[This question paper contains 10 printed pages.]

Your Roll No...............

Sr. No. of Question Paper : 2210   IC

Unique Paper Code   : 32341403

Name of the Paper   : Database Management Systems

Name of the Course   : B.Sc. (H) Computer Science

Semester   : IV

Duration : 3 Hours   Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. **Section A** is compulsory.

3. Attempt any **four** questions from **Section B**.

4. Parts of a question must be answered together.

5. Marks are indicated against each question.

Section A

1. (a) In the Restaurant relation given below :   (4)

P.T.O.

2210   2

RESTAURANT

DishNo	Dish_Desc	Price (Rs.)	Bill_No	Qty	Table_No	Day	Waiter
D1	Idli	60	B1	2	T1	Mon	Wt1
D2	Dosa	80	B2	3	T1	Mon	Wt2
D3	Poha	50	B3	2	T3	Tues	Wt3

Find out which of the following dependencies are violated? Justify your answer.

    (i) Dish_Desc $\rightarrow$ Price

    (ii) Bill_No $\rightarrow$ Qty

(b) What are the four different types of database users. Specify their roles.   (4)

(c) Justify that primary key cannot be null.   (2)

(d) Two transactions T1 and T2 are executing concurrently (assuming concurrency control is not in place) with initial value of X=50 and Y=5

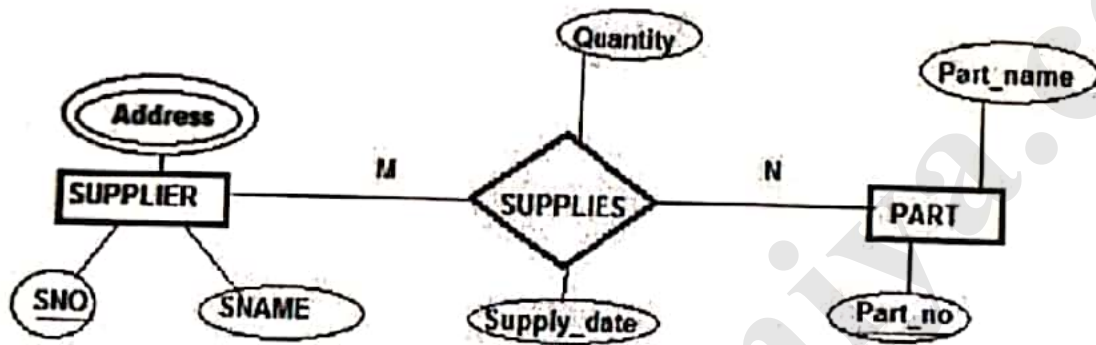| T1	T2
read_item(X)	
X = X+10	
	read_item(X)
	X = X+Y
write_Item(X)	
read_item(Y)	
	write_Item(X)

After the completion of the transactions T1 and T2 what will be the value of X. Is this the correct value, if not specify the problem.   (4)

(e) Map the following ER diagram to their corresponding relational tables.   (4)

(f) Consider the tables T1 and T2 given below :   (2×3)

T1

A	B	C
1	3	1
3	2	1

T2

X	Y	Z
1	3	1
2	5	4

Show the results of the following operations :

(i) $T1 \bowtie_{T1.X=T2.C} T2$

(ii) $T1 \cap T2$

(iii) $\Pi_{T1.Z, T2.C} (\sigma_{T1.Y=T2.B} (T1 \times T2))$

P.T.O.

2210 4

(g) Why is it necessary to give role names in a recursive relationship? (2)

(h) Give SQL command to create a relational table T having attributes A, B, C, D where : (5)

- A is a number (maximum 10 digits in length) and cannot contain null values.

- B is a character string (50 maximum characters in length)

- (A, B) form the primary key

- C and D are integer values.

- Default value of C is 6

- D is a foreign key referring to E from another table S of the database (assuming S is already created).

(i) Give EER diagram illustrating each of the following : (4)

　　(i) total-disjoint specialization and

　　(ii) partial-disjoint specialization

Section B

2. A university registrar's office maintains data about the following entities : (10)

(i) Courses, including number, title, credits, syllabus, and prerequisites;

(ii) Course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;

(iii) Students, including student-id, name, and program;

(iv) Instructors, including identification number, name, department, and title.

Design an ER schema for this application. Specify key attribute of each entity type and structural constraints on each relationship type.

3. (a) Consider the following relations :   (1+1+2+2)

CUSTOMER(Customer#, Customer_Name, City, Product#)

PRODUCT(Prod#, Prod_Name, Prod_Details)

(i) Write a command to insert a new attribute Price in PRODUCT relation.

(ii) Write a command to delete rows from PRODUCT table for Prod_Name = 'P2'.

P.T.O.

(iii) Retrieve the list of customers who have purchased product with `Prod_Name` as 'P3' and 'P4'.

(iv) Retrieve the total number of products bought by each customer.

(b) Two sets of FDs for a relation R (A, B, C, D, E) are given as follows :   (4)

$$F = \{A \rightarrow B, \ AB \rightarrow C, \ D \rightarrow AC, \ D \rightarrow E\} \text{ and}$$

$$G = \{A \rightarrow BC, \ D \rightarrow AE\}$$

Find out whether F and G equivalent. Justify your answer.

4. (a) Consider the following relation :   (6)

STUDENT

ID	NAME	COURSE	PHONENO.	PROJECTNO	PROJECTNAME

Assume that ID is primary key and the following dependency holds in the above relation:

PROJECTNO → PROJECTNAME

2210   7

• Give an instance of the STUDENT table and in the context of that instance illustrate the following concepts :

  (i) updation anomaly

  (ii) insertion anomaly

  (iii) deletion anomaly

(b) For the given binary relationship, suggest the cardinality ratio of the relationship based on the general context of entity types and state the context clearly :   (4)

Entity1	**Entity2**
College	Principal
Student	Course
Course	Book
Book	Author

5. Consider the given relations :

WORKER

ID	Name	Salary	JoiningDate	Department#

DEPARTMENT

DepID	DName	Location	Mgr#

P.T.O.

Write following queries in relational algebra for the relations given above :—   (2×5)

(i) Display name of all the workers along with their department name and manager name of that department.

(ii) Count number of workers working in finance department.

(iii) Show number of workers working in each department along with department name.

(iv) **Find Average salary of each department.**

(v) Retrieve the names of workers who have joined after the year 2010.

6. (a) Consider the following relation :   (2+3)

BOOK

BookID	GenreID	GenreType	Price

Following dependencies hold in the relation :

BookID → GenreID, Price

GenreID → GenreType

(i) Find Primary key of the above relation.

(ii) Apply normalization to convert it into 3NF stating the reasons behind each decomposition.

(b) Consider an ordered file with number of records $r = 30000$ stored on a disk with block size $B = 1024$ bytes and record size $= 100$ bytes.

(i) Find the blocking factor for the file.

(ii) The number of blocks needed for the file and

(iii) Number of block accesses needed by a binary search on this data file.

(iv) How many block accesses would be required if you create a primary index on a key field of size 9 bytes and size of block pointer 6 bytes.   (1+1+1+2)

7.   (a) Consider a file with the following key values: 19, 5, 12, 7, 40, 3, 15. Suppose these search key values are inserted in the given order in a B+ tree of order $p = 3$. Show the tree at each step.   (6)

(b) Consider the database schema given below :–   (4)

P.T.O.

Book(Book Id, Title, Publisher)

Book_copies(Book Id, Branch Id, No. of Copies)

Library_branch(Branch Id, BranchName, Address)

Book_Authors(Book Id, AuthorName)

Depict the referential integrity constraints diagrammatically using schema diagram.

(1400)

TUTORIALSDUNIYA.COM

Visit https://www.tutorialsduniya.com to get Delhi University Previous Year Question Papers of all the following courses,

- General Electives
- B.Sc. (H) Computer Science
- B.Sc. (H) Chemistry
- B.Sc. (H) Electronics
- B.Sc. (H) Botany
- B.Sc. (H) Home Science
- B.Com (H)
- B.Sc. Physical Science
- B.A. Programme
- B.A. (H) Psychology
- B.A. (H) Economics
- B.A. (H) Hindi
- B.A. (H) Journalism
- B.A. (H) Political Science
- B.A. (H) Sanskrit

- AECC
- B.Sc. (H) Mathematics
- B.Sc. (H) Physics
- B.Sc. (H) Statistics
- B.Sc. (H) Geology
- B.Sc. (H) Zoology
- B.Sc. (H) Microbiology
- B.Sc. Mathematical Science
- BMS
- B.Sc. Life Science
- B.A. (H) English
- B.A. (H) History
- B.A. (H) Philosophy
- B.A. (H) Geography
- B.A. (H) Sociology

THEFESTFEVER.COM

Visit TheFestFever.com to know about all Delhi College Events happening in and around your Campus.

Our aim is to connect students from campuses all over Delhi by making them aware of all Technical, Cultural, Management fests, workshops, Seminars organized by each college in Delhi.