

AMIETE – CS/IT (Current & New Scheme)

Time: 3 Hours

December - 2017

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.
- Q2 TO Q7 CAN BE ATTEMPTED BY BOTH CURRENT AND NEW SCHEME STUDENTS.
- Q8 AND Q9 HAVE BEEN GIVEN INTERNAL OPTIONS FOR CURRENT SCHEME (CODE AC61/AT61) AND NEW SCHEME (CODE AC112/AT112) STUDENTS.
- 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)

- Second Normal form is used to remove the
(A) Multivalued dependency (B) Functional dependency
(C) Partial dependency (D) Transitive dependency
- Atomicity is managed by
(A) Recovery Management component
(B) Transaction Management component
(C) Concurrency control component
(D) None of these
- The most commonly used operation in relational algebra for projecting a set of tuple from a relation is
(A) Join (B) Projection
(C) Union (D) Select
- Which of the following is not a comparison operator?
(A) =< (B) <
(C) < > (D) >=
- Related fields in a data base are grouped to form
(A) Data file (B) Menu
(C) Data record (D) Bank

- f. Which of the following fact is true about Distributed Concurrency Control?
(A) Distributed Concurrency Control Based on a Distinguished Copy of a Data Item
(B) Distributed Recovery
(C) Distributed Concurrency Control Based on Voting
(D) All of these
- g. 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) Set Difference
(C) Division (D) Cartesian Product
- h. Immediate database modification technique uses
(A) Undo but no redo (B) Both undo and redo
(C) Redo but no undo (D) Neither undo nor redo
- i. The highest level in the hierarchy of data organization is called
(A) data bank (B) data base
(C) data file (D) data record
- j. Which of the following are copies of physical database files?
(A) Transaction log (B) Physical backup
(C) Logical backup (D) None of these

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

- Q.2** a. A database is being constructed to keep track of the employees, customers and other entities of the banking system. Design an E-R schema diagram for this application and also list corresponding relation, attributes, primary keys using your own assumption. (10)
- b. Which of the following plays an important role in representing information about the real world in a database? Explain briefly. (6)
(i) The data definition language.
(ii) The data manipulation language
- Q.3** a. Define the Entity Integrity and Foreign Key Constraint. (4)
- b. Explain the SELECT AND PROJECT Operations with suitable examples. (6)

- c. 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. (2×3)

(i) Find the *names* of suppliers who supply some red part.

(ii) Find the *sids* of suppliers who supply some red part and some green part.

(iii) Find the *pids* of the most expensive parts supplied by suppliers named SHANKER.

Q.4 a. Enlist and explain various Attribute data types used in SQL. (6)

b. What is statically embedded SQL? How is it different from dynamically embedded SQL? What are the applications of embedded SQL? (6)

c. Define a view? How is it different from a table? Write the SQL syntax for creating a view? (4)

Q.5 a. Discuss the various normal forms upto BCNF for normalizing a relation with suitable examples. (8)

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

Q.6 a. What are the properties of database transaction? Discuss each of these properties. (8)

b. Explain the following terms with significant examples: (2×4)

(i) A read or write transaction

(ii) A read only transaction

Q.7 a. What are the roles of the Analysis, Redo, and Undo phases in ARIES? (6)

(i) What is done during Analysis?

(ii) What is done during Redo?

(iii) What is done during Undo?

b. Explain the following terms: (2×5)

(i) Transaction rollback

(ii) Shadow paging

Q.8 (For Current Scheme students i.e. for AC61/AT61)

a. Define and differentiate between ordered indexing and hashing. Give illustrative examples. (8)

b. Give a short note on data storage on disk. Explain its strategies and differentiate between them. (8)

Q.8 (For New Scheme students i.e. AC112/AT112)

- a. What do you mean by data replication and allocation in DDBMS? Explain by appropriate example. **(8)**
- b. How Specialization is differing from generalization? Explain with the suitable example. **(4)**
- c. List out the problems occurred in the distributed DBMS for concurrency control and recovery purposes. **(4)**

Q.9 (For Current Scheme students i.e. for AC61/AT61)

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

```
while ( $n \leq q$ )
do {
    read next  $k-1$  subfiles or remaining subfiles (from previous pass)
    one block at a time; merge and write as new subfile one block at a
    time;
     $n \leftarrow n + 1$ ;
}
 $j \leftarrow q$ ;
 $i \leftarrow i + 1$ ;
}
```

- b. What are the various steps involved in the generation of query-evaluation plans for an expression, elaborate using suitable examples. **(8)**

Q.9 (For New Scheme students i.e. AC112/AT112)

- a. Explain in brief the types of threats of database and what are their security mechanisms? **(8)**
- b. What are the factors that determine survivability of a Database in case of an attack? **(8)**