Code: AC61/AT61   **Subject: DATABASE MANAGEMENT SYSTEMS**

AMIETE – CS/IT

Time: 3 Hours   **DECEMBER 2013**   Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.
- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1   **Choose the correct or the best alternative in the following:**   (2×10)

a. The database design that consists of multiple tables that are linked together through matching data stored in each table is called a:

   (A) Hierarchical database   **(B)** Network database
   (C) Object oriented database   **(D)** Relational database

b. The rule that a value of a foreign key must appear as a value of some specific table is called a

   (A) Referential constraint   **(B)** Index
   (C) Integrity constraint   **(D)** Functional dependency

c. Which of the following items is not the advantage of a DBMS?

   (A) Improved ability to enforce standards
   (B) Improved data consistency
   (C) Local control over the data
   (D) Minimal data redundancy

d. According to the levels of abstraction, the schema at the intermediate level is called

   (A) Logical schema   **(B)** Physical schema
   (C) Conceptual schema   **(D)** None of these

e. What is the most appropriate special association that indicates that multiple textbooks make up a course required reading list?

   (A) aggregation association   **(B)** generalization association
   (C) n-ary association   **(D)** reflexive association

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f. The operation which is not considered a basic operation of relational algebra

(A) Join   (B) Selection
(C) Union   (D) Cross product

g. Which of the following statements is not correct?

(A) Data Normalization is the process of defining the table structure
(B) The purpose of class diagrams is to model the interrelationships between the different classes in the database
(C) Individual objects are stored as rows in a table
(D) Properties of an object are stored as columns in a table

h. Immediate database modification technique uses

(A) Both undo and redo   (B) Undo but no redo
(C) Redo but no undo   (D) Neither undo nor redo

i. The keyword to eliminate duplicate rows from the query result in SQL is

(A) DISTINCT   (B) NO DUPLICATE
(C) UNIQUE   (D) None of these

j. The statement that is executed automatically by the system as a side effect of the modification of the database is

(A) backup   (B) assertion
(C) recovery   (D) trigger

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Define the following terms giving examples for each of them:
Entity, attribute, role and relationship between the entities   **(8)**

b. Describe any four main functions of a database administrator.   **(4)**

c. What is a weak entity set? What are two principles sources of weak entity sets? Give examples to explain.   **(4)**

Q.3 a. Consider the following relation
Movie(title, year, length, incolor, studioName, producerC#)
StarsIn(movieTitle, movieyear, starName)
MovieStar(name, address, gender, birthdate)
MovieExec(name, address, cert#, networth)
Studio(name, address, presC#)

Write SQL quesries for

   (i) The titles of movies made by 'MGM' Studios that either were made after
        1970 or were less than 90 minutes long.
   (ii) The names and addresses of all female movie stars that are also movie
        executives with a net worth over $10,000,000.
   (iii) Finding the producer of 'Star Wars' by using a nested subquery.
   (iv) Finding the producers of Harrison Ford's movies.   **(10)**

b. Explain how Relational Calculus is different from Relational Algebra.   **(6)**

Q.4 a. SQL allows attributes to have a special value NULL, which is called the null
         value. What are three common interpretations that can be put on null values?   **(6)**

b. Define and explain the following constraints:
   Key Constraints, Referential Integrity Constraints, Attribute-Based Check
   Constraints and Tuple-Based Check Constraints
   How does SQL allow specification of these?   **(10)**

Q.5 a. What are Multi-valued Dependencies? When we can say that a constraint X is
         multi-determined? Does the following relation satisfy MVDs with 4NF?
         Decompose the following relation into 5NF.   **(8)**

SUPPLY SNAME	PARTNAME	PROJNAME
Dev	Bolt	X
Dev	Nut	Y
Sanju	Bolt	Y
Sainyam	Nut	Z
Sanju	Nail	X
Sanju	Bolt	X
Dev	Bolt	Y

b. Describe four desirable properties of relational decompositions using suitable
   examples.   **(8)**

Q.6 a. An ordered student file (ordering field is enrolment number) has 20,000
         records stored on a disk having the Block size as 1 K. Assume that each
         student record is of 100 bytes, the ordering field is of 8 bytes, and block
         pointer is also of 8 bytes, find how many block accesses on average may be
         saved on using primary index.   **(8)**

b. What is the order of a B-tree? Describe the structure of B-tree nodes. Why is
   a B+ tree a better structure than a B-tree for implementation of an indexed
   sequential file?   **(8)**

Q.7 a. Consider the following information to elaborate Nested-Loop Join algorithm.
         MARKS (enroll no, subject code, marks):10000 rows, 500 blocks
         STUDENT (enroll no, name, dob): 2000 rows, 100 blocks
         Also discuss the cost for the worst case.   **(8)**

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     b. What are the various steps involved in the generation of query-evaluation plans for an expression, elaborate using suitable examples.

Q.8 a. Describe using suitable examples, problems of concurrent transactions. Can these problems occur in transactions which do not read the same data values?   **(8)**

     b. Briefly describe Optimistic Concurrency Control.   **(3)**

     c. Consider the following two transactions, given two bank accounts having a balance A and B.
        Transaction T1: Transfer Rs. 100 from A to B
        Transaction T2: Find the multiple of A and B
        Add lock and unlock instructions (exclusive or shared) to transactions T1 and T2 so that they observe the serialisable schedule. Make a valid schedule.   **(5)**

Q.9 a. Compare shadow paging with log based recovery methods. Write the advantages and disadvantages of shadow paging over log-based schemes.   **(6)**

     b. Discuss deferred update technique of recovery. What are the advantages and disadvantages of this technique over immediate update technique?   **(6)**

     c. Define check point and give its impact on data base recovery.   **(4)**