

AMIETE – CS/IT (Current & New Scheme)

Time: 3 Hours

JUNE 2016

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)

- a. The capacity to change conceptual schema at one level of data base system without having to change the external schema at the next higher level is called
- | | |
|--------------------------------|-------------------------------|
| (A) Physical data independence | (B) Logical data independence |
| (C) Data independence | (D) None of these |
- b. If every non prime attributes of a relational schema R meets both of the following conditions
- (i) It is fully functionally dependent on every key of R
 - (ii) It is non transitively dependent on every key of R
- Then R is in
- | | |
|------------------|----------|
| (A) BCNF | (B) 3 NF |
| (C) 3NF and BCNF | (D) 2 NF |
- c. The data in the data base at particular movement of time is called
- | | |
|---------------|---------------|
| (A) Schema | (B) Snapshot |
| (C) Intension | (D) Extension |
- d. Which statement is true for rigorous Two- Phase locking protocol?
- (A) Only exclusive Locks are released before transaction commit
 - (B) All locks are released before transaction commit
 - (C) All Locks can held before transaction commit
 - (D) only shared Locks released before transaction commit

- e. Durability and Isolation is managed by
- (A) Concurrency control & Recovery Management component respectively
 - (B) Recovery Management & Concurrency control component respectively
 - (C) Transaction Management & Concurrency control component respectively
 - (D) Transaction & Recovery Management component respectively
- f. Atomicity is managed by
- (A) Transaction Management component
 - (B) Recovery Management component
 - (C) Concurrency control component
 - (D) None of these
- g. The command which is used to add new attribute (Column) in the existing relation schema is called
- (A) DROP
 - (B) CREATE
 - (C) INSERT
 - (D) ADD
- h. DDL and DML statements are compiled and executed by
- (A) Query processor
 - (B) Storage manager
 - (C) Transaction Manager
 - (D) Interpreter
- i. The following statements:
- (i) "Every View serializable Schedule is conflict serializable"
 - (ii) "Every Conflict serializable Schedule is view serializable"
- Which is not true?
- (A) Only (i)
 - (B) Only (ii)
 - (C) Both
 - (D) None
- j. The ARIES recovery scheme does not support
- (A) Greater concurrency
 - (B) Minimize recovery time
 - (C) Increasing Logging overheads
 - (D) Logical undo operations

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

- Q.2** a. Write the short notes on the following terms with example (2+3+3)
- (i) Physical schema
 - (ii) External schema.
 - (iii) conceptual schema
- b. Explain the Architecture of DBMS with its diagram and also mention all its components in brief. (3+5)

- Q.3** a. For the given Relational Database, give a relational algebra expression for each of the following queries: (8)
 Worker (Worker_ID, name, Organization , Age)
 Books (ISBN_No. , Title, Writer, Publisher)
 Loan (Worker_ID, ISBN_No. , Date)
- (i) Find the name of all workers who have borrowed a book published by BPB Publications.
 (ii) Find the name of all workers who have borrowed all books published by BPB Publications.
 (iii) Find the names of workers who have borrowed more than five different books published by BPB Publications.
 (iv) For each publisher, find the name of workers who have borrowed more than five books of that publisher.
- b. Define Relational Calculus. Discuss Tuple Relational Calculus and Domain Relational Calculus in brief. (8)
- Q.4** a. Define a view? Create a View in SQL using a suitable example. List two major problems with processing of update operations expressed in terms of Views? (3+3+2)
- b. What are the comparison operators for nested queries to perform tests for Set Membership to make Set Comparisons in SQL? (4)
- c. How does the SQL implement the referential integrity constraints of the relational data model? Explain with suitable example. (2+2)
- Q.5** a. If a relation schema R (U, V, X, Y, Z) is decomposed into R1 (U, V, X) and R2 (U, Y, Z) with following set F of functional dependencies: (8)
- $$U \rightarrow VX$$
- $$XY \rightarrow Z$$
- $$V \rightarrow Y$$
- $$Z \rightarrow U$$
- State whether the decomposition of R into R1 and R2 is Lossless or Lossy, and why?
- b. Write the inference rules for functional dependencies and multivalued dependencies. (4)
- c. Explain the concept of full functional dependency and describe how this concept relates to 2NF. (4)
- Q.6** a. Explain the distinction between the terms serial schedule, non serial schedule and conflict serializable schedule. Give relevant example. (6+2)
- b. What are the properties of database transaction? Discuss each of these properties. (4)
- c. Explain the following terms with significant examples: (4)
- (i) A read or write transaction
 (ii) A read only transaction

- Q.7**
- How the log sequence numbers are used by ARIES to reduce the amount of REDO work needed for recovery? Why does ARIES redo before undo in database management recovery? (5+5)
 - Describe the working of Shadow directory. Discuss the issues involved with implementation of shadow paging. (6)
- Q.8 (For Current Scheme students i.e. AC61/AT61)**
- What are the components of a disk block address? Why is accessing a disk block expensive? Briefly, explain how does double buffering improve block access time? (3+3+2)
 - How does a B-tree differ from B⁺-tree? Why a B⁺-tree is usually preferred as an access structure to a data file? (8)
- Q.8 (For New Scheme students i.e. AC112/AT112)**
- Draw the Five level schema architecture in a federated database system (FDBS). Also explain the following term in respect of FDBS: Local Schema, Component schema, Export schema and Federated schema? (8)
 - Define the distributed database. What are the different functions of the distributed database? (8)
- Q.9 (For Current Scheme students i.e. AC61/AT61)**
- Define query optimization and explain its significance for a DBMS. (4)
 - List and explain the steps followed to process a high-level query. (6)
 - What is the difference between pipelining and materialization? (6)
- Q.9 (For New Scheme students i.e. AC112/AT112)**
- What are the four main control measures provide for the security of data in databases? (4)
 - Discuss various different types of ingredients in public key encryption scheme or infrastructure. How digital signatures provide authentication services in Electronic Commerce Applications (ECA)? (6)
 - Discuss what is meant by each of the following terms? (6)
 - Database Survivability
 - Database audit, audit trail.