

5018

This question paper contains 4 printed pages.

Your Roll No.

B.Sc. (Gen.) / III

B

COMPUTER SCIENCE— Paper V.

(Data Base Systems)

Time : 3 hours

Maximum Marks : 38

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

All questions are compulsory.

1. Briefly define the following terms:

- (a) DBMS
- (b) Program data independence
- (c) Multiple views of data
- (d) Entity integrity constraint.

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2. Differentiate between:

- (a) Database Schema and Database State
- (b) Category and Shared Subclass
- (c) Single *versus* Multivalued attributes
- (d) Inner Join and Outer Join.

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3. (a) What do you understand by a foreign key? Can it refer to its own relation? Explain using appropriate example.
- (b) What is a weak entity? Explain its relationship with owner entity.
- (c) Under what conditions can an attribute of binary relationship type be migrated to become an attribute of one of the participating entity types? Explain. 6

4. Consider the following requirements for a Banking Database. Each bank can have multiple branches each having a unique branch number. Each branch can have multiple accounts which may be operated singly or jointly and can sanction multiple loans which may be taken singly or jointly by more than one person. The database needs to keep track of different types of accounts *eg.* savings or current a/c and types of loans *eg.* car loan, home loan, etc.

Draw an E-R diagram for the above database. Write all necessary attributes for each entity. Show all applicable constraints. State clearly any additional assumptions that you make. 5

5. Consider the following database that keeps track of books kept in different branches of a library:

Book (id, Title, Pub_name)

Book_author (Book_id, Author_name)

Lib_branch (Br id, Br_name, Addr)

Book_copies (Book id, Branch id, No_of_copies)

Borrower (Card no, name, addr, phone)

Books_issue (Book id, Branch id, card no, issue_date,
due_date)

Write SQL queries for the following:

- (a) Print the names of all borrowers who have no books issued at present.
 - (b) For each library branch retrieve the branch name and the total no. of
 - (c) Books issued from that branch.
 - (d) Retrieve name, address and no of books issued for all borrowers who
 - (e) have issued more than 5 books. 6
6. Consider the following Teacher-Student-Class database. Answer the given queries using Relational Algebra expressions:

Teacher (T id, T_name, subject)

Student (S id, S_name, address,, S_univ)//student
belongs to S_univ.

Class (T id, S id, Hours)

- (a) List the names of all students being taught by 'Prof Sharma'.
- (b) Give names of teachers who teach at least one student from 'Delhi University'. 4

7. Consider the relation $R = \{A, B, C, D, E, F\}$ and the following set of functional dependencies:—

$$C = \{ \{ AB \rightarrow C \}$$

$$\{ A \rightarrow D \}$$

$$\{ B \rightarrow E, F \}$$

$$\{ E \rightarrow F \}$$

$$\{ C \rightarrow B \}$$

- (a) Determine the primary key based on the functional dependencies.
- (b) Normalize the relation upto Third Normal Form and BCNF if necessary. Give reasons for the decomposition. 5