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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Second Semester, Master of Computer Applications (MCA)
Semester End Examination; October - 2023
Database Management Systems

Time: 3 hrs   *Max. Marks: 100*

Course Outcomes
The Students will be able to:
CO1: Demonstrate the basic concepts of DBMS with Data model.
CO2: Design an ER-diagram for a given problem description.
CO3: Identify appropriate Primary key and foreign key in an ER model, specify structural constraints on each relationship.
CO4: Compose data retrieval queries in SQL based on assumption and requirements.
CO5: Design and Develop a database application using relation schema with the help of normalization and Utilize transaction processing, concurrency control and crash recovery.

Note: I) *Answer any* **FIVE** *full questions, selecting* **ONE** *full question from each unit.*
   II) *Any* **THREE** *units will have internal choice and remaining* **TWO** *unit questions are compulsory.*
   III) *Each unit carries 20 marks.*

Q. No.	Questions	Marks	BLs	COs	POs
	UNIT - I	**20**			
1 a.	Explain the characteristics that distinguish the database approach with the traditional file system.	6	L1	CO1	PO1,2
b.	Explain the need for data independence with an example. Show how Three Schema Architecture enables it with a neat diagram.	10	L2	CO1	PO1,2
c.	List the various end users of database system and brief about their usage of database system.	4	L2	CO1	PO1,2
	UNIT - II	**20**			
2 a.	Explain different types of attributes that exist in ER Model with an example.	10	L2	CO2	PO1,2
b.	Examine the difference between Strong Entity and Weak Entity with an example.	4	L3	CO2	PO1,2
c.	Define Structural Constraints with an example.	6	L2	CO2	PO1,2
	UNIT - III	**20**			
3 a.	Illustrate mapping of Strong Entity type, Weak Entity type, 1:N cardinality and M:N cardinality to Relational Model with an example.	10	L2	CO3	PO2
b.	Discuss the different types of relation model constraints in DBMS.	6	L2	CO3	PO2
c.	Discuss Left Outer join and Right Outer join.	4	L6	CO3	PO2
	OR				
d.	Illustrate the following relational algebra operations with an example: i) Select ii) Project iii) Cartesian Product iv) union	10	L2	CO3	PO1,2

e. Discuss the four characteristics of relations	4	L2	CO3	PO1,2

f. Consider the following relational schema and construct the following

queries using relational algebra;

EMPLOYEE(SSN, Fname, Lname, DOB, Sex, DOJ, Salary,
 DeptNumber)

DEPARTMENT(DeptNumber, Name, Location)

i) Retrieve details of Employee who belong to department number "4"

and has salary > 2500 Rs

ii) List each employee's first and last name and salary

iii) Retrieve the first name, last name, salary of all employees who

work in department number 5

iv) Retrieve employees who either work in department 4 and make

over Rs 25,000 per year, or work in department 5 and make over

Rs 30,000

	6		CO3 L1,3	PO1,2,3,5

UNIT - IV   **20**

4 a. Discuss Delete and Update DML commands with examples.	6	CO4	L2	PO1,2,3

b. Illustrate with examples ON DELETE CASCADE and ON UPDATE

CASCADE for the following cases;

Case i) ON DELETE CASCADE and ON UPDATE CASCADE

 specified during table creation Case

 ii) ON DELETE CASCADE and ON UPDATE CASCADE is not

 specified during table creation

	10	CO4	L3	PO1,2,3

c. Consider the following relation,
EMPLOYEE(SSN, Name, DOB, Gender, DOJ, Salary, DeptNumber)

DEPARTMENT(DeptNumber, Name , Location)

Formulate SQL Queries;

i) Retrieve Total number of Employees working in Administration

 department

ii) Retrieve the Names of Employees who draw maximum salary in
 Research department

	4	CO4	L3	PO1,2,3

OR

d. Explain Group by and Order by clause with an example in SQL.	6	CO4	L2	PO1,2,3

e. Consider Table EMPLOYEE with attributes:

EmpID, First name, Middle Name, Last name, DOB, Gender, Salary

	10	CO4	L3	PO1,2

i) Use Appropriate commands, data types to create and populate the table with tuples

ii) Write the dataset for the Table student with minimum 5 tuples

iii) Apply five aggregate functions for the data set and analyze the results

f. Consider the following relations and Construct SQL query for the following:

   DOCTOR (DocID, Name, DOB, Specialization, Experience)

   PATIENT (PatID, Name, Age, Phone)

   CHECK_BY (PatID, DocID)   4   CO4   L3   PO1,2

   i) Retrieve the patients details whose is 20 years old and checked by Eye Specialist"

   ii) Retrieve the Doctor details who are specialist in Cardiology and have experience more than 10 years

UNIT - V	**20**			

5 a. Define normalization. Explain 1NF, 2NF, 3NF with example for each.   10   CO5   L2   PO1,2

  b. Discuss ACID properties.   10   CO5   L2   PO1,2

OR   PO1,2

  d. List and explain various states of a transaction during its execution with a neat diagram.   6   CO5   L2   PO1,2

  e. Consider the three transactions T1, T2, T3 and the schedules S1, S2 given below. Draw the serializability (precedence) graphs for S1 and S2, and Examine whether each schedule is serializable or not.

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

   T2 : r2 (Z); r2(Y); w2(Z); w2 (Y);   10   CO5   L6   PO1,2

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

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

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

  f. Explain various types of locks used in concurrency control.   4   CO5   L2   PO1,2

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