M.Sc. (INFORMATICS) / III Semester 2017
PAPER IT-32-Database Management Systems

TIME: 03 hours   Max Marks: 75

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

(Answer any 5 Questions)

Q1

a) What are the different types of database end users? Discuss main activities of each.   3

b) Explain "*Division Operation*" with an example.   4

c) Explain with a diagram the component modules of a DBMS and their interactions.   4

d) Explain **Assertion** and its benefits with suitable example.   4

Q2 a) Construct an E-R diagram for a Online Music Shop with following details

i. It will maintain information about all Singers like singer_id, name , contact no, address (street, city, pincode) Note: Singer may have multiple contact nos.

ii. Information about Composer like composer_id, name, contact_no, address

iii. Information about Record Companies rec_comp_id, name, contact_no, address

iv. Information about Customers like customer_id, name, contact_no, address

v. It will maintain information about Songs like Song_id, Title, movie_name, price, duration, Category, size

vi. Customer may place orders for songs online, system must store the Order details (Order_id, purchase_date, Total Price) and details of Songs in an Order

Specify entities, relationship, constraints, assumptions clearly   11

b) Explain with suitable examples how would map the following ER components to   8
corresponding Relational Components:

i. Weak Entity Type

ii. Multi-valued attributes   4

Q3 a) What are the conditions to be fulfilled for two relations to be involved in a INTERSECT operation?   3

b) Consider the following relational database schema

Doctor(**SSN**, FirstName, LastName, Specialty, YearsOfExperience, PhoneNum)
Patient(**SSN**, FirstName, LastName, Address, DOB, PrimaryDoctor_SSN)
Medicine(**TradeName**, UnitPrice, GenericFlag)
Prescription(**Id**, Date, Doctor_SSN, Patient_SSN)
Prescription_Medicine(**Prescription Id**, **TradeName**, NumOfUnits)

Write Relational Algebra expressions for the following?   [2*6]

i. List the first and last name of patients whose primary doctor named "Paul Patlin".

ii. List the first and last name of doctors who are not primary doctors of any patient.

iii. List the first and last name of patients who have no prescription written by doctors other than the primary doctors.

iv. List the trade name of generic medicine with unit price greater than $20

v. List the SSN of patients who have "Aspirin" prescribed to them by doctor name "Simon Roberts".

vi. Find average YearsOfExperience based on Speciality of doctors

SELECT Nmm FROM student WHERE Roll No IN (SELECT
Roll No —
DNO IN (SRC ...)
WHERE DNO = 12y kk
IC-1732 WHERE DNO = Ennde

SELECT sal any FROM Employee
WHERE salary = (SELECT MAX(sal) FROM

Q4)

a) Consider the following relational database schema
    Book(***BookId***, title, category, price)
    Student(***Student_id***, name, semester, contact_no, address)
    Issue(***BookId***, ***Student_Id***, issue_date, return_date, fine)

Write an embedded SQL program in C which does the following
    i.   Ask the user to enter a student id
    ii.   Find and display the details of books (BookId, Title, Issue Date, Return Date) which have been issued to that student till date

                8

b) What is a Correlated Subquery? Explain with an example.   **4**

c) Write SQL statement for the following with example   **3**
    i.   . Two types of insert statements in SQL
    ii.   Delete a constraint name CX from the schema

Q5) Consider the following relational database schema
    Customer(***CustId***, Cust_name, City)
    Order(***OrderNo***, Order_Date, CustId, Order_amt)
    Order_Item(***OrderNo***, ***ItemNo***, Qty)
    Item(***ItemNo***, Unit, Price)
    Shipment(***OrderNo***, ***WarehouseNo***, Ship_Date)
    Warehouse(***WarehouseNo***, City)

a) Write SQL queries for the following   [2*5]
    i.   List the orders that were not shipped within 30 days of ordering
    ii.   List Cust_name, No_of_orders, Avg_Order_amt for each customer who has placed at least one order
    iii. List the Order No, Order Date, Warehouse No of all orders of Customer " John Smith"
    iv.   Find all the Customers who have not placed any order in last 2 months
    v.   Find all the Orders which have been shipped from any Warehouse the company has in 'New Delhi'

b) Discuss how NULLs are treated in comparision operators in SQL? How are NULLs treated when aggregate functions are applied in SQL queriers? How a new column can be added to an existing table   [2 + 2 +1]

Q6 Write short notes on the following with suitable examples   [3*5]
    a) Denormalization, When and Why?
    b) Problem of Spurious Tuples and their Prevention
    c) Physical and Logical Data Independence
    d) Control measures for Database Security
    e) Data Fragmentation for Distributed Databases