Final Assessment Test (FAT) - APRIL/MAY 2023

Programme	B.Tech	Semester	Winter Semester 2022-23
Course Title	DATABASE SYSTEMS	Course Code	BCSE302L
Faculty Name	Prof. Rishikeshan C A	Slot	B2+TB2
		Class Nbr	CH2022235000590
Time	3 Hours	Max. Marks	100

PART-A (4 X 10 Marks)
Answer All questions

01. An airline ticket booking database is designed to maintain geographically distributed reservations and to schedule information about the airline system. The secondary storage device holds information in the form of bytes and words. Previously, the computation was performed directly on this airline data. Because of the difficulty in obtaining and altering this data, the physical information was hidden and the data were presented as a series of tables. To make the data more intelligible to a greater number of individuals, the data might be presented in a variety of ways to accommodate the diverse audience. Discuss in detail the database architecture required to execute such mapping with appropriate record types or tables. [10]

02. Check whether the given schedule S is conflict serializable, recoverable schedule or not. If it is conflict serializable, determine an equivalent serialized schedule. [10marks] [10]

T1	T2	T3	T4
			R(A)
	R(A)		
		R(A)	
W(B)			
	W(A)		
		R(B)	
	W(B)		

03. An ABC Apartment with 1000 families would like to implement a system to manage various amenities in the Club House, like Gym, Yoga Hall, Swimming Pool, Mini Theater, Table Tennis Board Room, Tennis Court, etc. Each resident can avail any of these services from 8 am - 8 pm in one hour slot per activity/day. Without booking, no service can be availed and the system manager decides to use the NoSQL database to store the details. [10]

(i) Create the following collections [3 marks]

a."Residents" to store each member with a unique MemberID, Name, Phone number, ApartmentNumber.

b."Amenities" to store details like AmenityID, Amenity, InchargeName, InchargePhoneNumber of the club house.

c."BookAmenity" to store documents with AmenityID, MemberID, Date, Slot [8 AM-9 AM, 9 AM-10 AM, 7 PM-8 PM]

(ii) Insert two documents in each collection with data of your choice. [2 marks]

(iii) New Gym trainer In charge got appointed and update his name, number in the "Amenities" collection. [1 mark]

(iv) System manager wants to take the list of residents who utilise the amenities most, so display the MemberID, AmenityID along with its count in descending order. [2 marks]

(v) One of the families who stayed in 101 Apartment number got vacated and all the respective member documents need to be deleted in "Residents" collection. [2 marks]

[10]

04. Consider the below-given schema of the hotel reservations database:

> Hotel (HotelNo, Name, City)
> Room (RoomNo, Hotel_No, Type, Price)
> Booking (HotelNo, GuestNo, FromDate, ToDate, RoomNo)
> Guest (GuestNo, Name, City)

[4 × 2.5 = 10 Marks]

Write SQL queries for the following:

a) Get the details (print name and price) of all hotels in Bangalore.
b) Get the average price of a room grouped by city.
c) Find the name and city of the hotel which has the highest-priced room.
d) Print the hotel names and room numbers of all hotels in Chennai which have rooms available at present.

PART-B (4 X 15 Marks)
Answer All questions

05. Assume person X is planning to start an online shopping system to purchase some products and [15] perform home delivery of the purchased products. He has identified some of the following entities, attributes and some information. Consider each customer will be assigned a unique id and each product on the shopping page will have a unique number. Similarly, for every order placed by the customer unique order number will be generated and after the successful payment of the bill, a payment id will be assigned. In this online shopping system, a customer places one or more order(s), the placed order includes one or more product(s), the placed order is associated with one payment and payment is associated with one order. Based on the above information:

(i)   Design an ER diagram with appropriate cardinality ratios (7 marks).
(ii)   Map the designed ER model to a relational schema (8 marks).

Entities & Attributes

Customer: customer_id [PK], name, email, address
Product: product_id [PK], name, price, description
Order: order_id [PK], order_date, customer_id [FK]
Payment: payment_id [PK], payment_date, amount, order_id [FK]

06. i. Given a set of Functional Dependencies (FD), identify the redundant FD(s) and remove it with [15] a suitable explanation.

FD = {C->A, B->X, AX->Y, CB->Y} (3 Marks)

ii. Consider a relational schema R(A,B,C,D,E) and a set of functional dependencies

FD = {A->BC, AC->E, B->D, E->AB}

a) Identify the minimal cover of R and explain the same (4 marks)
b) Identify the candidate keys of R and explain the same (4 marks)
c) Normalize the relation R to BCNF standard and give a suitable explanation (4 marks)

[15]

07. (i) Consider the given relation schema:

Student (Reg_no, stu_name, CGPA)
Course (ccode, cname, credits)
Course_student (Regno, stu_name, ccode)

Draw the query evaluation plan tree using the heuristic optimization technique for the following query.

"List the courses with more than 4 credits which were taken by the student 'John'" [8 Marks]

(ii) Consider the following Relation:

Cust_Id	Cust-name	Item	Price	Quantity
1111	Jennifer	Deodorant	1000	2
8888	Charles	Talcum Powder	2200	5
6666	George	Talcum Powder	2800	8
5555	Chris	Perfume	3100	3
7777	Cheery	Deodorant	3800	1
3333	Joseph	Perfume	2200	1
4444	Pamila	Deodorant	1500	7

Construct the B+tree with order=4 by inserting the above records in the same sequence. Delete the records which is having the values of as '3333' & '4444', and then, insert the record: (2222,'John', 'Talcum Powder',15000,3). [7 Marks].

08. Consider the following two schedules (Schedule S1 and Schedule S2) given below. They are performing operations on the data items A, B, C, and D and are submitted to the database system for execution in the given order. (Assume, S, and X are the shared and exclusive locks respectively): [15]

S1: T4:X(A), T3:S(C), T1:S(B), T2:X(B), T3:X(C), T2:X(A), T1:S(C), T4:S(B)

S2: T1:X(A), T3:S(D), T3: S(A), T4:X(C), T2:S(B), T4:X(A), T2:X(C), T1:X(B), T4:X(D)

Answer the following questions by considering each schedule independently.

For both the schedule sequences S1 and S2.

   i. For each request shown in the schedule, mention whether the request is granted or blocked by the lock manager. [7 Marks]

   ii. Show the waits-for graph and indicate whether there will be a deadlock or not at the end of each sequence. [8 Marks]

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