

- (a) Display details of movies produced by PNumber = 11.
- (b) List director names and number of movies directed by them.
- (c) Find movie names directed by 'A K GHOSH' and produced in 'DELHI'.

[This question paper contains 16 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3327

I

Unique Paper Code : 2344002001

Name of the Paper : Database Management Systems

Name of the Course : **Computer Science Generic Elective (NEP-UGCF-2022 GE)**

Semester : V

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll. No. on the top immediately on receipt of this question paper.
2. The paper has two sections. Section A is compulsory.
3. Attempt any four questions from Section B.
4. Parts of the question must be answered together.

Section A

1. (i) Fill in the blanks: (3)

(a) A relationship of degree three is called _____ .

(b) SQL clause used for pattern matching is _____ .

(c) The language used for defining a View in a database is _____ .

(ii) What is a primary index? State whether it is a dense or a sparse index. Justify your answer.

(3)

(iii) Consider the following table and the SQL query given below: (3)

MANAGER

MSSn	Name	StartDt	Salary	DNo
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SELECT StartDt FROM MANAGER
WHERE Salary > 30000 AND DNo = 12;
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Give an equivalent relational algebraic expression for the above query.

EMPLOYEE

EmpId	EmpName	Level	Department	Salary
E1	Smith	1	D1	50,000
E2	Jane	1	D2	40,000
E3	Bob	2	D1	60,000

Write SQL statements to perform the following operations on the above table:

(a) Make EmpId the primary key of the EMPLOYEE table.

(b) Change the Level of "Jane" to 2.

(c) Delete the EMPLOYEE whose EmpId is "E1" and EmpName is "Smith".

(d) Add a column ADDRESS with a suitable datatype.

(ii) Write the relational algebraic expression to perform the following operations on the relational schema given below: (7)

PRODUCTION HOUSE

PNumber	PName	OwnerName	TotalMoviesProduced	City
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MOVIE

Mid	MName	DirectorName	PNum
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TRAIN

TrainNo	SeatNo	Name	ArrivalTime	Fare
CHAR(6)	INT	CHAR(10)	DATETIME	DECIMAL(8,2)
CHECK(SeatNo >= 1 and SeatNo <= 100)				

Which of the following values entered for the columns are valid? Justify your answer for each case.

(a) 'JAMES1' for Name

(b) 11500' for Fare

(c) 123 for SeatNo

(d) 2024-12-29 22:17:30' for Arrival Time

(e) T12345' for TrainNo

7 (i) Consider the following table: (8)

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(iv) Identify primary keys and foreign keys for each relation given below. (3)

SUPPLIER

SNo	SName	SCity
-----	-------	-------

PART

PNo	PName	PType
-----	-------	-------

ORDER

SNo	PNo	Qty
-----	-----	-----

(v) In each of the following binary relations, suggest the cardinality ratio between Entity 1 and Entity 2. Justify your answer, stating any assumptions you make. (3)

ENTITY1		ENTITY2
SALESPERSON	-----	PRODUCT
CLASSROOM	-----	BLACKBOARD
COUNTRY	-----	PAST PRESIDENT

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- (vi) What is a Candidate key? Identify two candidate keys in the table given below. (3)

CAR

LicenseNo	Make	EngineSerialNo	Model	Year
DL980-ADF	FORD	W927354	Mustang	2011
HR456-GVB	TOYOTA	T276532	Camry	2009
BR761-RTE	MERCEDES	H452187	190-D	2010
DL923-YUT	JAGUAR	N267839	XJS	2012
HR452-UIO	TOYOTA	C458941	Corolla	2008
HR567-IUE	JAGUAR	Y563409	XJS	2012

- (vii) Consider the following relations: (3)

LANDLORD

FName	LName
Aniket	Sharma
Bhimsen	Rao
Alka	Gupta
Manish	Malhotra

TENANT

FName	LName
Alka	Sharma
Alka	Gupta
Yashika	Khuran

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R1

P	Q	R
10	a	5
15	b	8
25	a	6

R2

A	B	C
10	b	6
25	c	3
10	b	5

- a) $R1 \bowtie_{R1.P = R2.A} R2$
 b) $R1 \bowtie_{R1.Q = R2.B} R2$
 c) $R1 \cup R2$

- (ii) Consider the relational schema S (U, V, W, X, Y, Z) and a set of (5) functional dependencies denoted by $FD = \{U \rightarrow V, VW \rightarrow X, Y \rightarrow W, X \rightarrow U\}$. Determine the UVZ^+ and XZ^+ .

Which of them can serve as the candidate key?

(5)

- (iii) Consider the following table:

(5)

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- (ii) Consider the following relation: (9)

VEHICLE SALE (Vehicle#, Date sold,
Salesperson#, Commission%, Discount amt)

Assume that a vehicle may be sold by multiple salespersons, make {Vehicle#, Salesperson#} as the primary key. Additional dependencies are:

- Date_sold $\rightarrow$ Discount amt
- Salesperson# $\rightarrow$ Commission%

Based on the given primary key, is this relation in 1NF, 2NF, or 3NF? Give reasons for your answers. How would you successively normalize it?

- 6 (i) Consider the two relations R1 and R2 given below. Show the results of the following operations. (5)

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Find the output of the following:

(a) LANDLORD — TENANT

(b) TENANT U LANDLORD

- (viii) Write any three SQL commands for each of the following: (3)

(a) DDL

(b) DML

- (ix) Consider the following table: (3)

WORKER

WId	Name	Bdate	Salary	Address	Sex	DNo
-----	------	-------	--------	---------	-----	-----

Create a view V1 on the above table. V1 should have department number and number of workers in each department.

- (x) Consider the tables given below: (3)

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EMPLOYEE

Name	SSn	Bdate	Salary	Super SSn	DNo
John	123456789	1965-01-09	30000	12563478	1
Rose	999887777	1955-12-08	40000	56342190	1
Rana	888665555	1968-01-19	25000	NULL	4

DEPARTMENT

DNumber	DName	Mgr SSn	Mgr Start Date
1	Headquarter	333445555	1988-05-22
3	Admin	999887777	1995-01-01
4	Research	888665555	1981-06-19

Which integrity constraints are violated by the following statements? Justify your answer.

- (a) Insert <Cecilia', NULL, '1960-04-05', 28000, NULL, 4> into EMPLOYEE.
- (b) Insert <Sammy', '677678989', '1965-04-05', 29000, '987654321', 7> into EMPLOYEE.

Section B

- 2 (i) Differentiate between the following: (8)
- (a) Alter and Update command
- (b) Tuple and Attribute

- (a) Assume that the initial value of variable A is 20. Compute the value of A after the given schedule is executed.
- (b) What will be the value of A if Transaction Tr2 fails after line number 3? Explain the reason for the inconsistency.

- 5 (i) Identify and correct the errors in the following SQL queries, if any: (6)

CLIENT

ClientId	Name	Age	City	Country
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- (a) SELECT COUNT (ClientId), Country
FROM Client
GROUP BY Country
WHERE COUNT (ClientId) > 5;
- (b) SELECT ClientId, City
FROM Client
WHERE Name LIKE "M%"
ORDER BY DESC;

- Each student has a roll no, name, date of birth, address, gender.
- Many students can enrol in a section.

(a) Design an ER diagram for the above database.

(b) Identify key attributes of each entity type.

(c) Identify cardinality ratios and participation constraints.

State any assumptions that you make for drawing the diagram.

(ii) Consider the following transactions. (5)

Tr1	Tr2	Line No
Read(A); A := A-4; Write(A);	Read(A);	1
	A := A+5;	2
	Write(A);	3
		4
		5
		6
	Read(B);	7

(c) Having and Where clause

(d) Key and Superkey

(ii) The Book_Issue_System database is given below. (7)

EMPLOYEE (EmpNo, EName, Office, Age)

BOOK (ISBN, Title, Authors, PublisherId)

LOAN (EmpNo, ISBN, Date, LoanAmt)

PUBLISHER (PublisherId, PName, Address, Phone)

Write SQL query for the following:

(a) List details of employees whose name starts with 'A'.

(b) List the titles of books where loan amount is greater than Rs. 100/-. c) List PublisherId and names of publishers who have published more than 10 books.

3. (i) (a) Write SQL command to create a DEPENDENT table. The table should include the following attributes and constraints: (7)

- Essn (string): Cannot be Null.
- Dependent_name (string): Cannot be Null.
- Essn, Dependent_name: Primary key. Sex (char).
- Bdate (date).
- Relationship (string).
- Essn: Foreign Key referencing an EMPLOYEE table having primary key as Ssn.

(b) Insert a row into the DEPENDENT table with the following values:

787890781	Anuj Kumar	M	1986-04-05	Daughter
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(2)

(ii) Consider the following relation state: (6)

A	B	C	D	E
A1	B1	20	D1	8
A2	B2	30	D3	3
A3	B3	20	D3	5
A1	B1	30	D2	4
A1	B3	20	D1	8

Which of the following functional dependencies do not hold for the above relations state? Justify your answer.

(a) B → C

(b) AD → E

(c) AB → E

4 (i) Consider the following set of requirements for a COLLEGE database that is used to keep track of student's transcripts: (10)

- Each department is described by a department code, department name, HoD, Degree Program, Office phone.
- A department can have many sections under it.
- Each Faculty is defined by FacultyId, Name, Qualifications.
- A faculty belongs to a department and can teach many sections and their students.
- Each section has a section code, faculty, semester, course.

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