropriate attributes and relationships. (7)

(ii) Map the entity relationship diagram to relations. (8)

Or

(b) Consider the following relations for a boat management application for a beach resort:

SAILOR (SID, NAME, DOB, GENDER, RATING)

BOAT (BID, BTYPE, BNAME, COLOR)

BTYPE can take two values (D, S)

D — Deluxe

S — Super Deluxe

SAILS (SID. BID, DOT, SHIFT)

DOT — Date of Trip

SHIFT can take two values — FN or AN

A sailor is assigned a boat on a day. A sailor is permitted to sail the boat for only one shift on a day. The primary keys of each relation is underlined.

Write SQL queries to perform the following:

(i) List the details of sailors who have rating more than average rating of all sailors. (4)

(ii) List the details of boats whose type is super deluxe and color is red. (3)

(iii) List the details of sailors who have been assigned afternoon shift on '24-DEC-2021'. (4)

(iv) List the details of sailors who have sailed more than fifty times. (4)

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