

[This question paper contains 4 printed pages.]

2518

Your Roll No.

B.Sc. / III

A

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. (a) Explain the 3 Schema Architecture of a relational DBMS. How does it help achieve Data Independence. (4+1=5)
- (b) What is the difference between a primary key and a foreign key? Explain with the help of an example relation. (2)
- (c) Distinguish between :
 - (i) Database Schema and Database State
 - (ii) Outer Join and Inner Join operations using appropriate examples (3)
2. (a) What do you understand by degree of a Relationship? (2)

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(b) What are the responsibilities of DBA in creation and operation of a database? (4)

(c) Give an entity Relationship diagram for the following :

A bank gives loans to its customers for various purposes such as vehicle, house, and so on. Each loan is of a certain amount, repayment-term, rate of interest, and has some other customer as guarantor. A loan can be taken by two or more customers jointly.

You may assume additional details such as customer's attributes if required. (5)

3. Consider the following database :

Student (Roll_no, Name, Class, Major)

Course (Course_name, Course_no, Credithours, Dept.)

Section(Section_id, Course_no, Semester, Year, Instructor)

Grade_report(Roll_no, Section_id, Grade)

Class can be 1, 2 or 3.

(a) Determine and specify the foreign keys in the above database stating any assumptions that you make. (2)

(b) Write SQL queries for the following :

- (i) For each section taught by "Prof Roy" retrieve the course no., course name, semester, year, credit hours and department.
- (ii) Retrieve the names and major subject of all students who do not have a grade 'A' in any of their courses.
- (iii) Retrieve the names of all courses being taught by "Prof Sharma" in year 2004 and 2005. (6)

(c) Specify the following queries using relational algebra :

- (i) Retrieve the names and roll no. of all students who have at least one 'B' in any of their courses.
- (ii) Give the names of all instructors who did not teach any course in the year 2005. (4)

4. Consider the following relational schema

$R(A, B, C, D, E, F, G)$

R satisfies the following functional dependencies (and any other logically implied by these)

$A \rightarrow B$ $B \rightarrow A$ $C \rightarrow D$ $E \rightarrow FD$ $C \rightarrow A$ $G \rightarrow CAB$ $EF \rightarrow CA$

- (a) Find the Primary key and super key of this schema. (3)
- (b) Which normal form the relation R is in? Convert it to a higher normal form. (2)