



**MAULANA ABUL KALAM AZAD UNIVERSITY OF  
TECHNOLOGY, WEST BENGAL**

**Paper Code : CS-601**

**DATA BASE MANAGEMENT SYSTEM**

*Time Allotted : 3 Hours*

*Full Marks : 70*

*The figures in the margin indicate full marks*

*Candidates are required to give their answers in their own  
words as far as practicable.*

**GROUP - A  
( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following :

10 × 1 = 10

- i) The information about data in a database is called
- a) Metadata
  - b) Teradata
  - c) Hyperdata
  - d) none of these.
- ii) What is the highest normal form for the relational schema Bank ?
- a) First
  - b) Second
  - c) Third
  - d) Boyce code.

- iii) Which operator performs pattern matching in SQL ?
- a) Except
  - b) Intersect
  - c) Like
  - d) All of these.
- iv) Select operation in SQL is a
- a) Data query language
  - b) Data definition language
  - c) DML
  - d) DCL.
- v) Serializability of concurrent transactions are ensured by
- a) Locking
  - b) Drop
  - c) Both of these
  - d) None of these.
- vi) Which index is specified on the non-ordering fields of a file ?
- a) Primary
  - b) Clustering
  - c) Secondary
  - d) None of these.

- vii) One of the shortcomings of the file system is
- a) Data availability
  - b) Fixed records
  - c) Sequential records
  - d) Lack of security.
- viii) In the E-R diagram the term 'Cardinality' is synonymous to
- a) Attribute
  - b) Degree
  - c) Entities
  - d) Cartesian.
- ix) The employee salary should not be greater than Rs. 20,000. This is
- a) integrity constraint
  - b) referential constraint
  - c) over-defined constraint
  - d) feasible constraint.
- x) What is the name of a trigger that triggers itself ?
- a) Triggering trigger
  - b) Cascading trigger
  - c) Mutating trigger
  - d) None of these.

**GROUP – B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. Discuss the ACID properties of transactions.
3. a) Distinguish between file management system and database management system.  
b) Discuss the role of DBA.
4. What is Cardinality ratio ? What is the difference between procedural and non-procedural DML ? Describe different types of attribute.
5. What is closure and minimal cover ? What is inclusion dependency ?
6. What is 2-phase locking protocol ? How does it guarantee serializability ?

**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. a) Find out the closure of attribute set  $(AD)$  i.e.  $(AD)^+$  in the  $R$ . Set of FD's  $F$  are as given below :

$$R = \{ A, B, C, D, E \},$$

$$FD = \{ B \rightarrow CD, D \rightarrow E, B \rightarrow A, E \rightarrow C, AD \rightarrow B \}.$$

- b) Find out the candidate keys for  $R$ .

- c) Consider the following two sets of FDs :

$$F = \{ A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H \}$$

$$G = \{ A \rightarrow CD, E \rightarrow AH \}.$$

Check whether they are equivalent. Justify your answer. 5 + 5 + 5

8. Consider the relational database :

Employee ( person-name, street, city )

Works ( person-name, company name, salary )

Company ( company name, city )

Manages ( person-name, manager-name )

Write down appropriate SQL statement for the following queries :

- a) Find the name of all employees who work for 'SBI bank'.
- b) Find name, street address, cities of residence of all employees who work for 'UBI Bank' and earn more than Rs. 5,00,000 per annum.
- c) Find the second highest salary for employees in 'SBI bank'.
- d) Find the names of all employees who live in the same city and on the same street as do their manager.
- e) Find the company that has the most employees.

9. a) What are the various states of a transaction ?  
Explain with a state diagram.

- b) Consider the following schedule :

$S1 : r2 ( C ), r2 ( B ), w2 ( B ), r3 ( B ), r3 ( C ), r1 ( A ),$   
 $w1 ( A ), w3 ( B ), w3 ( C ), r2 ( A ), r1 ( B ), w1 ( B ),$   
 $w2 ( A ).$

Is the schedule serializable ?

- c) What is cascadeless schedule ? Why is cascadeless of schedule desired ?
- d) Explain log based recovery.  $5 + 5 + 3 + 2$
10. a) If  $R = ( A, B, C, D )$  and the FDs are  
 $\{ AB \rightarrow CE, E \rightarrow AB, C \rightarrow D \}$ . Why  $R$  is in 2 NF, but  
 not in 3 NF ? Explain.
- b) Show that if a relation schema is in BCNF, then it  
 is in 3 NF but if a relation schema is in 3 NF then it  
 is not necessary in BCNF. Give examples.
- c) What are metadata and data dictionary ?
- d) Explain the terms candidate key, primary key,  
 foreign key and super key.  $5 + 3 + 2 + 5$

11. Write short notes on any *three* of the following : 3 × 5

- a) Armstrong's axioms
  - b) Time stamp based protocol for concurrency protocol
  - c) Log based recovery
  - d) Ordered Index
  - e) Deadlock.
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