



WEST BENGAL UNIVERSITY OF TECHNOLOGY

BCA-401

DATA BASE MANAGEMENT SYSTEM

Time Allotted: 3 Hours

Full Marks: 70

*The questions are of equal value.
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. Answer *all* questions.

10×1 = 10

- (i) Referential integrity is directly related to
 - (A) relational key
 - (B) foreign key
 - (C) primary key
 - (D) candidate key
- (ii) Which level of Abstraction describes how data are stored in the database?
 - (A) Physical level
 - (B) View level
 - (C) Abstraction level
 - (D) Logical level
- (iii) Which of the following is true?
 - (A) A relation in BCNF is always in 3NF
 - (B) A relation in 3NF is always in BCNF
 - (C) BCNF and 3NF are same
 - (D) A relation in BCNF is not in 3NF

- (iv) Consider a schema $R(A, B, C, D)$ and functional dependencies $A \rightarrow B$ and $C \rightarrow D$. Then the decomposing $R_1(A, B)$ and $R_2(C, D)$ is
- (A) dependency preserving but not lossless join
 - (B) dependency preserving and lossless join
 - (C) lossless join but not dependency preserving
 - (D) lossless join
- (v) To select a tuple from a relational database table, the symbol used in relational algebra is
- (A) ρ (Row)
 - (B) σ (Sigma)
 - (C) Π (Project)
 - (D) none of these
- (vi) $R = (A, B, C, D)$, $F = \{AB \rightarrow C, C \rightarrow D\}$. Find candidate key
- (A) AB
 - (B) ABC
 - (C) ABCD
 - (D) none of these
- (vii) Which is the SQL command to remove rows from a table?
- (A) REMOVE
 - (B) DELETE
 - (C) TRUNCATE
 - (D) All of these
- (viii) The first phase of query processing is:
- (A) decomposition
 - (B) restructuring
 - (C) analysis
 - (D) none of these
- (ix) The distinguishable parts of a record are called:
- (A) Files
 - (B) Data
 - (C) Fields
 - (D) Database
- (x) Normalization of database is needed to:
- (A) make data more intelligible to humans
 - (B) remove error in data entry
 - (C) eliminate redundant data
 - (D) all of these

GROUP B
(Short Answer Type Questions)

Answer any *three* questions.

3×5 = 15

2. Compute the closure of the following set F of functional dependencies for relation schema:
 $R = (A, B, C, D, E)$, $F = \{A \rightarrow B, B \rightarrow C, C \rightarrow D, D \rightarrow E, E \rightarrow A\}$
List the candidate keys for R 5
3. Explain the query optimization technique with relevant examples. 5
4. What is lossless decomposition? Consider the relation $R_1 (A, B, C)$ and $R_2 (C, D)$. Show that this decomposition is dependency preserving or not. 5
5. How does BCNF differ from 3NF? Why is it considered stronger than 3NF? 5
6. Discuss the different database anomalies. 5

GROUP C
(Long Answer Type Questions)

Answer any *three* questions.

3×15 = 45

7. (a) Consider the following schema:
 $Book(\underline{acc_no}, yr_pub, title)$
 $User(\underline{card_no}, bname, baddress)$
 $Borrow(\underline{acc_no}, doi, card_no)$
where acc_no is account number, yr_pub is year of publication, $bname$ is borrower name, $baddress$ is borrower address. doi is date of issue.
Perform the following queries on the table. (In SQL)
(i) Find the account number whose year of publication is 1985.
(ii) Display the title of the book which has been borrowed by "Vijoy"
(iii) Find the borrower name who lives in same city as "Vijoy"
(iv) Find the borrower name and address who should issue book on 14-05-1988
(v) Find the acc_no of Book whose year of publication is 1992 and title is "Compiler Design"
(b) State Armstrong's Axioms. 5

8. (a) What is index? Define clustering indices, hash indices, dense indices and Primary-secondary index. 1+(2×4)
(b) What is data abstraction? 2
(c) Define the concept of aggregation, generalization, and specialization and attribute inheritance. 4
9. What do you mean by Super key, Candidate key and Primary key? Take a single example of a database and explain the relationship between primary key, candidate key, foreign key in the same example. 2+2+2+3+3+3
- 10.(a) Explain with two examples why the set $\{\sigma, \pi, \cup, -, X\}$ is called the complete set of relational algebra operation. 7+8
(b) Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number or recorded accidents. State all your assumptions.
11. Write short notes on any *three* of the following: 3×5
(a) Role of DBA in database design.
(b) Three-level architecture of DBMS.
(c) Query language
(d) B⁺ tree
(e) Logical and physical data independence.