VIT
Vellore Institute of Technology

Final Assessment Test – November/December 2023
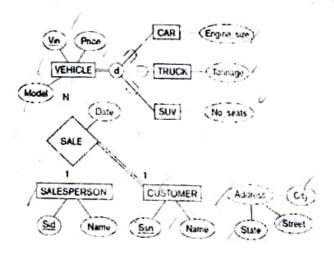Course: PMCA503L   -   Database Systems
Time: **Three Hours**
Max. Marks: **100**

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS TREATED AS EXAM MALPRACTICE

Answer ALL Questions

(10 X 10 = 100 Marks)

1. Draw an ER/EER diagram to capture the requirements as stated below:

   A University database must keep records of faculty, Program, course, and student information. Each faculty has ID, name, cabin no, date of joining, experience, Degree (A faculty might be completed more than one degree). A faculty can handle a maximum of three courses (0,3) and proctoring maximum of 20 students. The Salaried faculty members have DA, HRA, PF and Gross, whereas the consolidated faculties have just consolidated pay. Each student has a register number, name (Fname, Lname), address, dob, age, Aadhar card number. The university offers one or more programs. A program is made up of one or more courses. A student must enroll in any one of the programs. A student takes the courses that are part of his/her program. When a student registers for a course, the year and semester he/she attempted need to be recorded. When he finishes the course, a grade (such as A or B) and a mark are recorded. A program has a name, a unique program_identifier, and the total credit points required to graduate. Each program is headed by one faculty member. A course has a name, a credit point value, the year it commenced. Each course can have zero or more prerequisite courses. Each course can be identified by the program it belongs to.

2. Convert the following EER schema to Relation Schema.

3. With the following relational schema write the relational algebraic expression.

STUDENT (regno, name, major, DOB)

ENROLL (regno, courseno, grade)

COURSE(Courseno, Coursename, credit)

BOOK_ADAPT (courseno, BookISBN)

TEXT (BookISBN, title, publisher, author)

a) Find the name of students who enrolled in MCA major.   [2.5]

b) List the name of students who haven't enrolled for any course.   [2.5]

c) Retrieve the name of the course that follows books published by Pearson   [2.5]
education.

d) Find the name of the students who have registered more than 2 courses.   [2.5]

4. a) Explain the update anomalies with suitable example.   [5]

b) Consider the relation R (M, Y, P, A, C, D, E, F) and the FD {M → A; MY →P;   [5]
A → C; C→DE; DE→F}.

Identify whether decomposition D = {D1 (M, Y, P, C), D2 (M, A, C),

D3(C, D, E, F)} is lossless or not?

5. a) Does your BCNF decomposition procedure always preserve all functional   [3]
dependencies? Explain your answer.

b) Suppose that R (A, B, C, D, E, F, G) is a relational schema with functional   [7]
dependencies

F = {AB → CE;   B→D;   A→G;   C→F;   E→A}. Is this schema in BCNF? If
not, normalize this relation till BCNF.

6. a) Write down the table creation with check, primary and foreign key   [5]
constraints

Student(Regno, name, dob, CGPA)

Course(Code, Cname, credit)

Registered(Regno, Code, semester, year)

b) Patient(PatientID, name, DOB, age, Diagnosis)   [5]

Consider the above Patient table and write a PL/SQL block to update the age
(in terms of year) of all the patients in the patient table using Cursor.

7. Consider the following relational database schema.

   Customer (**CID**, name, address, DOB, Mobile_number)

   Book (**ISBN**, Title, Publisher, Price)

   Borrow (**CID, ISBN**, Return date, Fine_Amount)

   The primary keys are underlined.

   Write down the SQL query for the following, then develop the optimized query tree using heuristic query optimization technique.

   Display the name, DOB and Mobile number of the customer who live in Katpadi and borrowed the book published by 'Tata McGraw-Hill' and paid the fine amount >100.

8. Illustrate in detail the problems that occur due to uncontrolled concurrency transactions with suitable example.

9. a) Check whether the below schedule is conflict serializable or not using precedence graph. [5]

   S1 : R1(A), R1(B), R2(A),R2(C), R3(C),W1(A), W2(B), W3(C), W2(B),R4(D),

   W4(D),R2(B), W2(C), R4(E), W4(E), W2(D)

   b) Write short notes on No Undo/Redo recovery algorithm. [5]

10. a) Summarize the characteristics of NoSQL Databases. [5]

    b) Outline the distributed DBMS architectures. [5]

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