Reg. No. ☐☐☐☐☐☐☐☐☐☐

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL

A Constituent Institution of Manipal University

IV SEMESTER B.TECH. (INFORMATION TECHNOLOGY)

END SEMESTER EXAMINATIONS, APR/MAY 2017

SUBJECT: DATABASE SYSTEMS [ICT 2203]

REVISED CREDIT SYSTEM
(26/4/2017)

Time: 3 Hours   MAX. MARKS: 50

Instructions to Candidates:

❖ Answer All the questions.

❖ Missing data if any may be suitably assumed.

1A. Consider the following database schema.
      CUSTOMER (cust#: int, cname: string, city:string)
      ORDERS(order#:int, odate: date, cust#: int, ordamt:int)
      ITEM (item#: int, unitprice: int)
      ORDER_ITEMS (order#:int, item#:int , qty:int)
      SHIPMENT (order#: int, warehouse#: int, shipdate: date)
      WAREHOUSE (warehouse#:int, city:string)
      Write SQL queries for the following:
      i.   Identify those customers whose all orders are shipped.   5
      ii. Find the items which have been bought by most of the customers.

1B. R(ABCDEF) has following FD's
      F = {A→BCD, A→EF, BC→AD, BC→E, BC→F, B→F, D→E} with the following
      decomposed tables, R1(ABCD), R2(BF) and R3(DE).   3
      Check whether the decomposition is dependency preserving or not.

1C. Explain the working of Deadlock prevention schemes with the suitable example.   2

2A. Answer the following:
      i.   Find the Minimal cover for the relation R(ABCDEF) with functional
           dependency set F= {BC-->ADEF, F-->DE}.
      ii. Check whether the Functional dependency sets FD1 and FD2 are equivalent?   5
           FD1 = {A→B, B→C,A→C} and FD2 = {A→B, B→C, A→D}.

2B. Consider the database schema given in Q.1A.
      Write a SQL query to list the customer information whose all orders are shipped from   3
      a single Warehouse.

2C. Check whether the following schedule S1 is Conflict serializable or View serializable
      or both or none. Mention all the steps clearly. S1: R1(A); W2(A); W1(A); W3(A);

                                                                          2

3A. List out and explain all the characteristics of the Database Approach and all types of   5
      database users.

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3B. Identify all the candidate keys for the following relation R.   3
  R = (A, B, C, D) with F = {AB →C, AB →D, C→A, D→B}.
3C. What is the significance of Materialized View?   2

4A. Check which Normal Form the following relation R is in. If it is not in higher Normal Form, decompose R into highest Normal Form possible. Check whether the decomposition is loss-less or not. R =(A, B, C, D). F = {C→D, C→A, B→C}.   5
4B. Write a procedure which stores customer information into a table T1(cust#, cname, Total_Order_Amount), whose total order amount exceeds 10,000 INR. Refer the database schema given in Q.No.: 1A.   3
4C. What is UNDO/REDO technique in Recovery mechanism?   2

5A. The Prescriptions-R-X chain of pharmacies has offered to give you a free lifetime supply of medicines if you design its database. Given the rising cost of health care, you agree. Here's the information that you gather:
  Patients are identified by an SSN, and their names, addresses, and ages must be recorded.
  Doctors are identified by an SSN. For each doctor, the name, specialty, and years of experience must be recorded.
  Each pharmaceutical company is identified by name and has a phone number.
  For each drug, the trade name and formula must be recorded. Each drug is sold by a given pharmaceutical company, and the trade name identifies a drug uniquely from among the products of that company. If a pharmaceutical company is deleted, you need not keep track of its products any longer.
  Each pharmacy has a name, address, and phone number.
  Every patient has a primary physician. Every doctor has at least one patient.
  Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another.
  Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors. Each prescription has a date and a quantity associated with it. You can assume that if a doctor prescribes the same drug for the same patient more than once, only the last such prescription needs to be stored.
  Pharmaceutical companies have long-term contracts with pharmacies. A pharmaceutical company can contract with several pharmacies, and a pharmacy can contract with several pharmaceutical companies. For each contract, you have to store a start date, an end date, and the text of the contract.
  Pharmacies appoint a supervisor for each contract. There must always be a supervisor for each contract, but the contract supervisor can change over the lifetime of the contract.
  i. Draw an ER diagram that captures the above information. Identify any constraints that are not captured by the ER diagram.
  ii. How would your design change if each drug must be sold at a fixed price by all pharmacies?
  iii. How would your design change if the design requirements change as follows? If a doctor prescribes the same drug for the same patient more than once, several such prescriptions may have to be stored.   5
5B. What are ACID properties? Draw a state diagram to discuss the typical states that a transaction goes through during its life time.   3
5C. Explain with example Lock conversion mechanism and its benefits.   2