ROLL NO. _____

Code: AC61/AT61 Subject: DATABASE MANAGEMENT SYSTEMS

AMIETE – CS/IT

Time: 3 Hours **JUNE 2014** **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 characteristics that allows program-data independence and program-operation independence is called as _____

(A) Data abstraction **(B)** Data independence
(C) Data operation **(D)** Data design

b. Constraints that cannot be directly expressed in schemas of the data model, and hence must be expressed and enforced by the application programs is known as

(A) Application based **(B)** Semantic constraints
(C) Business rule **(D)** All of these

c. A relation is in _____ if an attribute of a composite key is dependent on an attribute of other composite key.

(A) 1 NF **(B)** 2 NF
(C) 3 NF **(D)** BCNF

d. The _____ operation between two relations 'r' and 's' produces a relation with tuples which are in 'r' but not in 's' is

(A) Intersection **(B)** Division
(C) Set Difference **(D)** Cartesian Product

e. The process of selecting the most efficient query evaluation plan for a query is known as

(A) Query optimization **(B)** Query tree
(C) Query processing **(D)** Query translation

f. If both the functional dependencies $X \rightarrow Y$ and $Y \rightarrow X$ hold for two attributes X and Y then the relationship between X and Y is

(A) 1 : 1 **(B)** M : 1
(C) 1 : M **(D)** None of these

g. UNDO / NO-REDO recovery algorithm is called as

(A) Recovery technique based on deferred update
(B) Recovery technique based on immediate update
(C) ARIES algorithm
(D) Shadow paging

h. Entity types that do not have key attributes of their own is

(A) Strong entity types **(B)** Weak entity types
(C) Foreign key **(D)** Candidate key

i. Memory-style error-correcting-code (ECC) organization refers to.

(A) RAID level 0 **(B)** RAID level 1
(C) RAID level 2 **(D)** RAID level 3

j. The organization in which the records of several different relations can be stored in the same file refers to

(A) Heap file organization
(B) B^+ tree file organization
(C) Hashing file organization
(D) Clustering file organization

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

Q.2 a. List the main characteristics of database approach versus file-processing approach. **(4)**

b. Discuss the different types of user-friendly interfaces and the types of users who typically use each. **(6)**

c. Describe the following attributes of ER – model:
(i) Simple versus composite
(ii) Single-valued versus multivalued
(iii) Stored versus derived **(6)**

Q.3 a. Consider the following schema:
Suppliers(*sid:* integer, *sname:* string, *address:* string)
Parts(*pid:* integer, *pname:* string, *color:* string)
Catalog(*sid:* integer, *pid:* integer, *cost:* real)

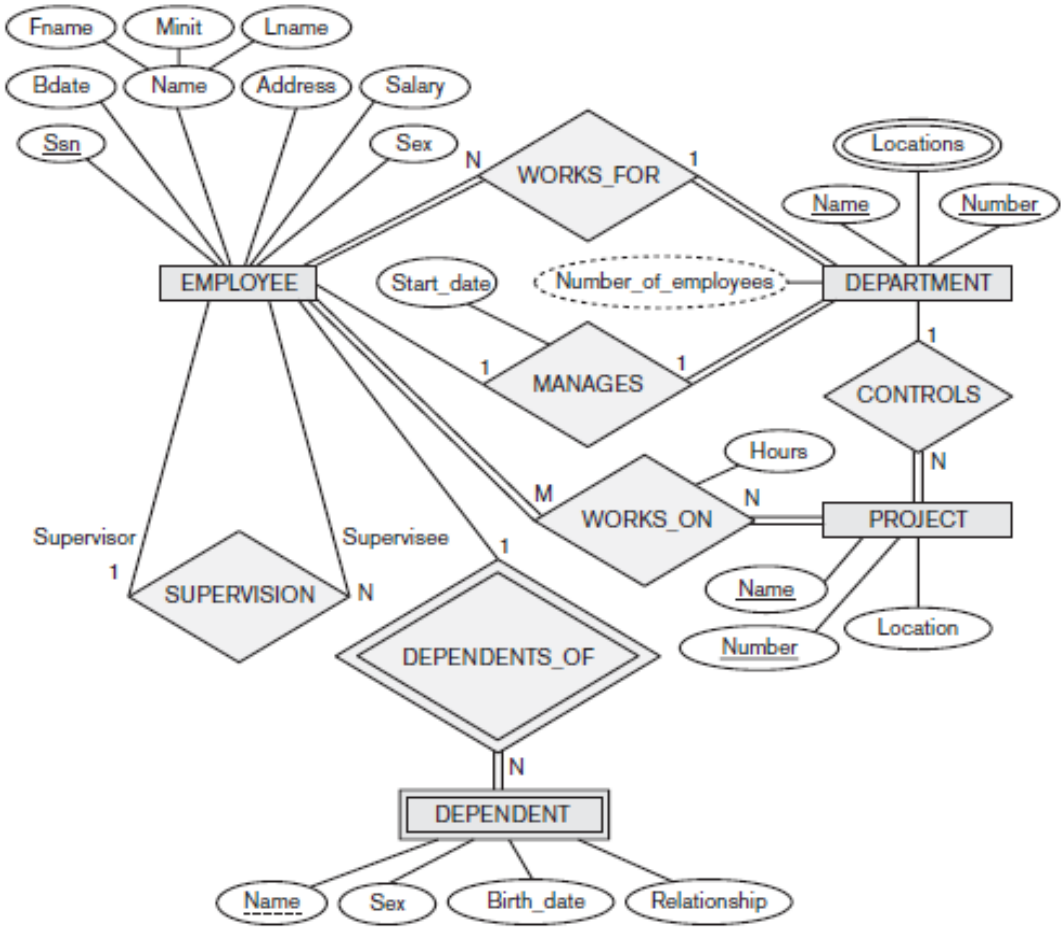
The key fields are underlined, and the domain of each field is listed after the field name. Therefore *sid* is the key for Suppliers, *pid* is the key for Parts, and *sid* and *pid* together form the key for Catalog. The Catalog relation lists the prices charged for parts by Suppliers. Write the following queries in relational algebra. **(2x3)**

(i) Find the *name*s of suppliers who supply some red part.
(ii) Find the *sid*s of suppliers who supply some red part and some green part.
(iii) Find the *pid*s of the most expensive parts supplied by suppliers named SHANKER.

b. Discuss the characteristics of a relation that make them different from ordinary tables and files? **(6)**

c. What is meant by a safe expression in relational calculus? **(4)**

Q.4 a. Consider the following ER conceptual schema diagram for the COMPANY database. Map the given ER diagram into relational database schema. **(10)**



b. Describe the circumstances in which you would choose to use embedded SQL rather than SQL alone or only a general-purpose programming language? **(6)**

Q.5 a. (i) When are two sets of functional dependencies equivalent? What conditions are to be satisfied to define a set of functional dependencies F to be minimal? **(2+3)**

(ii) Let the given set of functional dependencies be E: {B → A, D → A, AB → D}. Find the minimal cover of E. **(4)**

b. Define decomposition. State the properties that must be satisfied by a relation R to be decomposed into a set of relations. **(7)**

Q.6 a. What are the reasons for having variable length records? **(5)**

b. Briefly explain any two hashing techniques that allow dynamic file expansion. **(5)**

c. Why does the index file for a primary index need substantially fewer blocks than the data file? **(6)**

Q.7 a. Discuss the cost components for a cost function that is used to estimate query execution cost. What are the different parameters that are used in cost functions? Where is this information kept? **(8)**

b. Discuss the different phases of external sorting. Also give an outline of the algorithm used. **(8)**

Q.8 a. Define Deadlock. What are the necessary four conditions for a deadlock to occur? Discuss the different methods that can be used for deadlock prevention. **(8)**

b. What are the conditions that lead to the two schedules being view equivalent. When a schedule S is said to be view serializable? **(3+1)**

c. What are the rules followed when shared / exclusive locking scheme is used? **(4)**

Q.9 a. What are checkpoints and why are they important? List the actions taken by the recovery manager during checkpoints. **(3+3)**

b. Explain the term *"steal and no-steal"* approach in standard DBMS recovery schemes. **(4)**

c. Discuss the two main techniques for recovery from non-catastrophic transaction. **(6)**