

Enrolment No: \_\_\_\_\_ Name of Student: \_\_\_\_\_

Department/ School: \_\_\_\_\_

**END TERM EXAMINATION ODD SEMESTER 2022-23**

**COURSE CODE: CSET201 MAX. DURATION 2 HRS**

**COURSE TITLE: Information Management System**

**COURSE CREDIT: 3-0-2 TOTAL MARKS: 30 Marks**

**GENERAL INSTRUCTIONS: -**

1. Do not write anything on the question paper except **name, enrolment number** and **department/school**.
2. Carrying mobile phone, smart watch and any other non-permissible materials in the examination hall is an act of UFM.

**COURSE INSTRUCTIONS:**

- a) Plan your time wisely. You will be graded not only on the correctness of your answer. But also, on clarity with which you express it.
- b) All questions are compulsory.
- c) Mention batch number on the top of Answer Sheet.
- d) For each question write down required steps and formula involved in doing calculation.
- e) Good luck...

## SECTION A

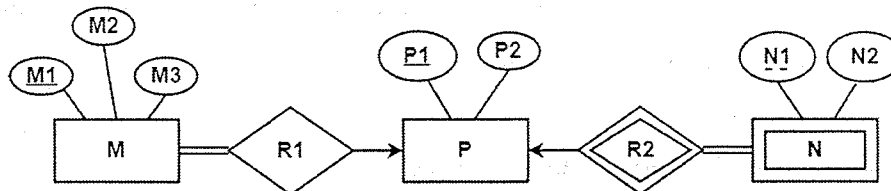
- 1) Consider the following tables T1 and T2:

| P | Q |
|---|---|
| 2 | 2 |
| 3 | 8 |
| 7 | 3 |
| 5 | 8 |
| 6 | 9 |
| 8 | 5 |
| 9 | 8 |

| R | S |
|---|---|
| 2 | 2 |
| 8 | 3 |
| 3 | 2 |
| 9 | 7 |
| 5 | 7 |
| 7 | 2 |

In table T1, P is the primary key, Q is the foreign key referencing R in table T2 with on-delete cascade and on-update cascade. In table T2, R is the primary key and S is the foreign key referencing P in the table T1 with on-delete set NULL and on-update cascade. In order to delete record (3,8) from table, numbers of additional record that need to be deleted from table T1 is \_\_\_\_\_. (1 marks)

- 2) Find the minimum number of tables required to represent the given ER diagram in relational model-



Also listed the relational schema of each table.?

(1 marks)

- 3) Draw a neat diagram only, for an example of partial, overlapping, and specialization based EER diagram? (1 marks)
- 4) For a relation R(ABCDEF) {ABC->C, ADE->DE, FCA->F} find the possible candidate keys? (1 marks)
- 5) Consider two relations R and S. If R has 10 tuples and S has 25 tuples, after performing left outer join what are maximum and minimum cardinalities of the resulting table? (1 marks)
- 6) Given the following relation instance.

| x | y | z |
|---|---|---|
| 1 | 4 | 2 |
| 1 | 5 | 3 |
| 1 | 6 | 3 |
| 3 | 2 | 2 |

Write all the possible following nontrivial functional dependencies are satisfied by the instance? (1 marks)

7) Consider the following relational database schema consisting of the four relation schemas:

passenger ( pid, pname, pgender, pcity)

agency ( aid, aname, acity)

flight ( fid, fdate, time, src, dest)

booking ( pid, aid, fid, fdate)

Write a relational algebra query:

Find only the flight numbers for passenger with pid 123 for flights to Chennai before 06/11/2020. (1 marks)

8) Illustrate briefly “When should we use a NOSQL database instead of a relational database”? (1 marks)

9) From the given table R:

| s_id | course  | hobby   |
|------|---------|---------|
| 1    | Science | Cricket |
| 1    | Maths   | Hockey  |
| 2    | C#      | Cricket |
| 2    | Php     | Hockey  |

Find whether Relation R is in 4 NF or not? (1 marks)

### SECTION B

1) Let  $R_i(z)$  and  $W_i(z)$  denote read and write operations on a data element  $z$  by a transaction  $T_i$ , respectively. Consider the schedule  $S$  with following transactions.

$S : R_4(x), R_2(x), R_3(x), R_1(y), W_1(y), W_2(x), W_3(y), R_4(x), R_5(w), W_6(m)$

From the given schedule find out its equivalent conflict serializable schedule using precedence graph? (2 marks)

- 2) Consider a simple checkpointing protocol and the following set of operations in the log.

(start, T4);  
 (write, T4, y, 2, 3);  
 (start, T1);  
 (commit, T4);  
 (write, T1, z, 5, 7);  
 (checkpoint);  
 (start, T2);  
 (write, T2, x, 1, 9);  
 (commit, T2);  
 (start, T3);  
 (write, T3, z, 7, 2);

If a crash happens now and the system tries to recover using both undo and redo operations, what are the contents of the undo list and the redo list ? (Note: solve this question using relevant diagram) (2 marks)

- 3) Briefly explain 2PL protocol, strict 2PL, rigorous 2PL, and conservative 2PL protocol with the help of example? (2 marks)
- 4) Briefly describe wound-wait and wait-die deadlock prevention scheme with a suitable example? (2 marks)
- 5) Consider the following schedules involving two Schedule S1 and S2.

S1: R1(X) R1(Y) R2(X) R2(Y) W2(Y) W1(X)

S2: R1(X) R2(X) R2(Y) W2(Y) R1(Y) W1(X)

Solve whether S1 and S2 are conflict serializable schedule or not using precedence graph?

(2 marks)

- 6) Let E1 and E2 be two entities in an E/R diagram with simple single-valued attributes. R1 and R2 are two relationships between E1 and E2, where R1 is one-to-many and R2 is many-to-many. R1 and R2 do not have any attributes of their own. Draw an ER diagram from the given statement? What is the minimum number of tables required to represent this situation in the relational model? (2 marks)

### SECTION C

- 1) Check whether the given schedule S is conflict serializable schedule and view serializable or not. If yes, then give the serial schedule.

**S: R1(A) , W2(A) , R3(A) , W1(A) , W3(A), R4(B), W4(B)**

Solve the questions using appropriate steps and explanation? **(3 marks)**

- 2) Consider a relation  $R = \{M, N, O, P, Q, R, S, T\}$  with the following set of dependencies:

$MN \twoheadrightarrow Q$

$M \twoheadrightarrow RQ$

$N \twoheadrightarrow R$

$R \twoheadrightarrow ST$

Next consider the following set of decompositions for the relation schema R:

$D1 = \{R1, R2, R3, R4\}$ :  $R1 = \{M, N, O, P\}$ ,  $R2 = \{M, P, Q\}$ ,  $R3 = \{N, R\}$ ,  $R4 = \{R, S, T\}$

$D2 = \{R1, R2, R3, R4\}$ :  $R1 = \{M, N, O\}$ ,  $R2 = \{P, Q\}$ ,  $R3 = \{N, R\}$ ,  $R4 = \{R, S, T\}$

Which of the above decomposition (s) has/ have lossless join property and why? Solve this question with suitable steps. **(3 marks)**

- 3) Decompose the relation R(ABCDEFGH) into BCNF, with suitable steps:

{Given FDs:  $AB \rightarrow C$   $B \rightarrow D$ ,  $D \rightarrow E$ ,  $ACG \rightarrow CG$ ,  $A \rightarrow F$ ,  $F \rightarrow G$ ,  $ADE \rightarrow DE$ ,  $AF \rightarrow F$ ,  $ADG \rightarrow D$ }

**(3 marks)**

😊😊😊 ALL THE BEST 😊😊😊