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MCS-023

MCA (Revised) / BCA (Revised)
Term-End Examination
December, 2021

MCS-023 : INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

Time : 3 hours *Maximum Marks : 100*

(Weightage : 75%)

Note : *Question no.* ***1*** *is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) Consider the following two relations : Customer and Sales_order :

Customer

Cust_No	Name	Address
C10	N1	AD1
C11	N2	AD2

Sales_order

Order_No	Date	Cust_No
OD10	1/6/19	C10
OD11	1/7/19	NULL
OD12	11/7/19	C12
NULL	1/8/19	C11

The underlined attributes are primary keys. State with proper reasoning which, if any, of the entity integrity rules are violated for each of the above tuples (row) in Sales_order relation. *8*

(b) Define the serializable schedule. State with proper explanation whether the following schedule is serializable or not : *6*

T1	T2
read (X);	
	read (X);
write (Y);	
	write (Y);
commit	
	commit

(c) Define 2NF. The following are the functional dependencies in a relation :

(order_no, item_code) → primary key

item_code → price/unit

order_no → order_date

Is this relation in 2NF ? Justify.

In case the relation is not in 2NF, convert it in 2NF. *8*

(d) Consider the following relations in a database that maintains the official tours of sales executives in a marketing company.

Sales_Executive (SEID, Dept_No, Joining_year)

Official_Tour (Tour_ID, from_city, to_city, dep_date, ret_date, SEID)

Expenditure (Tour_ID, Amt_spent)

Write the queries using SQL : 6

(i) Find the details of Official_Tour relation whose expenses exceed ₹ 5000.

(ii) Find the total official tour expenses incurred by sales executives from Dept_No = DN1.

(iii) Find the SEID's of sales executives who took trips to Bangalore for seven days with expenses ranging between ₹ 5000 and ₹ 9000.

(e) An academic organization has a student entity set which can be of two types — Full time and Part time as shown below :

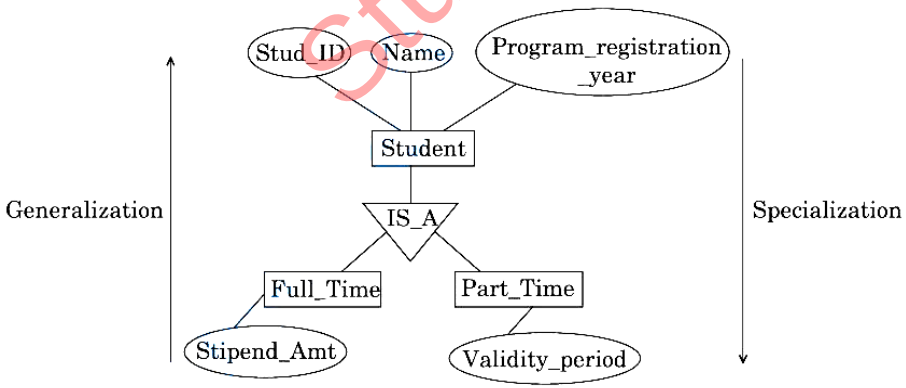

Figure : Generalization/Specialization Hierarchy

Convert the above diagram into tables. 6

(f) What are the two advantages of a B-Tree as an index ? Write the important features of B-Tree of order N. 6

2. (a) Define a view. Explain with the help of an example. Also specify the conditions that a view must meet in order to allow updates. *8*

(b) Identify the following symbols in relational algebra. What operations do they perform ? *4*

(i) σ

(ii) π

(c) Consider the following relation Person :

Person

P-ID	Name	Age	Salary
P-ID1	Ram	20	15000.00
P-ID2	Shyam	25	25000.00
P-ID3	Sita	30	30000.00
P-ID4	Gita	35	35000.00

What will be the output of the following operations on the Person relation ? *4*

(i) $\sigma >= 25$ (Person)

(ii) π age, salary (Person)

(d) Where are Having and Group by clauses used ?

What will be the output of the following SQL statement on the Person relation defined above in Q. no. 2(c) ? *4*

```
Select Name, Max (Salary)
        From Person
        Group by Name Having Max (Salary) > 15000
```

3. (a) With the help of an example for each, explain the following : *2×3=6*

(i) Binary Lock

(ii) Multiple-mode Locks

(b) Define primary and clustering indexes. Briefly discuss implementation of clustering indexes. *8*

(c) Discuss the advantages and disadvantages of data replication. What are the objectives of complete and selective replication ? *6*

4. (a) What is use of a precedence graph in database ? Write all the steps for constructing a precedence graph. Suppose there are two transactions T1 and T2. Draw an edge between T1 and T2, if T2 has written on item X first and T1 writes on the same item later. *10*

(b) What is Log-Based Recovery System ? Explain the type of information kept in a log about transaction. Which type of transactions are selected for REDO and UNDO for database recovery ? Explain with an example. *10*

5. (a) Describe the following client-server architecture with the help of a diagram : *2×5=10*

(i) 2-tier

(ii) 3-tier

(b) Explain the following concepts with the help of suitable example : *2×5=10*

(i) Lossless decomposition

(ii) Dependency preserving decomposition