

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

# GUJARAT TECHNOLOGICAL UNIVERSITY

MCA. Sem-I Remedial Examination April 2010

Subject code: 610005

Subject Name: Database Management System-I

Date: 08 / 04 / 2010

Time: 12.00 noon – 02.30 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** Define following terms: **14**

- a) Primary Key, Unique Key
- b) Entity Sets
- c) Data Dictionary
- d) Lossless decomposition
- e) Canonical cover
- f) Dependency Perseverance
- g) Closure set of FD
- h) Degree of relationship
- i) Cardinality of relationship
- j) DDL and DML with at least two examples
- k) Weak entity and strong entity
- l) View
- m) Discriminator attribute
- n) Enhanced ER

**Q.2 (a)** Design a database to keep track of the teams and the games played of your favorite sport (like football, baseball, cricket etc.). A team has a number of players, not all of whom participate in each game. We need 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 and score/performance of each player in each played game. Design ER schema diagram for this database application, stating any assumptions you make. **07**

**(b)** Compare functional dependency and multi-valued dependency. Give suitable examples. **04**

**OR**

**(b)** What are Armstrong Rules? Where / how are they used? Give suitable examples. **04**

**(c)** Define following terms: **03**

- 1) Overlapping constraints
- 2) Outer joins (Left and Right)
- 3) Redundancy

**OR**

**(c)** Define following terms: **03**

- 1) Canonical data model
- 2) Lossless join
- 3) Name minimum three DBMS available in the market.

**Q.3** Design UNIVERSITY database that is used to keep track of students' transcripts with following considerations. **14**

- a) The university keeps track of each student's name, student number, social security number, current address and phone, permanent address and phone, birth date, sex, class (freshman, sophomore, ... graduate), major department, minor department (if any), and degree programs(B.A., B.S., ... Ph.D.). Some user applications need to refer to the city, state and zip code of student's permanent address and to the student's last name. Both social security number and student number have unique values for each student.
- b) Each department is described by a name, department code, office number, office phone, and college. Both name and code have unique values for each department.
- c) Each course has a course name, description, course number, number of semester hours, level and offering department. The value of the course number is unique for each course.
- d) Each section has an instructor, semester, year, course, and section number. The section number distinguishes sections of the same course that are taught during the same semester/year; its values are 1,2,3,...up to the number of sections taught during each semester.
- e) A grade report has a student, section, letter grade, and numeric grade (0,1,2,3,4 or 5)

Design an ER schema for this application, and draw an ER diagram for the schema. Specify key attributes of each entity type and structural constraints on each relationship type. Note any unspecified requirements, and make appropriate assumptions to make the specification complete.

**OR**

**Q.3** The Olympic facilities are divided into sports complexes. Sports complexes are divided into one-sport and multi-sport types. Multi-sport complexes have areas of the complex designated for each sport with a location indicator (e.g. center, NE corner, and so on). A complex has a location, chief organizing individual, total occupied area and so on. Each complex holds series of events (e.g. the track stadium may hold many different races). For each event there is a planned date, duration, number of participants, number of officials, and so on. A roster of all officials will be maintained together with the list of events each official will be involved in. Different equipment is needed for the events (e.g. goal posts, poles, parallel bars) as well as for maintenance. Two types of facilities (one-sport and multi-sport) will have different types of information. For each type, the number of facilities needed is kept, together with an approximate budget. **14**

Draw an Enhanced ER diagram that shows the entity types, attributes, relationships, and specializations for this application. State any assumptions you make.

- Q.4 (a)** What is normalization? Explain with suitable examples 1NF, 2NF, 3NF, BCNF **07**
- (b)** Write responsibilities of Database Administrator (DBA) **04**
- (c)** Explain 2-tier and 3-tier architecture. **03**

**OR**

- Q.4 (a)** What is DBMS? Explain minimum seven features or advantages of DBMS with suitable example. **07**
- (b)** Explain minimum two database anomalies with suitable example and also how to avoid such anomalies? **04**

- (c) What are main steps in database design? When does ER-model come into picture? **03**
- Q.5** (a) Design a generalization-specialization hierarchy for motor vehicle sales company. The company sells motorcycles, passenger cars, vans, and buses. Justify your placement of attributes at each level of the hierarchy. Explain why they should not be placed at a higher or lower level. **06**
- (b) What is the difference between logical data independence and physical data independence? Which one is harder to achieve? Why? **04**
- (c) Can an identifying relationship of a weak entity type be of a degree greater than two? Give examples to illustrate your answer. **04**
- OR**
- Q.5** (a) Explain what is meant by “repetition of information” and “inability to represent information”. Explain why each of these properties may indicate a bad relational database design. **06**
- (b) List minimum four significant differences between DBMS and file processing system. **04**
- (c) What is data abstraction? Explain different levels with suitable examples. **04**

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