Indian Institute of Information Technology, Sri City, Chittoor

Name of the Exam: Database Management Systems Duration: 1.5 hr Max. Marks: 20

Roll No.:_____Room No.: _____Seat No.: _____

Name: _____Invigilator's Signature: _____

Instructions: 1. All questions have to be answered in the box space provided only.
2. You have to do rough work in the question paper if required in the last sheet.

Q1. Multiple Choice Questions. Write the answer for the following questions in the space provided. Only one answer to be selected. (5 marks)

i) Database _____ which is the logical design of the database, and the database _____ which is a snapshot of the data in the database at a given instant in time.
a) Instance, Schema
b) Relation, Schema
c) Relation, Domain
d) Schema, Instance

Ans: [ ]

ii) The result which operation contains all pairs of tuples from the two relations, regardless of whether their attribute values match.
a) Join
b) Cartesian product
c) Intersection
d) Set difference

Ans: [ ]

iii) Suppose relation R(A,B,C) has the following tuples. (See Fig 1). Compute the projection $\pi_{C,B}$ (R). Which of the following tuples is in the result?

A	B	C
1	2	3
4	2	3
4	5	6
2	5	3
1	2	6

Figure 1

a. (2,5)
b. (3,2)
c. (5,6)
d. (2,6)

Ans:

iv) Suppose relation R(A,B,C) has the following tuples. (See Fig 2).

A	B	C
1	2	3
4	2	3
4	5	6
2	5	3
1	2	6

and relation S(A,B,C) has the following tuples:

A	B	C
2	5	3
2	5	4
4	5	6
1	2	3

Figure 2

Compute the intersection of the relations R and S. Which of the following tuples is in the result?

a. (4,2,3)
b. (1,2,3)
c. (1,2,6)
d. (2,4,3)

Ans:

v) Consider the following schema for a courses database:
- department(did, dname, location)
- student(sid, sname, did, age)
- course(cid, cname, time, room)
- enrolled(sid, cid)

Which of the following SQL queries will count the number of departments with no students taking the course 'Databases'.

A. SELECT COUNT(d.did) FROM department d WHERE d.did IN (SELECT s.did FROM student s WHERE s.sid IN (SELECT e.sid FROM enrolled e, course c WHERE e.cid = c.cid AND c.cname = 'Databases'));

B. SELECT COUNT(DISTINCT s.did) FROM student s WHERE s.sid NOT IN (SELECT e.sid FROM enrolled e, course c WHERE e.cid = c.cid AND c.cname = 'Databases');

C. SELECT COUNT(DISTINCT d.did) FROM department d WHERE d.did NOT IN (SELECT s.did FROM enrolled e, course c, student s WHERE e.cid = c.cid AND c.cname = 'Databases' AND e.sid = s.sid);

D. SELECT COUNT(d.did) FROM department d, student s, course c, enrolled e WHERE e.cid = c.cid AND c.cname='Database' AND e.sid != s.sid AND d.did = s.did;

Ans:

Q2. Subjective Questions. Answer the following questions in the space provided only. (3 marks)

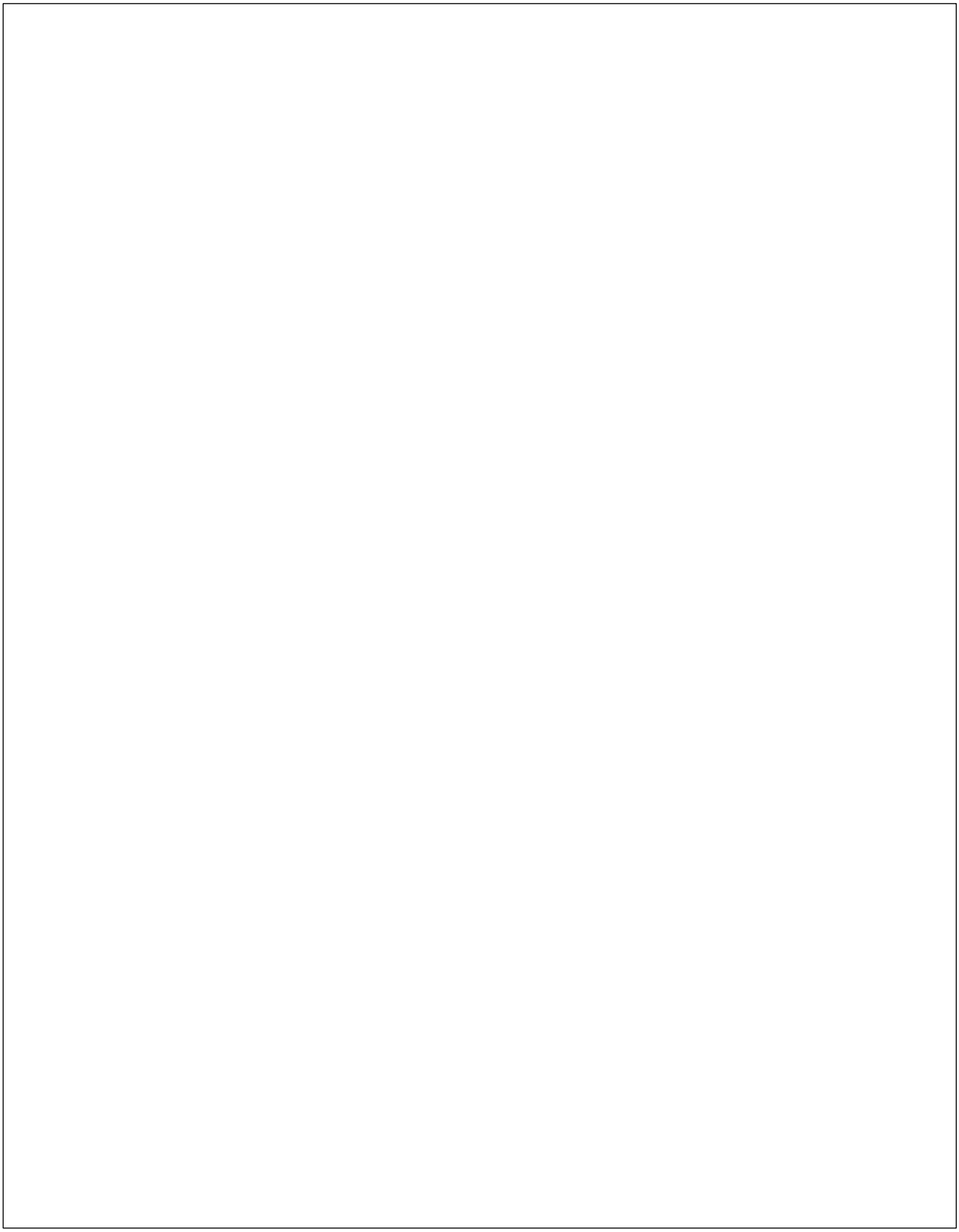
i) How Facebook or other popular social networking platform stores the data records. Explain the entire workflow/pipeline in using them.

ii) Define the 3 types of explicit constraints with examples in detail in DBMS.

iii) Give 2 advantages of DBMS systems over file systems. Also name the 2 types of users in a typical DBMS environment and explain their roles.

Q.3: ER Diagram (3 marks)

Draw a complete ER diagram and its extensions-generalization and specialization cases (EER) in the same diagram for Hospital Management System. Show disjoint/overlapping cases clearly. Draw the notations very carefully in the diagram.



Q. 4: Use Case Diagram (3 marks)

Draw a neat use case diagram with all the relevant notations and symbols showing the workflow of an E-commerce (e.g. Amazon, Flipkart etc.) website. Also show the include, exclude relationships very clearly.

Q.5: SQL Queries (3+3=6 marks)

i) Consider the following employee database, where the primary keys are underlined. Give an expression in SQL for each of the following queries.

Employee (employee_name, street, city)
Works(employee_name, company_name, salary)
Company(company_name, city)
Manages(employee_name, manager_name)

a. Find all employees who earn more than the average salary of all employees of their company.

b. Find the name, street addresses, and cities of residence of all employees who work for First Bank Corporation and earn more than $10,000.

c. Find the company that has the smallest payroll.

d. Find all employees in the database who live in the same cities and on the same streets as do their managers.

e. Give all employees of First Bank Corporation a 10 percent raise.

f. Delete all tuples in the *works* relation for employees of Small Bank Corporation.

ii) Suppose that we have a relation marks(ID, score) and we wish to assign grades to students based on the score as follows: grade F if score < 40, grade C if 40 $\leq$ score < 60, grade B if 60 $\leq$ score < 80, and grade A if 80 $\leq$ score. Write SQL queries to do the following:

a. Display the grade for each student, based on the marks relation.

b. Find the number of students with each grade.

c. The SQL like operator is case sensitive, but the lower() function on strings can be used to perform case insensitive matching. To show how, write a query that finds departments whose names contain the string “sci” as a substring, regardless of the case.

ROUGH WORK