

7. (a) Discuss following lock modes:  
 (i) ROW EXCLUSIVE  
 (ii) SHARE ROW EXCLUSIVE  
 (iii) EXCLUSIVE  
 (iv) NOWAIT.
- (b) Write down the PL/SQL code to grant insert privilege to a specific user.
- (c) Define different type of Lock Levels. In which situations are they implemented?
- (d) Discuss with example the differences between procedure and function in PL/SQL.

$$4 + 1 + (2 + 2) + 3 = 12$$

### Group - E

8. (a) Explain the concept of generalization and specialization in OODBMS.  
 (b) Differentiate between early binding and late binding.  
 (c) What is Bi-temporal relation? Explain with example.
9. (a) Illustrate the features of object oriented database. What are the advantages and disadvantages of using object oriented database management system?  
 (b) Why do we need temporal database?  
 (c) Explain with example, the valid time and transaction time in temporal database.

$$4 + 4 + 4 = 12$$

$$(2 + 3) + 3 + 4 = 12$$

## DATABASE MANAGEMENT SYSTEM II (MCAP 2103)

Time Allotted : 3 hrs

Full Marks : 70

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.*

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

### Group - A (Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) A lock that allows concurrent transactions to access different rows of the same table is known as a  
 (a) Database-level lock (b) Table-level lock  
 (c) Page-level lock (d) Row-level lock.
- (ii) Shadow Paging is used for  
 (a) writing same item at same location  
 (b) writing same item at different location  
 (c) creating shadows  
 (d) writing different item at same location.
- (iii) \_\_\_\_\_ states that only valid data will be written to the database.  
 (a) Atomicity (b) Consistency  
 (c) Isolation (d) Durability
- (iv) If a node is locked in \_\_\_\_\_ the subtree rooted by that node is locked explicitly in shared mode, and that explicit locking is being done at a lower level with exclusive-mode locks.  
 (a) Intention lock modes  
 (b) Shared and Intention-Exclusive (SIX) mode  
 (c) Intention-Exclusive (IX) mode  
 (d) Intention-Shared (IS) mode
- (v) Which of the following protocols ensures conflict serializability and safety from deadlocks?  
 (a) Two-phase locking protocol  
 (b) Time-stamp ordering protocol  
 (c) Graph based protocol  
 (d) Validation based protocol.

- (vi) \_\_\_\_\_ denotes the largest timestamp of any transaction that executed write (Q) successfully.
  - (a) W-timestamp (Q)
  - (b) R-timestamp (Q)
  - (c) RW-timestamp (Q)
  - (d) WR-timestamp (Q)
- (vii) This validation scheme is called the \_\_\_\_\_ scheme since transactions execute optimistically, assuming they will be able to finish execution and validate at the end.
  - (a) Validation protocol
  - (b) Validation-based protocol
  - (c) Optimistic concurrency-control
  - (d) Timestamp protocol
- (viii) Local Autonomy means
  - (a) Local query will be processed locally
  - (b) Local data will be accessed by local site only
  - (c) Local DBA is sole authority of local data
  - (d) Each site is a DBMS in its own right.
- (ix) A checkpoint where transactions are allowed to perform updates even while buffer blocks are being written out is called as a
  - (a) Buffer
  - (b) Fuzzy checkpoint
  - (c) Shadow paging
  - (d) UNDO and REDO.
- (x) Which of the following is not in the correctness rules of fragmentation?
  - (a) Disjointness
  - (b) Reconstruction
  - (c) Completeness
  - (d) Codes Rule.

**Group - B**

- 2. (a) Define the project-join normal form (5NF).
  - (b) Check whether the schedules  $S_1$  and  $S_2$  are conflict equivalent or not?
    - $S_1 = r_1(X), r_1(Y), r_2(X), r_2(Y), w_2(Y), w_1(X)$
    - $S_2 = r_1(X), r_2(X), r_2(Y), w_2(Y), r_1(Y), w_1(X)$
  - (c) Define blind write?
  - (d) Check whether the following schedule  $S$  is view serializable or not?
    - $S = r_2(A), r_1(A), w_1(C), r_3(C), w_1(B), r_4(B), w_3(A), r_4(C), w_2(D), r_2(B), w_4(A), w_4(B).$
- 2 + 4 + 1 + 5 = 12**
- 3. (a) Consider the following sequence of actions S.
    - $S: r_1(A), r_2(A), r_3(B), w_1(A), r_2(C), r_2(B), w_2(B), w_1(C)$
    - Write down the complete schedule satisfying the 2PL protocol.
  - (b) What is lock table? Briefly explain the components of lock table?

- (c) Write down pseudocode for exclusive lock operation and explain it with suitable example.

**4 + (1 + 3) + 4 = 12**

**Group - C**

- 4. (a) How are buffering and caching techniques used by the recovery subsystem?
  - (b) Discuss the UNDO and REDO operations and the recovery techniques that use each.
  - (c) Describe the shadow paging recovery technique. Under what circumstances does it not require a log?
- (2 + 2) + (2 + 2) + (3 + 1) = 12**
- 5. (a) Consider two transactions T1 and T2 as follows:

T1	T2
Read (A, a);	Read (C, c);
$a = a - 100;$	$c = c - 200;$
Write (A, a);	Write (C, c);
Read (B, b);	
$b = b + 100;$	
Write (B, b);	

T1 and T2 are executed serially i.e.,  $T1 \rightarrow T2$ . The values of A, B and C before the execution as 1000, 2000 and 3000 respectively. If immediate database modification technique used then what will be the contents of log and Database? What happens if a crash occurs:

- (i) Just after write (B, b)
  - (ii) Just after write (C, c)
  - (iii) Just after < T2, Commit >.
- (b) Explain the important components of system global area (SGA) in RDBMS.
- 6 + 6 = 12**

**Group - D**

- 6. (a) An HRD manager has decided to raise the salary of employees working in department number 20 by 20%. Write a PL/SQL block to update the same using implicit cursors.
- (b) Define pragma? When it is used? Explain it with proper example.
- (c) What is the utility of WITH GRANT OPTION?

**5 + (2 + 1 + 2) + 2 = 12**