Section- A

Note: Attempt All Three Questions. 3 x 2 = 6 Marks

1. What is the difference between database state and database schema?
2. What are the responsibilities of Database Administrator?
3. What are the various problems that arise due to bad database design?

Section- B

Note: Attempt All Three Questions. 3 x 3= 9 Marks

1. Differentiate between stored vs derived attributes. What do you understand by recursive relationship? (3)
2. Describe the three-schema architecture. Why do we need mapping between schema levels? (3)
3. Let R= (A, B, C, D, E, F) be a relation schema with the following dependencies: C->F, E->A, EC->D, A->B. Find the key of R? (3)

Section – C

Note: Attempt Any Three Questions. 3 x 5 = 15 Marks

1. What are the set operation in relational algebra explain each and also explain what is the union Compatibility? (5)
2. What do you understand by data independence? What is difference between logical data independence and physical data independence? (5)

3. Consider the following schema, and write the following query in Relational Algebra (5)

Suppliers (Sid, sname, address)

Parts (pid, pname, color)

Catalog (sid, pid, cost)

I. Find the name of suppliers who supply some red part

II. Find the sid of supplier who supply red or green part both)

III. Find the sid of supplier who supply every part

IV. Find the avg cost

V. Delete record of that suppliers where sname is 'RAJ'

4. With a suitable example, describe 1st,2nd and 3rd Normal form. (5)

Printed Pages: 02 **University Roll No.....**

Mid-Term Examination, Even Semester 2020-21

B.Tech. (CSF, CCV, DA, IoT, AIML), 2nd Year, 4th Semester

Applied Database Management System-BCSC 0014

Time :2 Hours **Maximum Marks: 30**

Section- A

Note: Attempt All Three Questions. 3 x 2 = 6 Marks

1. Consider a relation R(A,B,C,D,E)with the following dependencies: AB->C,CD->E,DE->B.Is AB a candidate key of this relation? if not is ABD?
2. What is entity type, entity set? Explain the difference among an entity an entity type and an entity set.
3. Differentiate between single valued attribute vs multiple valued attributes with suitable diagram.

Section- B

Note: Attempt All Three Questions. 3 x 3 =9 Marks

1. Discuss insertion deletion and modification anomalies? Illustrate with example.
2. Consider the following schema, and write the following query in Relational Algebra
   Employee (emp_id, emp_name, emp_street, emp_city)
   Works (emp_id, company_id, salary)
   Located_in (company_code, company_name, company_city)
   i. Find the names of the emp who work in company 'SANOMED'.

Algebra

Employee (emp_ _city)

Works (emp_id, company_id, salary)

Located_in (company_code, company_name, company_city)

i. Find the names of the emp who work in company 'SANOMED'.

ii. Find the name of all employees who work for a company located at 'LUCKNOW'.

iii. Find the names of the employees who do not work for company 'SANOMED'.

iv. Find the names of the employees who work for the company located at city in which they live.

v. Delete the record of emp id 1001.

'delhi'> in emp table

iv. Find the names of the employees who work for the company located at city in which they live.

v. Delete the record of emp id 1001.

vi. Add <1006,'jay','xyz','delhi'> in emp table

3. What do you understand by data independence and also explain the types of data independence?

Section – C

Note: Attempt Any Three Questions. 3 x 5 = 15 Marks

1. Consider the following two relation R and S.

R

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

S

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

Then find the following

i) $R \bowtie_{R.P=S.A} S$ ii) $R \bowtie_{R.Q=S.B} S$ iii) $R \bowtie_{R.P=S.A} S$ iv) $R \cup S$ v) $R \cap S$

2.

i. What is the role database administrator? Explain each role in brief.

ii. Explain the first, second and third normal form with example?

Then find the following

i) $R \bowtie_{R.P=S.A} S$ ii) $R \bowtie_{R.Q=S.B} S$ iii) $R \bowtie_{R.P=S.A} S$ iv) $R \cup S$ v) $R \cap S$

2.

i. What is the role database administrator? Explain each role in brief.

ii. Explain the first, second and third normal form with example?

3. In a relation schema R(ABCDEH), if F = {A→BCD, CD→E, E→C
D→AH, ABH→BD, DH→BC} then find out canonical Cover of F.

4.

i. Given R(ABCDE, ~~with the functional dependencies~~
R(AB→CD,A→E,C→D) then check the decomposition
R1(ABC),R2(BCD),R3(CDE) is loss less or not.

ii. What do you understand by DDL and DML?

ion – A

3 x 2 = 6 Marks

I. List four significant differences between a file-processing system and a DBMS.

II. What is the importance of data independence in the context of DBMS? Explain with suitable examples.

III. Enlist various categories of End Users in DBMS.

Section – B

3 x 3 = 9 Marks

I. Construct an ER Diagram for Company having following details:

- Company organized into DEPARTMENT. Each department has unique name and a particular employee who manages the department. Start date for the manager is recorded. Department may have several locations.
- A department controls a number of PROJECT. Projects have a unique name, number and a single location.
- Company's EMPLOYEE name, ssno, address, salary, sex and birth date are recorded. An employee is assigned to one department, but may work for several projects (not necessarily controlled by her dept). Number of hours/week an employee works on each project is recorded; The immediate supervisor for the employee.
- Employee's DEPENDENT are tracked for health insurance purposes (dependent name, birthdate, relationship to employee).

II. What are the different levels of abstraction in the DBMS? Explain each level in detail.

III. **Give the following queries in the relational algebra using the relational schema:**

student(id, name)
enrolledIn(id, code)
subject(code, **lecturer**)

a) **What are the names of students enrolled in cs3020?**
b) **What are the names of students in both cs1500 and cs1200?**
c) **What are the names of students taking a subject taught by Roger.**

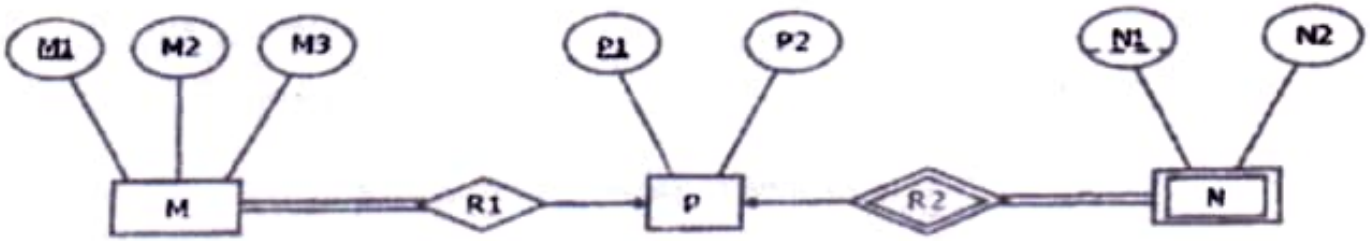
Time: 1 Hour [redacted] Maximum Marks: 15

Section – A

Note: Attempt All Questions. 3 x 2 = 6 Marks

I. Let a relation R have attributes {a1, a2, a3, a4} & a1 is the candidate key. Then how many super keys are possible? Write down all the super keys.

II. Consider the following ER diagram:



How many minimum numbers of tables needed to represent the above ER diagram and construct the appropriate tables?

III. Differentiate between the following:

a. Intension and Extension

b. Candidate key, Surrogate key and Unique key

Note: Attempt All Questions. 3 x 3 = 9 Marks

I. A database is being constructed to keep track of the teams and games of a sports league. A team has a number of players, not all of whom participate in each game. It is desired to keep track of the players participating in each game for each team, the positions they played in that game, and the result of the game. Design an ER schema diagram for this application, stating any assumptions you make. Choose your favorite team sport (e.g., soccer, baseball, football)

II. What are the different levels of abstraction in the DBMS? Explain each level in detail.

III. Consider the relational database schema:

employee(empno, name, office, age)
books(isbn, title, authors, publisher)
loan(empno, isbn, date)

where the primary keys are underlined. Give an expression in the relational algebra to express each of the following queries:

a. Find the names of employees who have borrowed a book published by McGraw-Hill.

b. Find the name of all employees who have borrowed all book published by McGraw.

c. Find the names of employees who have borrowed more than five different books published by McGraw-Hill.

Note: Attempt All Questions **(1x5=5)**

I. Define Database Management System.

II. What do you understand by entity integrity constraint in relational model?

III. How is sophisticated user different from end user in a database system?

IV. Give examples of physical and logical data independence in database systems.

V. What does the following tuple relational expression represent?

$$\forall t \in r(P(t))$$

Section B

Note: Attempt any Three Questions **(2x3=6)**

I. Identify the following in the given Student Relation:

Student (Stu_id, Name, DOB, Course, Section, Phno, Email)

I. Candidate Key
II. Primary Key
III. Alternate Key
IV. Key Attribute
V. Non-key Attribute
VI. Multi-valued Attribute

II. Suppose (A, B) and (C, D) are two relation schemas. Let r1 and r2 be the corresponding relation instances. B is a foreign key that refers to C in r2. If data in r1 and r2 satisfy referential integrity constraints, which of the $\pi_B(r1) - \pi_C(r2)$ or

be the correspond . B is a foreign key that refers to C in r2. If data in r1 and r2 satisfy referential integrity constraints, which of the $\pi_B(r1) - \pi_C(r2)$ or $\pi_C(r2) - \pi_B(r1)$ will be NULL and why?

III. Consider the relations A, B, C as given below. Assume that the schema of A U B is the same as that of A. Find the result of the following relational algebra expression, where ∞ denotes the join operation: $(A \cup B) \infty_{A.Id>40 \text{ or } C.Id<15} C$

Table A

Id	Name	Age
12	Arun	60
15	Shreya	24
99	Rohit	11

Table B

Id	Name	Age
15	Shreya	24
25	Hari	40
98	Rohit	20
99	Rohit	11

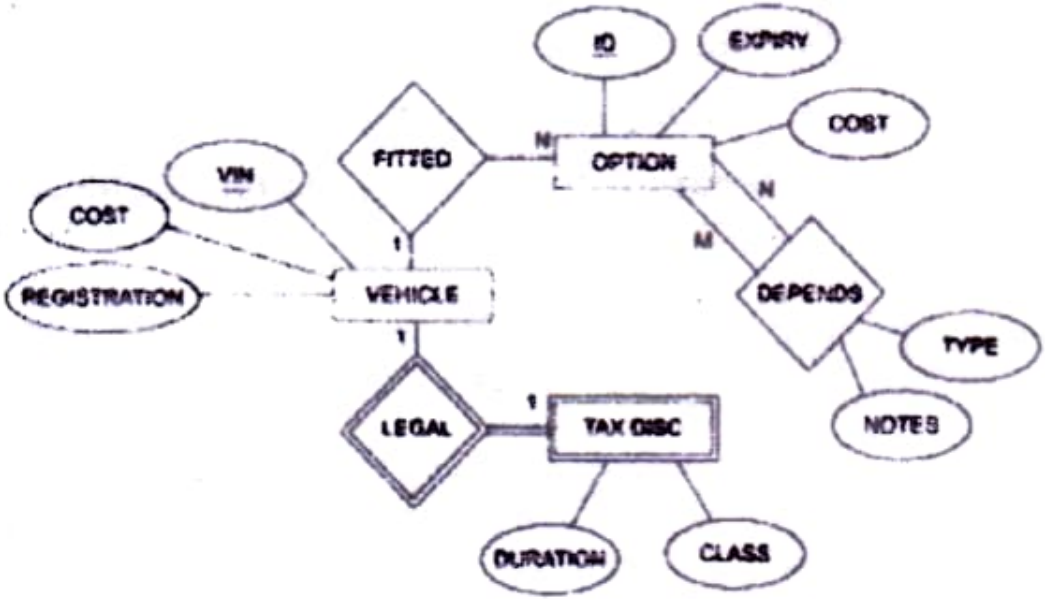
Table C

Id	Phone	Area
10	2200	02
99	2100	01

IV. Convert the following ER diagram to relational tables:

15 Shreya 24 10 2200 02
99 Rohit 11 98 Rohit 20 99 2100 01
99 Rohit 11

IV. Convert the following ER diagram to relational tables:



Section C

Note: Attempt any Three Questions **(3x3=9)**

I. Explain the three schema architecture of database systems by clearly defining the different levels and mapping among them.

II. How does database system offer the advantages of atomicity and concurrent updates over file system? Explain with example.

III. Design an ER/EER Diagram that models the following objects and relationships in the world of football: teams, players, games, managers and contracts. Note that:

III. Design an ER/EER Diagram that models the following objects and relationships in the world of football: teams, players, games, managers and contracts. Note that:

- Each team has a unique team name, and a city it plays in.
- Each person (as part of the FIFA-world) has a unique ssn and a name. Additionally, for players their weight, height, position and birth dates are of importance.
- Players have a contract with at most one team and receive a salary for their services,
- Each team can have more than one manager; managers can work for more than one team and receive a salary for each of their employments.
- Players cannot be managers.
- A game involves a home-team and visiting-team; additionally, the day of the game, and the score of the game are of importance; teams play each other several time[illegible] day!).
- For each game played we like to know which players participated in

• A game involves a home team and a visiting team; additionally, the day of the game, and the score of the game are of importance; teams play each other several times in a season (not on the same day!).

• For each game played we like to know which players participated in the game and how many minutes they played.

Indicate the keys of entity types, cardinalities for each relationship type; assign roles (role names) to each relationship if there are ambiguities. State clearly any assumptions you make.

IV. Consider the relational schema given below, where the primary keys are underlined.

employee (person-name, street, city)
works (person-name, company-name, salary)
company (company-name, city)
manages (person-name, manager-name)

Give an expression in the Relational Algebra to express each of the following queries:

1. Find the names, street address, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000 per annum.

2. Find the names of all employees who live in the same city and on the same street as do their managers.

Give an expression in the Relational Algebra to express each of the following queries:

1. Find the names, street address, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000 per annum.

2. Find the names of all employees who live in the same city and on the same street as do their managers.

3. Give all managers in this database a 10 percent salary raise, unless the salary would be greater than $100,000. In such cases, give only a 3 percent raise.

4. Find those companies whose employees earn a higher salary, on average, than the average salary at First Bank Corporation.