

AMIETE – CS/IT (NEW SCHEME)**DECEMBER 2011**

Time: 3 Hours

Max. Marks: 100

NOTE: There are 9 Questions in all.

- Please write your Roll No. at the space provided on each page immediately after receiving the Question Paper.
- 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. In an ER diagram double lines indicates:

- (A) Total participation (B) Multiple participation
(C) Cardinality N (D) None of these.

b. The metadata is created by the _____.

- (A) DDL compiler (B) DML compiler
(C) DDL interpreter (D) DML processor

c. Name the operation which is not considered a basic operation of relational algebra:

- (A) Union (B) Product
(C) Join (D) Intersection

d. 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

e. Which of the following is the activity of the coordinating the actions of the process that operate in parallel and access shared data?

- (A) Transaction management (B) Recovery management
(C) Concurrency control (D) None of these

f. The basic variations of timestamp based methods of concurrency control are:

- (A) Total timestamp ordering (B) Partial timestamp ordering
(C) Multiversion timestamp ordering (D) All of these

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- g. Which of the following are copies of physical database files?
- (A) Transaction log (B) Physical backup
(C) Logical backup (D) None of these
- h. The graphical representation of a query is _____.
- (A) Query tree (B) Query graph
(C) B tree (D) B⁺ tree
- i. The organization in which the records of several different relations can be stored in the same file refers to _____.
- (A) Heap file organization (B) Hashing file organization
(C) Clustering file organization (D) B+ tree file organization
- j. The technique that ensures transaction atomicity by recording all database modifications in the log, but delaying the execution of all write operations of a transactions until the transaction partially commits refers to _____.
- (A) Log-Record Buffering (B) Deferred Database Modification
(C) Shadow Paging (D) Immediate Database Modification

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

- Q.2** a. List the major steps that you would take in setting up a database for a particular enterprise. (5)
- b. Discuss the three-schema architecture. (6)
- c. What do you mean by Entity and Relationship in an ER model? Explain how a relationship set is defined? (5)
- Q.3** a. Discuss the characteristics of relations that make them different from ordinary tables and files? (6)
- b. Consider the following relational database
employee (employee_name, street, city)
works (employee_name, company_name, salary)
company (company_name, city)
manages (employee_name, manager_name)
 Give an expression in the relational algebra to express each of the following queries:
 (i) Find the names of all employees who work for XYZ Bank.
 (ii) Find the names and cities of residence of all employees who work for XYZ Bank.
 (iii) Find the names, street address, and cities of residence of all employees who work for XYZ Bank and earn more than Rs.10,000 per annum.

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- (iv) Find the names of all employees in this database who live in the same city as the company for which they work.
- (v) Find the names of all employees who live in the same city and on the same street as do their managers. **(10)**
- Q.4**
- How we resolve the ambiguity when the same name for two or more attributes in different relations is used and the query refers to those attributes? **(4)**
 - What is a view in SQL? Discuss the problems that may arise when one attempts to update a view. How views are implemented? **(6)**
 - There are numerous ways to specify the same query in SQL. Discuss the advantages and disadvantages of this flexibility? **(6)**
- Q.5**
- Discuss insertion, deletion and modification anomalies. Illustrate with examples. **(8)**
 - A functional dependency $\alpha \rightarrow \beta$ is called partial dependency if there is a proper subset γ of α such that $\gamma \rightarrow \beta$. We say that β is partially dependent on α . A relation scheme R is in second normal form (2NF) if each attributes A in R meets one of the following:
 - It appears in a candidate key
 - It is not partially dependent on a candidate key.
 Show that every 3NF schema is in 2NF. **(8)**
- Q.6**
- Discuss the techniques for allocating file blocks on disk? **(5)**
 - Discuss the advantages and disadvantages of extendible hashing. **(5)**
 - What is collision? Discuss the different methods for collision resolution. **(6)**
- Q.7**
- Discuss the different phases of external sorting? Also give an outline of the algorithm used. **(8)**
 - Let relations $r_1(A,B,C)$ and $r_2(C,D,E)$ have the following properties: r_1 has 20,000 tuples, r_2 has 45,000 tuples, 25 tuples of r_1 fit on one block, and 30 tuples of r_2 fit on one block. Estimate the number of block accesses required, using each of the following join strategies for $r_1 \bowtie r_2$:

(i) Nested-loop join	(ii) Block nested-loop join
(iii) Merge join	(iv) Hash join

(8)
- Q.8**
- Discuss the various possible reasons for a transaction to fail in the middle of execution. **(8)**
 - What is “Two-Phase locking protocol”? Explain with the help of example of a schedule, how the protocol ensures a schedule to be conflict-serializable, but not Cascade-less? **(8)**

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- Q.9** Write short notes on
- (i) Write-Ahead logging (6)
 - (ii) Recovery techniques based on Deferred Update (5)
 - (iii) Recovery based on immediate update in a single-user environment (5)