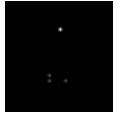
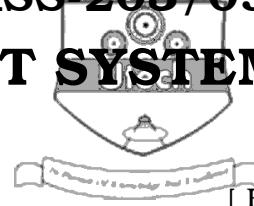


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CS/M.Tech (MSS)/SEM-2/MSS-203/09
DATABASE MANAGEMENT SYSTEM
SEMESTER - 2



[Full Marks : 70

Time : 2 Hours]

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer any *five* questions from the following.

5 × 14 = 70

1. Use an entity-relationship diagram to depict the following requirements for a restaurant :
 - * The restaurant employs a number of chefs. A record is kept of each chef's name, address, phone number and salary.
 - * Each chef can prepare a number of meals. The name of the meal and the price of the meal is recorded.
 - * Each meal consists of a number of ingredients. The name of the ingredient and the quantity required for the particular meal is recorded.
 - * These meals are ordered by customers. A record is kept of the customers name, address and phone number. A record is kept of the time and date the meal is ordered.

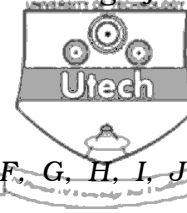
State any assumptions made in the design of E-R diagram.

Also convert it to its equivalent relational model and use the normalization technique to reduce the redundancy. 7 + 4 + 3

2. a) What benefit does rigorous two phase locking provide ? How does it compare with other forms of two phase locking ?
- b) Discuss about the deadlock prevention schemes and compare the performance also.
- c) Write a short note on "Dirty read" problem. 6 + 6 + 2
3. a) Describe validation based concurrency control protocol. Why is it called optimistic concurrency control ?



- b) Compare the performance of Hash join and the Sort-Merge join for joining two tables R and S. (6 + 2) + 6



4. a) Discuss the roll of checkpoints in recovery.
 b) Let the relation R have attributes A, B, C, D, E, F, G, H, I, J and suppose it satisfies the following FDs :

$ABD \rightarrow E$

$AB \rightarrow G$

$B \rightarrow F$

$C \rightarrow J$

$CJ \rightarrow I$

$G \rightarrow H$

Is this an irreducible set ? What are the candidate keys ?

- c) How does multilevel indexing improve the efficiency of searching an index file ? Which one is the most efficient index structure as per your opinion ? Justify your answer. 5 + 3 + 6

5. a) Consider the following relational schema :

Emp (eid, did, sal, hobby)

Dept (did, dname, floor, phone)

Finance (did, budget, sales, expenses)

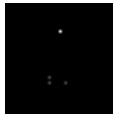
Draw a relational algebra tree for the following SQL query and transform the query tree into a more efficient form.

SELECT D. dname, F. budget

FROM Emp E, Dept D, Finance F

WHERE E.did = D. did AND D.did = F.did AND D.floor = 1 AND E.sal > = 59000 AND E.hobby = "Gardening"

- b) Consider a simple selection query of the form $\sigma_{R.attribute \text{ op } value} (R)$. What are the alternative access paths in each of these cases (i) There is no index and the file is not sorted (ii) There is no index but the file is sorted ?



- c) Why a hash structure is not a best choice for a search query on which range queries are likely ? 7 + 4 + 3
6. a) Distinguish between serial and serializable schedule through example.
- b) Why is cascadelessness of schedules desirable ? What is a recoverable schedule?
- c) Why do database systems support concurrent execution of transactions, in spite of the extra programming effort needed to ensure that concurrent execution does not cause any problems ? 4 + 6 + 4
7. Write short notes on any *two* of the following : 7 + 7
- a) Shortcoming of relational model
- b) Shadow paging
- c) Multi-valued dependency and 4 NF
- d) Problems of lock-based protocol.

END