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[[CO1)(Analyse/HOCQ)]

(b) Distinguish between instance and schema. Explain with suitable examples. [[CO1)(Understand/IOCQ)]

(c) Distinguish between procedural DML and non-procedural DML. [[CO1)(Remember/IOCQ)]

7 + 3 + 2 = 12

Group - C

4. Consider the relational database as given below:

Project (PId, PName, Project_Amount, Project_Location)

Department (DId, DName, DLocation)

Proj_Dept (PId, DId, Start_date, End_date)

The underlined attributes are the primary keys.

Write down the relational algebra expressions for the following queries:

(i) Show the project details having project_amount more than Rs. 250000

(ii) Show the project_location wise maximum project_amount

(iii) Find the PId, PName, DId, and DNamedetails where the project has started on or after 01-04-2023 and ended on or before 31-03-2024

(iv) Find the DId, DName of the departments which have worked on the projects having ids P11 or P25. [[CO2)(Analyse/IOCQ)]

(4 × 3) = 12

5. (a) Describe with example the different anomalies that may exist in a database without normalisation. [[CO4)(Understand/LOCQ)]

(b) Let R = (V, W, X, Y, Z) be a relational schema and let F be the set of FDs such that F = {Z→V, W→Y, XY→Z, V→WX}. Determine whether the following decompositions are lossy or lossless. Explain your answer properly.

(i) R1 = (V, W, X) and R2 = (V, Y, Z) (ii) R1 = (V, W, X) and R2 = (X, Y, Z)

[[CO4)(Analyse/IOCQ)]

6 + (3 × 2) = 12

Group - D

6. The tables in the database of a engineering college are as follows:

STUDENT(rollno, name, courseId, session);

COURSE(courseId, courseName, Dept_Id);

SUBJECT_PAPER(pcode, pname, courseId, semesterNo) ;

MARKS_OBTAINED(rollno, pcode, marks, year_of_exam);

DEPARTMENT(Dept_Id, Dname);

Faculty(empid, name, sal, Dept_id);

Subject-Taught(empid, pcode, session);

Write the SQL statement for the following queries using the given tables:

(i) Find the name of the topper(s) of CSE 1st Semester of 2005 session.

[Note: topper of a semester means one who obtained maximum aggregate marks considering all subjects of that semester]

- (ii) Find the faculties who have taught maximum number of subjects in odd Semester of 2017 session and display their name along with number of subjects taught.
- (iii) Display the name of the department that conducts course named “M.Tech in VLSI Design”.
- (iv) Display the lowest salary of each department along with department name, in the descending order of the department’s lowest salary. [[CO3](Analyse/HOCQ)]

(4 × 3) = 12

7. (a) What is a view in SQL? How is it different from a table? [[CO3](Analyse/IOCQ)]
 (b) Differentiate between correlated subquery and nested subquery. Explain with example. [[CO3](Analyse/IOCQ)]
 (c) What is a trigger? What are used of trigger? [[CO3](Understand/LOCQ)]
- (2 + 2) + (2 + 2) + (2 + 2) = 12**

Group - E

8. (a) What are the differences between sequential and indexed file organization? [[CO6](Remember/LOCQ)]
 (b) Write the difference between commit and rollback. [[CO6](Remember/HOCQ)]
 (c) Construct a B+ tree for the key values 1, 3, 5, 7, 9, 2, 4, 6. Order of each node is 4. Show each step. [[CO6](Apply/IOCQ)]
- 3 + 3 + 6 = 12**

9. (a) Consider the following schedule (events in order):
 T1: lock-X(A), W(A), unlock(A), lock-S(B), R(B), unlock(B), commit
 T2: lock-S(A), R(A), unlock(A), lock-X(B), W(B), unlock(B), commit
 Is this a valid (basic) 2PL schedule? [[CO5](Analyze/IOCQ)]
- (b) Given, block size = 4096 bytes, record length = 200 bytes (fixed). There are 10,000 records.
- (i) What is the blocking factor?
 - (ii) How many disk blocks are needed to store all records (no spanned records)? Index entry contains a key (10 bytes) + a pointer (6 bytes) = 16 bytes per index entry. Index block size = 4096 bytes.
 - (iii) To build a primary index with one index entry per data block, how many index blocks are needed?
 - (vi) To build a secondary (non-clustered) index with one entry per record, how many index blocks are needed?
 - (v) To build a clustering index over a field that has 500 distinct key values (one index entry per distinct key, each pointing to the block(s) for that key), how many index blocks are required? [[CO6](Understand/HOCQ)]

4 + (1 + 1 + 2 + 2 + 2) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	26.04	36.46	37.5