

**GUJARAT TECHNOLOGICAL UNIVERSITY****MCA - SEMESTER-II • EXAMINATION – WINTER 2013****Subject Code: 2620003****Date: 27-12-2013****Subject Name: Database Management System (DBMS)****Time: 10:30 am to 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Attempt the following questions in brief. **07**
- i. What is the goal of Database System?
  - ii. Discuss three levels of data abstraction.
  - iv. What is authorization? List its types.
  - v. Define data model and list various data models.
  - vi. What is Referential Integrity? Give example.
  - vii. Discuss any two purposes of using database systems.

- (b) Match the following** **07**

G	Specialization	1	Collection of information stored in the database at a particular moment
H	Aggregation function	2	First Normal form
I	Entity integrity	3	Doubly outlined box
J	Weak Entity set	4	SUM
K	Atomic Entity	5	Inheritance
L	Weak relationship	6	Allocation of conceptual tools for describing data, data relationships, semantics etc
M	Instance	7	Overall design of the database
N	Data Models	8	Data about data
O	Metadata	9	Diamond shaped box
P	Schema	10	Primary Key Values
Q	Relational Algebra	11	Function of database system
R	BCNF	12	Every determinant should be a candidate key
S	Database Security	13	Dr. Codd rules
T	Non Subversion	14	Procedure Language

- Q.2 (a)** Explain the following constraints for database design with examples. **07**
1. Participation constraints
  2. Generalization/Specialization constraints

- (b) i. Draw ERD for the following case and convert into tables. **04+03**

A farming company has fields to plow, tractors to do the plowing, and farmers to ride the tractors. Fields have names, total area covered. Tractors have serial numbers and name and farmers have names and the number of years that they've worked the farm. The date that a field was plowed, and by whom, and with what tractor, is kept by farming company.

ii. Discuss types of attributes with example.

**OR**

- (b) i. Draw ERD for the following Case study. **04+03**

An engineering company has several projects in progress, identified by a name and having a start date. Each occupies the full attention of several engineers, each having a name, rank and start date with the firm. Moreover, each engineer is working on at least one project, and each project has at least one engineer. Each engineer has a crew of assistants (also having a name and rank, along with a primary skill) who report only to that engineer.. Each assistant has exclusive ownership of a collection of instruments, each identified by a part number.

ii. Discuss types of relationships with example.

- Q.3** (a) Consider the table storing details of education institute. **04+03**

Note that the primary key is the composite of all its fields.

Department	Subject	Branch
CS	Java	MCA
CS	OS	MCA
Civil	C Programming	Engineering
Civil	CS	Engineering
E&C	C Programming	Engineering

i. Which functional dependency is correct? Justify your answer.

- Department  $\rightarrow$  Subject
- Subject  $\rightarrow$  Branch
- Department  $\rightarrow$  Branch
- Branch  $\rightarrow$  Department
- Subject  $\rightarrow$  Department

ii . Why the table is not in 4NF ? Justify your answer.

- (b) Explain 2NF and 3NF concept with examples. **07**

**OR**

- Q.3** (a) Explain the concept of Functional Dependency and Multi Valued Dependency. (Definition, Examples, Armstrong rules). **07**

- (b) i. Given  $R=\{A,B,C\}$  **04+03**  
FD given as  $A \rightarrow B$  and  $B \rightarrow C$  and

Decomposition of R into R1(A,B) and R2(B,C)

1. List out candidate keys using armstrong rules.
2. Is Decomposition lossy or lossless decomposition? Justify.
3. Find the closure of Z={ A,B }.
4. Find highest normal form ( 1NF/2NF/3NF)

ii. Discuss BCNF concept with example.

**Q.4 (a)** Answer the following questions **07**

- i. Discuss volatile, nonvolatile and stable storage with example.
- ii. Discuss atomicity and isolation property of transaction.

**(b)** Write Relational Algebra for the given queries using mentioned table. **07**

EMPLOYEE(emp\_id, emp\_name, skills, gender, date\_birth)  
PROJECT(proj\_id, project\_name, status)  
PROJ\_ASSIGNED (emp\_id, proj\_id, starting\_date,  
number\_of\_days)

Note: Project status can be incomplete, completed or cancel.

- i. List employee names who works for project 'Inventory'.
- ii. Delete the project whose status is 'cancel'.
- iii. Count total number of projects.
- iv. List all female employees.
- v. List project name whose status is completed.
- vi. List employee name who are not assigned to any project.
- vii. List project id whose starting date is current date.

**OR**

**Q.4 (a)** Discuss Deadlock prevention techniques- Wait-die and Wound-wait schema. **07**

**Q.4 (b)** Discuss Rename operator and aggregation functions in terms of Relational Algebra concept with examples. **07**

**Q.5 (a)** Discuss Timestamp based protocol giving example. **07**

**(b)** What is schedule? Give examples of serial and concurrent schedule. Discuss serializability concept in brief. **07**

**OR**

**Q.5 (a)** What is lock? Discuss two phase locking protocol with example. **07**

**(b)** Why do we need checkpoint? What it performs? How redo and undo operations works in Checkpoint? Explain giving example. **07**

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