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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Fourth Semester, B.E. - Information Science and Engineering

Semester End Examination; Sep. / Oct. - 2023

Database Management System

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1: Apply the database concepts to create the relations by specifying various constraints.

CO2: Design ER diagrams for given scenario.

CO3: Apply suitable normalization technique to improve database design.

CO4: Conduct experiments on given database using modern tools: Draw io, MySQL.

***Note**: I) **PART - A** is compulsory. **Two** marks for each question.*

*II) **PART - B**: Answer any **Two** sub questions (from a, b, c) for a Maximum of **18 marks** from each unit.*

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
1 a.	Compare View and Assertion.	2	L2	CO1	PO1
b.	List out the informal design guidelines of database design.	2	L1	CO1	PO1
c.	Define serilizability.	2	L2	CO1	PO1
d.	Define DBMS.	2	L1	CO1	PO1
e.	Explain different types of end users.	2	L2	CO1	PO1
	II : PART - B	**90**			
	UNIT - I	**18**			
2 a.	How database approach is different from traditional file approach? Explain by taking real world example.	9	L2	CO1	PO1
b.	UPS prides itself on having up-to-date information on the processing and current location of each shipped item. To do this, UPS relies on a company-wide information system. Shipped items are the heart of the UPS product tracking information system. Shipped items can be characterized by item number (unique), weight, dimensions, insurance amount, destination and final delivery date. Retail centers are characterized by their type, unique ID and address. Shipped items make their way to their destination via one or more standard UPS transportation events (i.e., flights, truck deliveries). These transportation events are characterized by a unique schedule number, a type (e.g, flight, truck) and a delivery route. Write an entity relationship diagram that captures this information about the UPS system.	9	L3	CO2	PO1,2,3,12

Contd.. 2

c.	Analyze use of the following in ER diagram with an example: i) Weak entity type ii) Participation constraint iii) Cardinality ratio iv) Recursive relationship v) Specialization	9	L3	CO4	PO1,2,3,12
	UNIT - II	**18**			
3 a.	Consider the employee database, where the primary keys are underlined. Employee (empname, street, city, empid) Works (empid, companyname, salary) Company (companyname, city) Manages(empid, department) Give an expression in the relational algebra for each request. i) Find the name of all employees who work for first bank corporation. ii) Find the names, street addresses and cities of residence of all employees who work for first bank corporation and earn more than 200000 per annum. iii) Find the names of all employees in this database who live in the same city as the company for which they work. iv) Find the names of all employees who earn more than every employees of small bank corporation.	9	L3	CO1	PO1
b.	Consider the following schema diagram and write relational algebra expression for the requirements. Suppliers (sid: integer, sName: string, address: string) Parts (pid: integer, pname : string, colour: string) Catalog (sid: integer, pid : integer, cost: real) i) Find the name of suppliers who supply some red parts ii) Find all prices for parts that are red or green (a part may have different prices from different manufacturers) iii) Find the sIDs of all suppliers who supply a part that is red or green iv) Find the sIDs of all suppliers who supply a part that is red & green v) Find the name of all suppliers who supply a part that is red or green	9	L3	CO1	PO1
c.	Discuss about the categories of attributes in entity relationship model with example for each.	9	L	CO	PO1

Contd…3

UNIT - III **18**

4 a. The following relations keeps track of airline flight information:

Flight (flno: integer, from: string, to: string, distance: integer, departs: time, arrives : time, price: real)

Aircraft (aid : integer, aname: string, cruisingrange: integer)

Certified (eid: integer, aid: integer)

Employees (eid: integer, ename: string, salary: integer)

Write each of the following queries in SQL;

i) Find the names of aircraft such that all pilots certified to operate them have salaries more than $800000. 9 L3 CO4 PO1,2,3,4,5,9,12

ii) Find the names of pilots whose salary is less than the price of the cheapest route from Los Angeles to Honolulu.

iii) For all aircraft with cruising range over 1000 miles, find the name of the aircraft and the average salary of all pilots certified for this aircraft.

iv) Find the names of pilots certified for some Boeing aircraft.

b. Consider the following relations for an order processing database applications in a company

CUSTOMER(cust:int, cname: string, city: string)

ORDER(order:int, odate:date, cust:int, ord-amt:int)

ORDER-ITEM(order:int, item:int, qty:int)

ITEM(item:int, unitprice:int)

SHIPMENT(order:int, warehouse:int, ship-date;date)

WAREHOUSE(warehouse:int, city:string)

Write each of the following queries in SQL; 9 L3 CO4 PO1,2,3,4,5,9,12

i) Produce a listing: CUSTNAME, # of orders, AVG_ORDER_AMT, where the middle column is the total no. of orders by the customer and the last column is the average order amount for that customer.

ii) List the order # for orders that were shipped from all warehouses that the company has in a specified city.

iii) Demonstrate how you delete item # 10 from ITEM table and make the field null in the ORDER_ITEM table.

c. Consider the following database of student enrollment in courses and books adopted for each course:

STUDENT(regno: string, name:string, major:string, bdate;date)

COURSE (course:int, cname:string, dept:string) 9 L3 CO4 PO1,2,3,4,5,9,12

ENROLL(regno:string, course:int, marks:int)

Contd…4

BOOK_ADOPTION(course:int, sem:int, book-ISBN:int)

TEXT(book-ISBN:int, book-title:string, publisher: string, author: string)

Write each of the following queries in SQL;

i) Demonstrate how you add a new text book to the database and make this book be adopted by some department

ii) Produce a list of text books in alphabetical order for courses offered by CS department that use more than two books.

iii) List any department that has all its adopted books published by a specific publisher.

UNIT - IV **18**

5 a.	Why insertion, deletion and modification anomalies are considered bad? Illustrate with example.	9	L2	CO3	PO1,2,3
b.	Consider the relation schema R(A, B, C, D, E, F) and functional dependencies A->B, C->DF, AC->E, D->F. What is the primary key of this relation R? What is its highest normal form? Preserving the dependency, decompose R into third normal form.	9	L3	CO3	PO1,2,3
c.	With a suitable example, explain properties of Relational Decompositions.	9	L2	CO3	PO1,2,3

UNIT - V **18**

6 a.	Explain the multivalued dependency and join dependency with example.	9	L2	CO3	PO1,2,3
b.	Consider the three transactions T1, T2 and T3 and the schedules S1 and S2 given below. Draw the serializability (precedence) graphs for S1 and S2 and state whether each schedule is serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s). T1:r1(X); r1(Z); w1(X); T2:r2(Z); r2(Y); w2(Z); w2(Y); 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);	9	L3	CO1	PO1
c.	Check whether given schedule is serializable or not using precedence graph. Explain with algorithm. S1: R1(X) R2(Z) R1(Z) R3(X) R3(Y) W1(X) W3(Y) R2(Y) W2(Z) W2(Y)	9	L3	CO1	PO1

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