DATABASE MANAGEMENT SYSTEMS
(MCA1203)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) In relational algebra, the operation that combines tuples from two relations using condition based on common attributes is called
(a) Union (b) Intersection
(c) Projection (d) Join

(ii) Which type of constraint ensures that a value exists in parent/ base table before it can be referenced from another dependent table?
(a) Entity Integrity constraint (b) Participation constraint
(c) Referential Integrity constraint (d) Mapping cardinality constraint

(iii) Which SQL aggregate function will be most suitable for estimating the number of rows in a table?
(a) COUNT(*) (b) COUNT(column name)
(c) SUM(column name) (d) AVG(column name)

(iv) Which of the following is NOT a Data Definition Language (DDL) command?
(a) ALTER (b) CREATE
(c) INSERT (d) DROP

(v) Which of the following best defines a candidate key in a relational model?
(a) Any super key that can uniquely identify a tuple of strong entity
(b) A minimal super key that can uniquely identify a tuple of strong entity
(c) A discriminator key of a weak entity
(d) A foreign key attribute of strong entity.

(vi) Which of the following statements can be used to terminate a PL/SQL loop?
(a) GOTO (b) EXIT WHEN
(c) CONTINUE WHEN (d) KILL

(vii) Which of the following command is used to direct the PL/SQL output to a screen?
(a) dbms_output.line (b) dbms_output.put
(c) dbms_output.put_line (d) utl_file.put_line

(viii) In 2-phase locking protocol, which of the following locks are compatible?
(a) Read-lock(A) by T1 transaction and write-lock(A) by T2 transaction
(b) Write-lock(A) by T1 transaction and write-lock(A) by T2 transaction
(c) Write-lock(A) by T1 transaction and read-lock(A) by T2 transaction
(d) Read-lock(A) by T1 transaction and read-lock(A) by T2 transaction

(ix) Checkpoints are a part of
(a) Recovery measures (b) Security measures
(c) Concurrency measures (d) Authorization measures

(x) Which one is not a state of RDBMS transaction?
(a) Active (b) Passive
(c) Partially Committed (d) Committed.

Fill in the blanks with the correct word

(xi) The _____ property of database architecture allows for changes in the database schema without affecting the application using the database.

(xii) A _____ entity in an ER diagram is an entity that cannot exist without being associated with another entity.

(xiii) In SQL, the _____ command is used to remove all records from a table without deleting the table itself.

(xiv) _____ clause in SQL, is used to specify a search condition involving group or aggregate function value in a query.

(xv) In a table, a B+ tree index is created on _____ attribute of a table, which is frequently accessed in application query.

Group - B

2. (a) Illustrate with example that BCNF differ from 3NF. Explain 4NF with an example. *[(CO1)(Understand/LOCQ)]*

(b) Estimate the irreducible set of functional dependencies for the following set of functional dependencies $F = \{AB \rightarrow C, C \rightarrow AB, B \rightarrow C, ABC \rightarrow AC, A \rightarrow C, AC \rightarrow B\}$ *[(CO1)(Apply/IOCQ)]*

6 + 6 = 12

3. (a) Let a relation schema R(A,B,C,D,E) with FD set F= $\{A \rightarrow B, B \rightarrow C, C \rightarrow D, D \rightarrow A\}$ is divided into two relation schemas R1(A,B,C) and R2(C,D,E).Test whether it is dependency preserving? *[(CO1)(Evaluate/HOCQ)]*

(b) Let R(A,B,C,D,E,F,G,H) be a given relation schema and F be the set of functional dependencies on R where F ={$A \rightarrow BD, B \rightarrow C, E \rightarrow FG, AE \rightarrow H$}. Implement R into the form BCNF. *[(CO1)(Apply/IOCQ)]*

6 + 6 = 12

Group - C

4. 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. *[(CO2) (Analyse/IOCQ)]*

(2 + 4 + 3 + 3) = 12

5. (a) Illustrate Inner join and outer join with example. *[(CO2) (Remember/LOCQ)]*

(b) Given two tables:

(i) Airport to store information of airports such as AirportId, AirportName, Location.

(ii) Schedule to store the schedule flights running between two airports. Each schedule contains information such as Scheduleid, SourceAirport, DestAirport, FlyingDateTime.

Write create statements for the above two tables with appropriate referential integrity constraints.

Write a SQL query to display all the airports for which there is no flight scheduled. You have to show AirportId, AirportName, Location in the order of Location and AirportName. *[(CO2)(Analyse/IOCQ)]*

4 + 8 = 12

Group - D

6. (a) Write a PL/SQL code to find whether a number entered by the user is even or odd. If even then insert the number in a table named EVEN else insert it into table ODD. Both the tables has only one attribute, number. Repeat the process for all numbers in the range 3 to 100. *[(CO3) (Apply/IOCQ)]*

(b) Discuss with example the differences between procedure and function in PL/SQL. *[(CO3) (Remember/LOCQ)]*

(c) Create a package ***my_pack*** that will hold a function and procedure. Write the package specification and package body for the ***my_pack***. *[(CO3) (Apply/IOCQ)]*

4 + 4 + 4 = 12

7. (a) Write a trigger which will check the age of an employee while inserting the record in EMP (emp_no, emp_name, birth_date, street, city) table. If the age is less than 18 years then display an error message. *[(CO3,CO6)(Apply/IOCQ)]*

(b) Why GRANT/REVOKE is used? Explain with example. *[(CO3) (Analyze/IOCQ)]*

(c) Explain the raise keyword in PL-SQL. *[(CO3) (Remember/LOCQ)]*

6 + 4 + 2 = 12

Group - E

8. (a) Name the different types of file organization techniques. Illustrate the advantages and disadvantages of using Indexed sequential file organization over the Sequential file organization techniques. *[(CO4)(Analyse/IOCQ)]]*

(b) Consider the concurrent schedule S of three transactions T1,T2 and T3, where Ri(A), Ri(B) are read operations and Wi(A), Wi(B) are write operations of Transaction Ti on data items A and B accordingly: S = R1(A) R3(C) W1(A) R2(A) W3(C) W2(A) R1(B) R2(C) W1(B) W2(C).
Find out whether the above concurrent schedule S is serializable or not – Justify your answer. *[(CO4) (Analyse/IOCQ)]*

(2 + 4) + 6 = 12

9. (a) Every conflict serializable schedule is also a view serializable, but all view serializable schedules are not conflict serializable. justify this statement *[(CO4)(Evaluate/HOCQ)]]*

(b) Explain with examples, the Lost Update problem and Dirty Read problem *[(CO4)(Understand/LOCQ)*

6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	22.92	64.58	12.50