*Name* : .....

*Roll No.* : .....

*Invigilator's Signature* : .....

**CS/MCA/SEM-4/MCA-403/2011**

**2011**

# DATABASE MANAGEMENT SYSTEM-II

*Time Allotted* : 3 Hours *Full Marks* : 70

*The figures in the margin indicate full marks.*

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

## GROUP – A

## ( Multiple Choice Type Questions )

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

   i) Transaction T1 reading the updates made by T2 (which have not yet committed) is

      a) Dirty read

      b) Non-replaceable read

      c) Phantom phenomena

      d) none of these.

   ii) Cautious waiting refers to

      a) Deadlock Prevention b) Deadlock Detection

      c) Deadlock Avoidance d) none of these.

iii) An MVD $x \varnothing \varnothing y$ is trivial if and only if

a) $x$ is a superkey

b) $x$ is a superset of $y$ or $xy$ constitute the entire table header

c) $x$ is a primary key

d) none of these.

iv) A schedule is serializable if

a) produces same result as all possible serial schedule of participating transactions

b) produces same result as a serial schedule of participating transactions

c) produces same result as a concurrent schedule of participating transactions

d) it is same as a serial schedule of participating transactions.

v) ALTER keyword refers to alteration of

a) attributes value

b) schema

c) datadictionary

d) all of these.

vi) Rollback of a transaction

a) Updates the transaction

b) Repeats a transaction

c) Restores previous values

d) none of these.

vii) Media recovery refers to recover

a) after a system crash

b) after network failure

c) after database is physically damaged

d) after a transaction failure.

viii) All instructions of a transaction execute consecutively in

a) serial schedule

b) serializable schedule

c) recoverable schedule

d) cascadeless schedule.

ix) A relation in BCNF always guarantees

a) lossless join

b) dependency preservation

c) both (a) and (b)

d) none of these.

x) Wait-for graph may be used to

a) Detect deadlock

b) Prevent deadlock

c) Conflict serializability

d) View serializability.

## GROUP – B

### ( Short Answer Type Questions )

Answer any *three* of the following. $3 \infty 5 = 15$

2. a) Compare Database Triggers with database constraints.

b) Discuss the differences between procedures & Database Triggers. $2\frac{1}{2} + 2\frac{1}{2}$

3. Define Horizontal Fragmentation, Vertical Fragmentation, Derived Horizontal Fragmentation & Mixed Fragmentation.

4. a) Explain the term 'MVD' and the conditions for it to be trivial.

b) Decompose the relation { ENAME, PNAME, DNAME } into 4NF, given

ENAME ∅ ∅ PNAME

ENAME ∅ ∅ DNAME

And { ENAME, PNAME, DNAME } constitutes the primary key. $2\frac{1}{2} + 2\frac{1}{2}$

5. Explain the term 'Stable Storage'. State the various types of failures.

6. Differentiate between deadlock and starvation. Explain "Wait-Die" and "Wound-wait" with respect to deadlock prevention.

## GROUP – C

### ( Long Answer Type Questions )

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Explain two-phase locking with suitable example. 5

   b) Explain the utility of Precedence Graph. Draw the Precedence Graph for the following schedule $S$ :

   2 + 5 + 2

| | $T_A$ | $T_B$ | $T_C$ |
|---|---|---|---|
| | | Read(Z) | |
| | | Read(Y) | |
| | | Write(Y) | |
| | | | Read(Y) |
| | | | Read(Z) |
| ↓ Time | Read(X) | | |
| | Write(X) | | |
| | | | Write(Y) |
| | | | Write(Z) |
| | | Read(X) | |
| | Read(Y) | | |
| | Write(Y) | | |
| | | Write(X) | |

   Explain the steps and justify whether $S$ is serializable.

   c) Define 'Srializable Schedule'. 1

8. a) Explain 'S1 is the cover of S2' where S1 & S2 are 2 sets of FDs. State the conditions for S1 to be called equivalent to S2. 2 + 2

   b) Given a relvar $R$ with attributes $A$, $B$, $C$, $D$ and set of FDs :

   $$A \varnothing BC, B \varnothing C, A \varnothing B, AB \varnothing C, AC \varnothing D$$

   Find whether the given set of FDs are irreducible. Justify your answer and show the steps. 6

   c) In which case the 2 projections R1 & R2 of relation $R$ can be termed independent ? Explain 'Dependency Preservation' and the various considerations in implementation of the same. $2\frac{1}{2} + 2\frac{1}{2}$

9. a) Explain the various concurrency problems. Explain the term 'Log-Based-Recovery'. 4 + 4

   b) Classify the various types of protocols to implement concurrency control. Compare with respect to advantages and disadvantages. 5 + 2

10. a) Justify whether schedules under tree protocol implies compliance with two-phase locking protocol & vice versa. Give examples. 3 + 5

    b) Discuss the discriminating characteristic of Distributed Databases with respect to a set of the local databases. 7

11. a) Discuss the benefits of rigorous two-phase locking. Compare it with the other forms of two-phase locking. 2 + 3

b) Discuss the advantages of Timestamp Ordering protocol over 2PL protocol. 4

c) Describe the following terms : 3 × 2

i) Intention Shared & Intention Exclusive Locks

ii) Lock Granularity

iii) Foreign Key.