Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**MCA – SEMESTER-II– • EXAMINATION – WINTER - 2016**

**Subject Code: 2620003** **Date: 07/01/ 2017**

**Subject Name: Database Management System**

**Time: 02:30 am - 05:00 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)** Define the following terms: **14**

1) Physical data independence
2) Domain
3) Super key
4) Candidate key
5) Alternate key
6) Transaction log
7) Checkpoint
8) Multi-valued attribute
9) Functional dependency
10) Weak entity set
11) Closure set of functional dependency
12) Degree of relationship
13) Relational algebra
14) Canonical cover

**Q.2** **(a)** Draw an ER diagram that captures following information and map it to relational model: **07**

A company database needs to store information about employees (identified by eno, with salary and phone as attributes), departments (identified by dno, with dname and budget as attributes), and children of employees (with name and age as attributes). Employees work in departments; each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known. We are not
interested in information about a child once the parent leaves the company.

**(b)** Explain various levels of data abstraction for DBMS. **07**

**OR**

**(b)** Explain the components and data structures of storage manager module. **07**

**Q.3** **(a)** Why are the Extended E-R features needed? Summarize the EER features. **07**

**(b)** Explain the basic set-theoretic operations of relational algebra with notation and example. **07**

**OR**

**Q.3** **(a)** Write Armstrong's axioms and derive additional union and pseudo-transitivity rule from it. **07**

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|---|---|---|---|
| | **(b)** | **(1)** Consider the following database schema:<br>CUSTOMER (CNO, CNAME, GENDER, CITY, PHONE)<br>ITEM (INO, INAME, COLOR, WEIGHT, PRICE)<br>ORDER (OID, CNO, INO, ODATE, QTY)<br>Give relational algebra expressions for each of the following query.<br>1) Display the customer name & phone whose city is "Surat".<br>2) Display iname and price of all items whose color is 'green' and weight is more than 10.<br>3) Display oid, odate, cname, iname of all orders.<br>4) Find all item numbers ordered by customer 'Jeet'. | **04** |
| | | **(2)** The shadow-copy recovery technique is efficient for large database. State True or False. Justify your answer. | **03** |
| **Q.4** | **(a)** | Discuss anomalies for bad database design giving proper example. | **07** |
| | **(b)** | What are the types of failures than can take place to the database? Explain. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Define normalization. Explain 3NF with proper example. | **07** |
| **Q.4** | **(b)** | Discuss the advantages and problems of concurrent execution of transactions. | **07** |
| **Q.5** | **(a)** | Compare immediate and deferred modification approach of log based recovery schemes. | **07** |
| | **(b)** | Explain two-phase locking protocol. List its advantages over simple lock base protocol. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | What is difference between serial schedule and serializable schedule? Explain conflict serializability. | **07** |
| | **(b)** | Explain the concept of transaction and discuss the typical states of transaction by giving an example. | **07** |

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