VIT
Vellore Institute of Technology

Reg. No. : 23MCA1030

Final Assessment Test (FAT) - November/December 2023

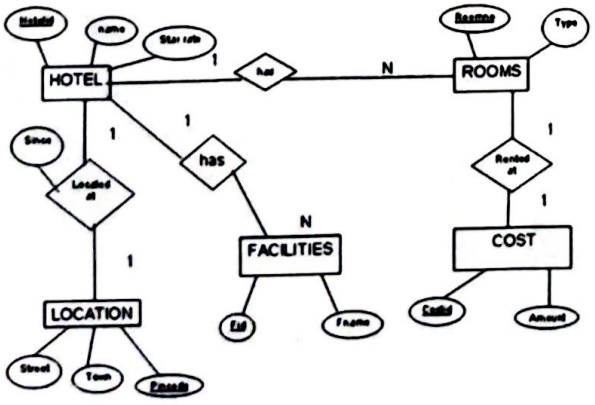
Programme	**M.C.A.**	Semester	**FALL SEMESTER 2023 - 24**
Course Title	**DATABASE SYSTEMS**	Course Code	**PMCA503L**
Faculty Name	**Prof. Sandhya M**	Slot	**C1+TC1**
		Class Nbr	**CH2023240101715**
Time	**3 Hours**	Max. Marks	**100**

Section I (10 X 10 Marks)
Answer all questions

01. Due to privacy concerns some organizations were not allowed to use Aadhar number to identify individuals unless certain restrictions are satisfied. As a result, most universities cannot use Aadhar number as primary keys. In practice, Student_id, a unique identifier assigned to every student, is likely to be used as the primary key rather than Aadhar number since Student_id can be used throughout the system. Discuss about the issues faced of using the Aadhar card and also the issues faced due to adding up of another one attribute to this problem with a detailed justification. [10]

02. Design an ER diagram for keeping track of your favorite cricket team. Include the matches played, runs scored by a player, places where the match is played, players in each match and other necessary attributes. From the above information track about the performance of player in their country and other countries, it should be modeled as a derived attribute with suitable explanation. The entities along with attributes has to be designed and the relationship between the attributes should also be shown in the ER diagram. [10]

03. Give a relational schema diagram with a suitable illustration for the ER diagram given below: [10]



04. Consider the set of functional dependencies F = { AB→C, A→DE, B→F, F→GH, D→IJ }. [10]
(a) What is the key and candidate key for R? (4 marks)
(b) Compute the closure of (ABCDE) and (BDEF).(3 x 2=6 marks)

05. The given tables are: **[10]**

Books(ISBN, Title, Author, Instock, price, Publication year)

Customers (CustID, CustName, Address)

Orders (OrderNo, ISBN, CustID,CardNo, quantity, Orderdate, Shipdate)

The FD's are:

OrderNo→CustID

OrderNo→Orderdate

OrderNo→CardNo

Normalize the tables upto BCNF with suitable illustration.

06. Create an Emp table with the following fields: (EmpNo, EmpName, Job,Basic, DA, HRA,PF, GrossPay, NetPay) (Calculate DA as 30% of Basic and HRA as 40% of Basic). [10]

Write the following queries in SQL.(5 x 2 = 10 marks)

(a) Insert Five Records and calculate GrossPay and NetPay.

(b) Display the employees whose Basic is lowest in each department .

(c) If NetPay is less than < Rs. 10,000 add Rs. 1200 as special allowances.

(d) Display the employees whose GrossPay lies between 10,000 & 20,000.

(e) Display all the employees who earn maximum salary .

07. Consider the following University Schema: **[10]**

department(deptname, building, budget)

course(courseid, title, deptname, credits)

faculty(ID, name, deptname, salary)

section(courseid, secid, semester, year,)

teaches(ID, courseid, secid, semester, year)

student(ID, name, deptname, totcred)

advisor(s_ID, f_ID)

Write the following queries in relational algebra, using the university schema. (5 x 2 = 10 marks)

a. Find the ID and name of each faculty in the Computer Science department.

b. Find the ID and name of student who has registered for atleast two courses in computer science department along with the faculty ID and name.

c. Find the ID and name of each student who has not registered for any course in the year 2022.

d. Find the list of faculties who have played the role of advisor from 2020 to till date.

e. Find the name of the course who has registered by maximum number of students .

08. Consider the transactions T1, T2, and T3 and the schedules S1 and S2 given below. **[10]**

T1: r1(X);r1(Y);w1(X);w1(Y)

T2: r2(Y);r2(X);w2(X)

T3: r3(Z);r3(X);w3(Z)

S1: r1(X);r3(Z);r3(X);r2(Z);r2(Y); w3(Y);w2(Z);r1(Z);w1(Z);w1(X)

S2: r1(Z); r3(Y); r2(Y); r3(Z); r1(X); r2(X); w3(Y); w1(Z); w2(Z); w1(X)

Answer the following questions:

(a)For the above transactions provide the precedence graph . (5 marks)

(b) Are the schedules conflict or view serializable? (5 marks)

09. Consider the following relations: [10]

Student(RegNo, FirstName, LastName, PhoneNumber, City)

Course(CourseId, CourseName, RegisterNumber, Credits, FacultyID)

Faculty(FacultyID, FacultyName, DateOfJoining, Specilization)

(a) Write a query to display the RegNo, CourseID and FacultyID of students who has chosen the courses with 4 credits. (4 marks)

(b) Draw the query tree and evaluate it by using heuristic optimization techniques.(6 marks)

10. Use the hashing technique to insert values into an empty bucket:: 33, 22, 56, 65, 10, 17, 48, 89, 29, 60. The insertion should be done considering the LSB value. The bucket can hold a maximum of 2 records. Step by step procedure after inserting an element has to be provided. [10]

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