



**DHARMSINH DESAI UNIVERSITY, NADIAD**  
**FACULTY OF TECHNOLOGY**

**B.TECH. SEMESTER V [INFORMATION TECHNOLOGY]**  
**SUBJECT: (IT 502) DATABASE MANAGEMENT SYSTEM**

<b>Examination</b> : First Sessional	<b>Seat No.</b> : _____
<b>Date</b> : 31/07/2018	<b>Day</b> : Tuesday
<b>Time</b> : 11:45 to 1:00	<b>Max. Marks</b> : 36

**INSTRUCTIONS:**

1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

**Q.1 Do as directed.**

- (a) Define descriptive attribute and discriminator of weak entity with example. [2]
- (b) Explain referential integrity constraint with example. [2]
- (c) Explain the responsibilities of DBA. [2]
- (d) In an Entity-Relationship (ER) model, suppose R is a many-to-one relationship from entity set E1 to entity set E2. Assume that E1 and E2 participate totally in R and that the cardinality of E1 is greater than the cardinality of E2. Which one of the following is true about R? Justify your answer with diagram. [2]  
(A) Every entity in E1 is associated with exactly one entity in E2.  
(B) Some entity in E1 is associated with more than one entity in E2.  
(C) Every entity in E2 is associated with exactly one entity in E1.  
(D) Every entity in E2 is associated with at most one entity in E1.
- (e) Consider the relations r (A, B) and s (B, C), where s.B is a primary key and r.B is a foreign key referencing s.B. Consider the query Q:  $r \bowtie (\sigma_{B < 5}(s))$  [2]  
Let **LOJ** denote the natural left outer-join operation. Assume that r and s contain no null values. Which one of the following is NOT equivalent to Q? Justify.  
(A)  $\sigma_{B < 5}(r \bowtie s)$  (B)  $\sigma_{B < 5}(r \text{ LOJ } s)$  (C)  $r \text{ LOJ } (\sigma_{B < 5}(s))$  (D)  $\sigma_{B < 5}(r) \text{ LOJ } s$  [1]
- (f) Select operation in SQL is equivalent to [1]  
(A) the selection operation in relational algebra  
(B) the selection operation in relational algebra, except that select in SQL retains duplicates  
(C) the projection operation in relational algebra  
(D) the projection operation in relational algebra, except that select in SQL retains duplicates
- (g) Suppose r1(A, B) and r2(C, D) are two relation schemas. B is a foreign key that refers to C in r2. If data in r1 and r2 satisfy referential integrity constraints, which of the following is ALWAYS TRUE? [1]  
(A)  $\Pi_B(r1) - \Pi_C(r2) = \Phi$  (B)  $\Pi_C(r2) - \Pi_B(r1) = \Phi$   
(C)  $\Pi_B(r1) = \Pi_C(r2)$  (D)  $\Pi_B(r1) - \Pi_C(r2) \neq \Phi$

**Q.2 Attempt Any Two from the following questions.** [12]

- (a) (I) Draw an E-R diagram for Railway Reservation System. (Min. 4 Entity Sets) Also convert E-R Model in to a Relational Model. [3+3]
- (b) (I) Explain types of Joins in Database. Why do we require outer join operation on tables? [3]  
Consider the following two tables and four queries in SQL.  
Book (isbn, bname), Stock (isbn, copies)  
**Query 1:** SELECT B.isbn, S.copies FROM Book B INNER JOIN Stock S ON B.isbn = S.isbn;  
**Query 2:** SELECT B.isbn, S.copies FROM B B LEFT OUTER JOIN Stock S ON B.isbn = S.isbn;  
**Query 3:** SELECT B.isbn, S.copies FROM Book B RIGHT OUTER JOIN Stock S ON B.isbn = S.isbn;  
**Query 4:** SELECT B.isbn, S.copies FROM B B FULL OUTER JOIN Stock S ON B.isbn = S.isbn;  
Which one of the queries above is certain to have an output that is a superset of the outputs of the other three queries?

- (II) Explain generalization and specialization concept in E-R Model with appropriate example [3]
- (c) Draw and explain functional components of database system architecture. [6]
- Q.3** (a) Write down SQL Query for the following **SCHEMA 1**. [6]
- BOOK(Book\_id, Title, Publisher\_name)**  
**BOOK\_AUTHORS(Book\_id, Author\_name)**  
**PUBLISHER(Publisher\_Name, Address, Phone)**  
**BOOK\_COPIES(Book\_id, Branch\_id, No\_of\_copies)**  
**BOOK\_LOANS(Book\_id, Branch\_id, Card\_no, Date\_out, Due\_date)**  
**LIBRARY\_BRANCH(Branch\_id, Branch\_name, Address)**  
**BORROWER(Card\_no, Name, Address, Phone)**
- (i) Modify PUBLISHER schema and insert EMAIL\_ID column to it. [1]  
(ii) Remove all records from LIBRARY\_BRANCH table in an efficient and effective way. [1]  
(iii) Retrieve the names of all borrowers who do not have any books checked out. [2]  
(iv) How many copies of the book titled 'PL/SQL Programming' are owned by the library branch whose name is 'CENTRAL LIBRARY'. [2]
- (b) **Write the Tuple Relational Calculus queries for the following [Use SCHEMA 1].** [6]  
(i) Retrieve Publisher\_name and book Title of the book whose author is 'EVAN BAYROSS'. [2]  
(ii) Retrieve branch\_name of library having more than five copies of any book. [2]  
(iii) Retrieve the name and address of borrower whose due\_date is 31/07/2018. [2]
- OR**
- Q.3** (a) Write down relational algebra for the following problems. [Use SCHEMA 1].
- (i) How many copies of the book titled 'DATABASE CONCEPTS' are owned by each library branch. [2]  
(ii) Remove records from LIBRARY\_BRANCH table whose branch name is 'CENTRAL LIBRARY'. [2]  
(iii) Retrieve Publisher\_name and book Title of the book whose author is 'EVAN BAYROSS'. [2]
- (b) **Write the Domain Relational Calculus queries for the following [Use SCHEMA 1].** [6]  
(i) Retrieve Publisher\_name and book Title of the book whose author is 'EVAN BAYROSS'. [2]  
(ii) Retrieve branch\_name of library having more than five copies of any book. [2]  
(iii) Retrieve the name and address of borrower whose due\_date is 31/07/2018. [2]