

M.C.A. SECOND YEAR SECOND SEMESTER - 2018

DATABASE MANAGEMENT SYSTEMS

Time : Three hours

Full Marks : 100

*Answer Question No.1, 7 and any **THREE** from the rest*

1.
 - (a) What is Starvation? How starvation can be avoided?
 - (b) When does a transaction enter the "Partially committed" state ? Is it possible for a partially committed transaction to be aborted? Yes or No? give reason.
 - (c) What is Null value ? Explain with example uses and abuses of such constraint.
 - (d) Consider the following two sets of functional dependencies
 $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$ and $G = \{A \rightarrow CD, E \rightarrow AH\}$.
 Check whether or not they are equivalent. 4X5=20
2.
 - (a) What is Data Independence ? Show types of Data Independence with example.
 - (b) What are the activities of the Database Administrator?
 - (c) Consider the following system and answer the questions:

A database is being constructed to keep track of the teams and games of IPL T20. A team has a number of players, not all of whom participate in each game. It is desired to keep track of the players participating in each game for each team, the positions they played in that game, and the result of the game. The Performance attribute of participate is used to store information on the individual performance of each player in a game. Each game in the schedule is identified by a unique Game#, and a game is also identified uniquely by the combination of Date, starting Time, and Field where it is played.

- (i) Identify the entity sets present in the above environment along with their attribute sets and primary keys.
- (ii) Design a logical conceptual schema for this application, stating any assumptions you make. 4+4+12

[Turn over

3. (a) What is deadlock ? How and when deadlock is arise? Write mechanisms (techniques) to prevent various kind of deadlock situation?
 (b) Problems in Recovery process ? What is checkpointing ? Advantages and disadvantages of checkpointing in recovery process?[(2+3+5)+(2+3+5)]
4. (a) Show how you may specify the following relational algebra operations in both tuple and domain relational calculus.
- (i) PROJECT $\langle A, B \rangle$ (R(A, B, C)):
 (ii) R(A, B, C) UNION S(A, B, C):
 (iii) R(A, B, C) INTERSECT S(A, B, C):
- (b) What is functional dependency? Prove or disproof of the following inference rules for functional dependencies.
- (i) $\{X \rightarrow Z, Y \rightarrow Z\} \models \{X \rightarrow Y\}$
 (ii) $\{X \rightarrow Y, XY \rightarrow Z\} \models \{X \rightarrow Z\}$
 (iii) $\{XY \rightarrow Z, Y \rightarrow W\} \models \{XW \rightarrow Z\}$ [6+2+12]
5. (a) Consider the following relations:
- STUDENT (SSN, Name, Major, Bdate)
 COURSE (Course#, Quarter, Grade)
 ENROLL (SSN, Course#, Quarter, Grade)
 BOOK_ADOPTION(Course#, Quarter, Book_ISBN)
 TEXT (Book_ISBN, Book_Title, Publisher, Author)
- (i) Specify the primary key(s) and foreign key(s) for this schema, stating any assumptions you make.
 (ii) Write the SQL statements required to create the relations, including the appropriate version of all primary key and foreign key integrity constraints.
 (iii) What normal form is the relation in? Explain your answer.
 (iv) Apply normalization until you cannot decompose the relations further. State the reasons behind each decomposition. [3+5+2+10]
6. (a) What is a transaction? What is ACID property of Transaction?
 Describe the ACID properties? Explain example
 (b) How a lock manager implement the locking? What is lock table and how the table is maintained the overflow? [(2+2+4+2)+(4+6)]

7. Answer any four : [5x4]
- (a) View Serializable vs. Conflict Serializabable
 - (b) Hashing file organization vs. Clustering
 - (c) Dense index vs. Sparse index
 - (d) 3NF vs. BCNF
 - (e) Static Hashing vs. Dynamic Hashing
 - (f) Set Operations in SQL vs. Nested queries in SQL