Hall Ticket No | | | | | | | | | | | Question Paper Code:AITC05

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal-500043, Hyderabad

B.Tech IV SEMESTER END EXAMINATIONS (REGULAR) - JULY 2022

Regulation:UG20

DATABASE MANAGEMENT SYSTEMS

Time: 3 Hours (Common to CSE | CSE(AI&ML) | CSE(DS) | CSE(CS) |CSIT | IT) Max Marks: 70

Answer ALL questions in Module I and II

Answer ONE out of two questions in Modules III, IV and V

(NOTE: Provision is given to answer TWO questions from among one of the Modules III / IV / V

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

MODULE – I

1. (a) Classify different types of attributes in entity relationship diagram with examples.
[BL: Understand| CO: 1|Marks: 7]

(b) Construct an ERD for a car dealership. The dealership sells both new and used cars, and it operates a service facility. Base your design on the following business rules:

i) A salesperson may sell many cars, but each car is sold by only one salesperson.

ii) A customer may buy many cars, but each car is bought by only one customer.

iii) A salesperson writes a single invoice for each car he or she sells.

iv) A customer gets an invoice for each car he or she buys.

v) A customer may come in just to have his or her car serviced; that is, a customer need not buy a car to be classified as a customer.

vi) When a customer takes one or more cars in for repair or service, one service ticket is written for each car.

vii) The car dealership maintains a service history for each of the cars serviced. The service records are referenced by the car's serial number.

viii) A car brought in for service can be worked on by many mechanics, and each mechanic may work on many cars.

ix) A car that is serviced may or may not need parts (e.g., adjusting a carburetor or cleaning a fuel injector nozzle does not require providing new parts).

[BL: Apply| CO: 1|Marks: 7]

MODULE – II

2. (a) Discuss in detail about relational calculus with examples.Differentiate tuple relational calculus with domain relational calculus. [BL: Understand| CO: 2|Marks: 7]

(b) Consider the following schema: suppliers(sid: integer, sname: string, address: string) parts(pid: integer, pname: string, color: string) catalog(sid: integer, pid: integer, cost: real) The key fields are underlined, and the domain of each field is listed after the field name. Therefore sid is the key for suppliers, pid is the key for parts, and sid and pid together form the key for catalog. The catalog relation lists the prices charged for parts by suppliers. Write the following queries in relational algebra, tuple relational calculus, and domain relational calculus:

i) Find the names of suppliers who supply some red part

ii) Find the sids of suppliers who supply some red or green part. [BL: Apply| CO: 2|Marks: 7]

MODULE – III

3. (a) How did the normal forms develop historically? Discuss about lossless join decomposition. [BL: Understand| CO: 3|Marks: 7]

   (b) Consider the following schema
   Employee details(Empid, fullname, managerId, date of joining, city)
   Employee salary (Empid, project, salary, variable) [BL: Apply| CO: 3|Marks: 7]

   i) Write an SQL query to fetch all the Employees who are also managers from the EmployeeDetails table.

   ii) Write an SQL query to remove duplicates from EmployeeDetails table without using a temporary table..

   iii) Write SQL query to find the 3rd highest salary from a table without using the TOP/limit keyword.

4. (a) Describe the concept of functional dependency and explain computation of closure of F. When are two sets of functional dependencies equivalent? [BL: Understand| CO: 4|Marks: 7]

   (b) For the example given in Table 1, set the table in normalized form.
   OID = Order ID, O_Date= Order date, CID = Customer ID, C_Name = customer name, C_State = customer's state, PID = project id, P_Desc =project Name, P_Price = Product Price, Qty = Quantity Purchased
   Note: 7, 5, 4 means three product IDs.
   Similarly 1, 1, 5 means three quantities.
   Functional dependencies are: OID -> O_Date, CID -> C_Name, PID -> P_Desc, PID -> P_Price, OID -> CID, CID -> C_State PID and OID -> Qty [BL: Apply| CO: 4|Marks: 7]

Table 1

OID	O_Date	CID	C_Name	C_State	PID	P_Desc	P_Price	Qty
1006	10/24/09	2	Apex	NC	7,5,4	Table, Desk, Chair	800, 325, 200	1,1,5
1007	10/25/09	6	Acme	GA	11,4	Dresser, Chair	500, 200	4,6

MODULE – IV

5. (a) Summarize multiple granularity? Explain the need of it. How to achieve multiple granularity? [BL: Understand| CO: 5|Marks: 7]

   (b) What is conflict serializable schedule? For the following schedule S, draw the precedence graph and decide if the schedule is conflict serializable.
   r2(Y), w2(Y), r3(Y), r1(X), w1(X), w3(Y), r2(X), r1(Y), w1(Y) [BL: Understand| CO: 5|Marks: 7]

6. (a) What is a transaction? Explain desirable properties of transactions. Discuss the transaction support in SQL. [BL: Understand| CO: 5|Marks: 7]

(b) Consider the given schedule S1 with transactions T1 and T2; if the value of X at the beginning of the transactions is 100, what will be the value of X at the end of the transactions? Also, find the problem with the schedule given in Table 2. [BL: Apply| CO: 5|Marks: 7]

Table 2

Transaction T1	Transaction T2
Read X	
X:X-20	
	Read X
	X:X-30
Write X	
	Write X

MODULE – V

7. (a) Explain how queries are processed in B+ tree? Explain any two ways of organizing records in files. [BL: Understand| CO: 6|Marks: 7]

   (b) Suppose that we are using extendable hashing on a file that contains records with the following search-key values: 2, 3, 5, 7, 11, 17, 19, 23, 29, 31

   Show the extendable hash structure for this file if the hash function is h(x) = x mod 8 and buckets can hold three records. [BL: Apply| CO: 6|Marks: 7]

8. (a) Demonstrate about the dynamic index structure. Differentiate between hash based indexing and tree based indexing. [BL: Understand| CO: 6|Marks: 7]

   (b) Assume (for simplicity in this exercise) that only one tuple fits in a block and memory holds at most 3 blocks. Show the runs created on each pass of the sort-merge algorithm, when applied to sort the following tuples on the first attribute: (kangaroo, 17), (wallaby, 21), (emu, 1), (wombat, 13), (platypus, 3), (lion, 8), (warthog, 4), (zebra, 11), (meerkat, 6), (hyena, 9), (hornbill, 2), (baboon, 12). [BL: Apply| CO: 6|Marks: 7]

– ∘∘○∘∘ –