



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (W), Mumbai : 400058, India

(Autonomous College of Affiliated to University of Mumbai)

## End Semester Examination

December 2022

Max Marks : 100

Class : S.Y.BTech

Course code: CE204/DS204/AI204

Name of the course : Data Base Management System

Duration : 3 hours

Branch : COMP/DS/AIML

Semester : III

### Instruction:

- (1) All questions are compulsory
- (2) Draw neat diagrams
- (3) Assume suitable data if necessary
- (4) Mention the question number clearly while writing the answer

Q No		Max Marks	CO	BL
1a	<p>Consider the following Blood Bank System.</p> <p>Blood bank is a critical entity in providing the required type of blood to the patients at critical times. Their database keeps track of the inventory of the blood, together with relevant information like blood group, date received, location, date of expiry, donor etc.</p> <p>The database keeps information such as name, address and telephone number of other blood banks in the area. The reason for doing so is to get blood of a particular from other bank in case of emergency. Information about donors is recorded as well. Donors are classified into occasional and regular donors. For the regular donors, the database keeps information such as identification number, blood type and a history of their donations. A list of health care providers in the area along with information such as address, telephone number etc. is kept. The healthcare providers are the customers of the blood bank. They keep track of the blood transactions performed. These transactions are classified into normal transactions and unexpected transactions (for example, the motor accidents during the holiday season). The reason for keeping track of the unexpected transactions is to use this information in estimating the extra amount of blood to keep in the inventory for each age group during the coming holiday season.</p> <p>a. Draw an extended E-R diagram for the system. b. Convert ER diagram into Relation Model.</p>	10	1	4
1b	Draw and explain DBMS system architecture. Describe the role of database Administrator.	10	1	2
2a	What is the difference between SQL and NO SQL Explain various CRUD operations in MongoDB.	10	2	4
OR				



Write the queries in SQL, using the following university schema.

Classroom (building, room\_number, capacity)  
 department (dept\_name, building, budget)  
 course (course\_id, title, dept name, credits)  
 instructor (ID, name, dept name, salary)  
 section (course\_id, sec\_id, semester, year, building, room number, time slot id)  
 teaches (ID, course\_id, sec\_id, semester, year)  
 student (ID, name, dept name, tot cred)  
 takes (ID, course\_id, sec\_id, semester, year, grade)  
 advisor (s\_ID, i\_ID)  
 time slot (time\_slot\_id, day, start time, end time)  
 prereq (course\_id, prereq\_id)

- Find the names of all students who have taken at least one Comp. Sci. course; make sure there are no duplicate names in the result.
- Find the IDs and names of all students who have not taken any course offering before Spring 2009.
- For each department, find the maximum salary of instructors in that department. You may assume that every department has at least one instructor.
- Find the ID of Instructor having lowest salary.
- Find the capacity of room number 406.

2b

Write the following query in relational algebra.

10

2

4

- In a factory maintaining the relation Product (ID, Name, Tag), the product Tag of "Mouse" was mistakenly copied to the Tag of another Product. Write a query to returns the Name of all Products that have the same Tag as that of the "Mouse"
- Consider the following schema

Department (Name, Total\_staff)

Name	Total_Staff
RESEARCH	60
HR	70
ADMIN	50

What will be the output of the following query?

$\Pi \text{ Name}(\sigma \text{ Name} = \text{"HR"}(\text{Department})) - (\Pi \text{ Name}(\sigma \text{ Total\_staff} > 50 \text{ Department}) \cap \Pi \text{ Name}(\sigma \text{ Total\_staff} = 60(\text{Department})))$

- A pet rescue organization considers the following relation:  
 Owner(OID, Name, Address),  
 Pet(PID, Breed),  
 Rescue(OID, PID)  
 Write a query to Display the OIDs of those Owners whose Pets are DOG or CAT."



	<p>4 Consider the relations</p> <p>HOSPITAL(HOSPITALID, NAME, LOCATION) DOCTORS(DOCTORNAME, HOSPITALID) Write a query to find “Names of all doctors available in Global Hospital”.</p> <p>5 Consider the relation STUDENT(ID, RANK, MARKS, SCHOOL) Write a query to find “Rank of all students of Bhavans school, whose marks is greater than 90”.</p>																																			
3a	<p>Consider the relation give in the diagram</p> <table border="1"><thead><tr><th>Emp_Id</th><th>Emp_Name</th><th>Dept_Id</th><th>Dept_Name</th></tr></thead><tbody><tr><td>S101</td><td>Raj</td><td>C01</td><td>Testing</td></tr><tr><td>S102</td><td>Abhijeet</td><td>C01</td><td>Testing</td></tr><tr><td>S103</td><td>Rahul</td><td>C02</td><td>Production</td></tr><tr><td>S104</td><td>Steve</td><td>C02</td><td>Production</td></tr><tr><td>S105</td><td>John</td><td>C03</td><td>HR</td></tr><tr><td>S101</td><td>Raj</td><td>C03</td><td>HR</td></tr><tr><td>S102</td><td>Abhijeet</td><td>C02</td><td>Production</td></tr></tbody></table> <p>The primary key of given relation is {Emp_Id, Dept_Id} Assume the relation is decomposed into two relations such as R1{Emp_Id, Emp_Name, Dept_Id} and R2{Dept_Id, Dept_Name} Determine whether the given decomposition is lossy or lossless with justification.</p> <p style="text-align: center;"><b>OR</b></p> <p>Consider the relation R(A ,B,C,D,E) and the set of functional dependencies F= {A →B, AB → D, B → BDE, C → D, D → D}</p> <p>Identify the highest normal form of a given relation Is it in a BCNF? If No, then Find the BCNF decomposition of the above relation.</p>	Emp_Id	Emp_Name	Dept_Id	Dept_Name	S101	Raj	C01	Testing	S102	Abhijeet	C01	Testing	S103	Rahul	C02	Production	S104	Steve	C02	Production	S105	John	C03	HR	S101	Raj	C03	HR	S102	Abhijeet	C02	Production	10	3	3
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3b	<p>What is database Normalization? Why do you need to use functional dependencies while normalizing databases?</p> <p>Suppose a relational schema R(a, b, c, d, e), and set of functional dependency as following</p> <p style="text-align: center;">F : { ab→ cd, d → a, bc → de }</p> <p>Find the candidate keys, prime and non-prime attributes in the above relation.</p>	04 06	3	3																																



4a	When you withdraw money from an ATM or when you do transactions online it follows some set of rules of ACID properties, discuss the online transactions in detail.	10	4	3
4b	Discuss the drawbacks of two-phase locking protocol? How these drawbacks are overcome.	10	4	3
5a	Identify the efficient query evaluation plan for the following relational algebra query. Draw an optimized query tree for the same.  $\Pi_{\text{cust\_name}} (\text{Balance} < 2500 (\text{Account} \bowtie \text{Customer}))$	06	5	4
5b	Prove with example "Set operations union and intersection are commutative" with respect to query processing.	06	5	3
5c	Consider the following schema.  Student (sid, name, department, Subject Marks)  Write a trigger to print the result of the student as "PASS" if the subject mark is greater than 50 else "FAIL".	08	2	3