Indian Institute of Information Technology Ranchi

Department of CSE/ECE

B. Tech Mid Semester Examination – Autumn Semester 2022-23

Semester: 5th **Branch:** CSE/ECE

Course Code: CS-3001 **Course Name:** Database management systems (DBMS)

QUESTION PAPER

Duration: 2 hrs. **Max Marks: 60**

Instructions:

(1) Answer all the questions. Number in [] indicates marks.

(2) Any missing data can be assumed suitably.

Roll No. 2020UCS065R

1 **(a)** A university registrar's office maintains data about the following entities: **[5]**

(a) courses, including number, title, credits, syllabus, and prerequisites;
(b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
(c) students, including student-id, name, and program; and
(d) instructors, including identification number, name, department, and title.
Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled. Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.

(b) List five responsibilities of a database management system. For each responsibility, explain the problems that would arise if the responsibility were not discharged. **[8]**

(c) Let R(a,b,c) and S(d,e,f) *be two relations in which d is the foreign key of S that refers to the primary key a of R. Consider the following four operations R and S:* **[2]**

1) insert *into R*
2) *insert into S*
3) *delete from R*
4) *delete from S*

Explain, which of the following is true about the referential integrity constraint above?

a. none of 1, 2, 3 or 4 can cause its violation
b. all of 1,2,3 and 4 can cause its violation
c. both 1 and 4 can cause its violation
d. both 2 and 3 can cause its violation

2 **(a)** Consider the given below relational database, where the primary keys are underlined. Give an expression in the SQL to express each of the following queries: **[6]**

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

i). Find the names and cities of residence of all employees who work for First Bank Corporation.

ii). 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.

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

(b) Explain the distinctions among the terms primary key, candidate key, and super key with the help of suitable examples. **[5]**

(c) What is the difference between WHERE and HAVING in SQL? Explain with the help of suitable example. Can we use HAVING clause without using GROUP BY clause? [4]

3 (a) Consider a relational database containing the following schemas. What will be the result of the following query? [2]

Catalogue

sno	pno	cost
S1	P1	150
S1	P2	50
S1	P3	100
S2	P4	200
S2	P5	250
S3	P1	250
S3	P2	150
S3	P5	300
S3	P4	250

Suppliers

sno	sname	location
S1	M/s Royal furniture	Delhi
S2	M/s Balaji furniture	Bangalore
S3	M/s Premium furniture	Chennai

Parts

pno	pname	part_spec
P1	Table	Wood
P2	Chair	Wood
P3	Table	Steel
P4	Almirah	Steel
P5	Almirah	Wood

```
SELECT s.sno, s.sname
FROM Suppliers s, Catalogue c
WHERE s.sno=c.sno AND
    cost > (SELECT AVG (cost)
            FROM Catalogue
            WHERE pno = 'P4'
            GROUP BY pno);
```

(b) Discuss the importance of view in DBMS. Write the syntax of creating and inserting information in view. How updation in view is not possible in all cases? [5]

(c) Given a relation R(P, Q, R, S, T, U, V, W, X, Y) and Functional Dependency set FD = { PQ → R, PS → VW, QS → TU, P → X, W → Y }, determine whether the given R is in 3NF? If not convert it into 3 NF. [8]

4 (a) Consider the following relational database schema consisting of the four relation schemas: [5]

passenger (pid, pname, pgender, pcity)
agency (aid, aname, acity)
flight (fid, fdate, time, src, dest)
booking (pid, aid, fid, fdate)

Answer the following questions using relational algebra.

a.) Find the passenger names for those who do not have any bookings in any flights.

b.) Get the details of flights that are scheduled on both dates 01/12/2020 and 02/12/2020 at 16:00 hours.

(b) Explain the result of following relation algebra. [10]

1. Person (SSN, Name, Address, Hobby)
   Professor (Id, Name, Office, Phone)

   a) πName,address, (Person) and πName,office (Professor) are they union compatible?

   b) πName (Person) and πName (Professor) are they set difference compatible?

2. Transcript (StudId, CrsCode, Sem, Grade)
   Teaching (ProfId, CrsCode, Sem)

   a) πStudId, CrsCode (σGrade≠ 'F' (Transcript)) / πCrsCode(σSemester='2000' (Teaching))

   b) πStudId (σCrsCode ≠ CrsCode2 (Transcript ⋈ Transcript [StudId, CrsCode2, Sem2, Grade2]))

Best of Luck