Question Paper

Exam Date & Time: 20-Jul-2022 (02:00 PM - 05:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FOURTH SEMESTER B.TECH MAKEUP SEMESTER EXAMINATIONS, AUG 2022

DATABASE SYSTEMS [ICT 2271]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1) Write a suitable PL/SQL block to handle the following business regulation for the database given in the following database schema: (5)

A) Update the Qty_In_stock for the product whenever customer orders the product, also inform the details about the products to the shop owner whenever the total number of products with quantity in stock is equal to zero are more than 5.

Product(Prd_Id, Prd_Name, Qty_In_stock, Unit_price);

Order(Ord_Id, Cust_Id, Ord_Date, Total_Amount);

Order_Product(Ord_Id, Prd_Id, Ordered_Qty).

B) Consider the relation Code(LOC, VCount, FCount, Size). Two sets of functional dependencies hold on the relation. (3)

REL1

FD1: LOC ->VCount

FD2: VCount -> FCount

FD3: (LOC, VCount) ->Size

REL2

FD1: LOC -> (VCount, FCount, Size)

FD2: VCount -> FCount

Are REL1 and REL2 equivalent? Justify your answer.

C) In a relation Guest, having the attributes FirstName, MiddleName, Surname, Email, RoomNo, the FirstName can uniquely identify SurName and MiddleName together. Email, Surname, MiddleName can uniquely identify FirstName. RoomNo can identify Surname, MiddleName, Email together. What is the highest normal form of Guest? Justify your answer. (2)

2) Find the candidate key for the relations given below. Also find the highest normal form achieved by the relation. (5)

A)

i. Relation R (A, B, C, D, E, P, G} with functional dependencies F = {AB->D, DE->P, C->E, P->C, B->G}.

ii. Relation R(A,B,C,D,E,F} with functional dependencies F = { C->F, E->A, EC->D, A->B}.

B) The Computer Science Department frequent fliers have been complaining to the Local Airport officials about the poor organization at the airport. As a result, the officials decided that all information related to the airport should be organized using a DBMS, and you have been hired to design the database. Your first task is to organize the information about all the airplanes stationed and maintained at the airport. The relevant information is as follows: - Every airplane has a registration number, and each airplane is of a specific model. - The airport accommodates a number of airplane models, and each model is identified by a model number (e.g., DC-10) and has a capacity and a weight. - A number of technicians work at the airport. You need to store the name, SSN, address, phone number, and salary of each technician. - Each technician is an expert on one or more plane model(s), and his or her expertise may overlap with that of other technicians. This information about technicians must also be recorded. - Traffic controllers must have an annual medical examination. For each traffic controller, you must store the date of the most recent exam. - All airport employees (including technicians) belong to a union. You must store the union membership number of each employee. You can assume that each employee is uniquely identified by a social security number. The airport has a number of tests that are used periodically to ensure that airplanes are still airworthy. Each test has a Federal Aviation Administration (FAA) test number, a name, and a maximum possible score. The FAA requires the airport to keep track of each time a given airplane is tested by a given technician using a given test. For each testing event, the information needed is the date, the number of hours the technician spent doing the test, and the score the airplane received on the test. Draw an ER diagram for the above scenario. Make sure to indicate the various attributes of each entity and relationship set along with the key for each entity. Further, reduce the ER diagram. (3)

C) With a neat diagram explain in detail the database environment. (2)

3) Answer the following questions by considering University database given below: (5)

A)

Student (S_ID, Name, dept_name, tot_credit)

Takes (S_ID, Crs_ID, Year, Grade)

Course (Crs_ID, Title, dept_name, credits)

Department (dept_name, building, budget)

Advisor (S_ID, I_ID)

Instructor (I_ID, name, dept_name, salary)

i. Write a procedure to store course information in a new table, which has at least 10 number of students scored 'A' grade and maximum 5 students scored 'F' grade in a course offered by a particular department. Consider department name as an input parameter.

ii. Enforce the following constraint on University database, without using Trigger concept: Student should not score 'F' grade in more than 5 courses offered by his department.

B) Given T1 (x=x+x; x= x+2) and T2 (x= x**2; x=x+2), write the possible serial schedules on the given sequences. (3)

C) Explain in detail about NoSQL distinguishing characteristics. (2)

4) Given a relation R (A, B, C, D, E) and Functional Dependency set FD = {A → B, B → E, C → D}, determine the highest normal form of the R? If not in highest form, convert it into highest normal form. (5)

A)

B) Write a PL/SQL program to Withdraw an amount 2,000 and deposit 10,000 for all the accounts. If the sum of balance of all accounts exceeds 2,00,000 then undo the deposit just made. (3)

C) Check whether the following schedule is recoverable. (2)

T_8	T_9
read (A)	
write (A)	
	read (A)
	commit
read (B)	

5) Discuss about the pros and cons of all the deadlock prevention and deadlock handling schemes. (5)

A)

B) Explain the importance of topological sorting in a transaction management system using an appropriate example. (3)

C) Describe CAP theorem with a neat sketch. (2)

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