ROLL NO. _____

Code: AC61 / AT61 **Subject: DATABASE MANAGEMENT S[illegible]**

AMIETE – CS/IT

Time: 3 Hours **DECEMBER 2012** **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. A database schema is specified by a set of definitions expressed by a language called _____

(A) Procedural language **(B)** Data manipulation language
(C) Data definition language **(D)** Data query language

b. Domain constraints and referential-integrity constraints are special forms of

(A) Triggers **(B)** Cursors
(C) Views **(D)** Assertions

c. If $\alpha \rightarrow \beta$ holds and $\gamma\beta \rightarrow \delta$ holds, then $\alpha\gamma \rightarrow \delta$ holds. This rule is

(A) Transitivity rule **(B)** Pseudo transitivity rule
(C) Augmentation rule **(D)** Reflexivity rule

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

(A) SET DIFFERENCE **(B)** SET UNION
(C) DIVISION **(D)** CARTESIAN PRODUCT

e. For the FD, A → BC, B → CA, C → AB the candidate keys are

(A) {A} **(B)** {A}, {B}
(C) {C} **(D)** {A}, {B}, {C}

f. 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

g. A transaction enters into _____ state immediately after it start... executing.

(A) Read **(B)** Write
(C) Active **(D)** Commit

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

(A) Query optimization **(B)** Query processing
(C) Parsing **(D)** Translation

i. The protocol that ensures that the resulting schedules will be conflict-serializable, cascade-less and recoverable is

(A) Graph-Based locking protocol
(B) Strict-Two-Phase locking protocol
(C) Time-Stamp-Ordering protocol
(D) Multiple-Granularity protocol

j. The problem where one transaction reads a database item updated by another uncommitted transaction is called _____.

(A) Pseudo read **(B)** Dirty read
(C) Intermediate read **(D)** none of these

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

Q.2 a. List some of the advantages of using the DBMS approach as compared to traditional file approach. **(5)**

b. Discuss the different types of user-friendly interfaces and the types of users who typically use each. **(5)**

c. Consider a university database for the scheduling of classrooms for final exams. This database could be modeled as the single entity set *exam*, with attributes *course-name*, *section-number*, *room-number* and *time*. Alternatively, one or more additional entity sets could be defined along with relationship sets to replace some of the attributes of the *exam* entity set, as
• *course* with attributes *name*, *department* and *c-number*
• *section* with attributes *s-number* and *enrollment* and dependent as a weak entity set on *course*
• *room* with attributes *r-number*, *capacity* and *building*
Show an E-R diagram illustrating the use of the listed entity sets. **(6)**

Q.3 a. List the categories in which constraints on database can be divided. **(4)**

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

c. Let the following relation schemas be given:
R = (A, B, C)
S = (D, E, F)
Let relations *r(R)* and *s(S)* be given. Give equivalent SQL statements for the following queries.
(i) $\Pi_A(r)$
(ii) $\sigma_{B=33}(r)$
(iii) *rXs*
(iv) $\Pi_{A,F}(\sigma_{C=D}(r \; X \; s))$ **(8)**

Q.4 a. Discuss the following SQL commands with examples:
(i) DROP (ii) ALTER
(iii) INSERT (iv) UPDATE
(3*4)

b. Describe the circumstances in which you would choose to use embedded SQL rather than SQL alone or only a general-purpose programming language? **(4)**

Q.5 a. What is a minimal set of functional dependencies? Does every set of dependencies have a minimal equivalent set? Give an algorithm for finding a minimal cover G for F. **(6)**

b. With the help of examples, differentiate between candidate key, primary key and secondary key. **(6)**

c. Briefly describe Boyce-Codd Normal Form. **(4)**

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

b. What are the advantages of ordered files over unordered files? **(5)**

c. What is Partitioned Hashing? What are its advantage and disadvantage? **(6)**

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

b. Briefly explain the different methods for implementing joins. **(8)**

Q.8 a. Briefly explain the following problems that arise because of concurrent execution of transactions: **(8)**
(i) Lost Update Problem
(ii) Dirty Read Problem
(iii) Incorrect Summary Problem

b. What is timestamp? What are the rules followed to ensure serializability in multiversion techniques based on timestamp ordering? **(8)**

Q.9 a. What are checkpoints and why are they important? List the actions taken by the recovery manager during checkpoints. **(4)**

b. Briefly explain the shadow paging recovery scheme. **(4)**

c. Describe the three phases of the ARIES recovery method. **(8)**