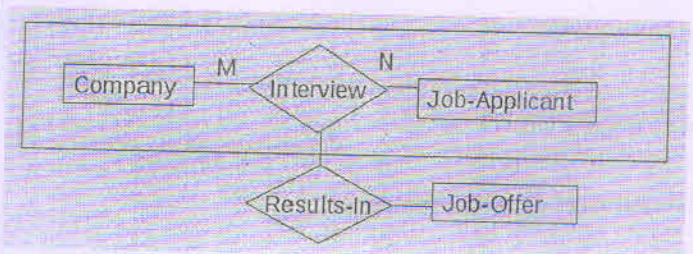
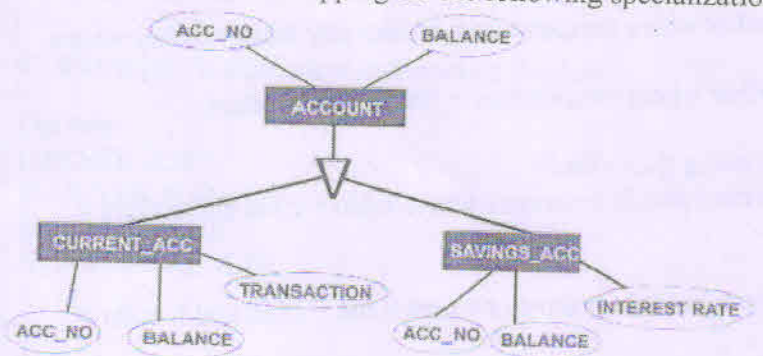
SOMAIYA VIDYAVIHAR UNIVERSITY

26.05.2023 (E)

Semester: January 2023– May 2023		
Maximum Marks: 50	**Examination: ESE Examination**	**Duration:** 3 hrs
Programme code: 01 **Programme:** B.Tech Computer Engineering	**Class:** SY	**Semester:** IV (SVU 2020)
Name of the Constituent College: K. J. Somaiya College of Engineering	**Name of the department:** COMP	
Course Code: 116U01C403	**Name of the Course:** Relational Database Management System	

Instructions:
1) All Questions are Compulsory.
2) Draw neat diagrams.
3)Assume suitable data if necessary.

Question No.	Section A	Max. Marks
Q 1	**Attempt any four.** i) List and explain the various users of database and their roles. ii) Describe different applications of database. iii) State and explain concerns while using an enterprise database. iv) State the difference between physical data independence and logical data independence. v) Explain the role of database administrator. vi) State characteristics of Database System.	20 M
Q 2	**Attempt any four from the following** i) Explain the distinction between disjoint and overlapping constraints. ii) Show the relational mapping for the following. consider any attributes for entity shown in the diagram.  iii) Explain aggregate functions in SQL with syntax and example. iv) Describe security mechanism in SQL. v) Show the relational mapping for the following specialization: 	20 M

	vi) Write a note on total participation and partial participation. Give suitable example.	
Q 3	1) Given the following statements: S1: A foreign key declaration can always be replaced by an equivalent check assertion in SQL. S2: Given the table R(a,b,c) where a and b together form the primary key, the following is a valid table definition. CREATE TABLE S (a INTEGER, d INTEGER, e INTEGER, PRIMARY KEY (d), FOREIGN KEY (a) references R) Which one of the following statements is CORRECT? Options - i) S1 is TRUE and S2 is FALSE ii) Both S1 and S2 are TRUE iii) S1 is FALSE and S2 is TRUE iv) Both S1 and S2 are FALSE 2) Which of the following statements are TRUE about an SQL query? P: An SQL query can contain a HAVING clause even if it does not have a GROUP BY clause Q: An SQL query can contain a HAVING clause only if it has a GROUP BY clause R: All attributes used in the GROUP BY clause must appear in the SELECT clause S: Not all attributes used in the GROUP BY clause need to appear in the SELECT clause Options- i) P and R ii) P and S iii) Q and R iv) Q and S 3) Find all tuples having temperature greater than 'Paris'. Options- i) select * from weather where temperature > (select temperature from weather where city = 'Paris') ii) select * from weather where temperature > (select * from weather where city = 'Paris') iii) select * from weather where temperature > (select city from weather where city = 'Paris') iv) select * from weather where temperature > 'Paris' temperature 4) What does the following query find? (select distinct r.sid from boats b, reserves r where b.bid = r.bid and b.color = 'red') MINUS (select distinct r.sid from boats b, reserves r where b.bid = r.bid and b.color = 'green') Options-	10 M

i) Find the sailor IDs of all sailors who have reserved red boats but not green boats
ii) Find the sailor IDs of atleast one sailor who have reserved red boats but not green boats
iii) Find the sailor IDs of atmost one sailor who have reserved red boats but not green boats
iv) None of these

5) Consider the following relations A, B and C:

A

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

B

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

C

Id	Phone	Area
10	2200	02
99	2100	01

How many tuples does the result of the following SQL query contain?
Select A.Id from A where A.Age > ALL (select B.Age from B where B.Name = 'Arun')
Options-
i) 4
ii) 3
iii) 0
iv) 1

6) A command to remove a relation from an SQL database
Options-
i) Delete table <table name>
ii) Drop table <table name>
iii) Erase table <table name>
iv) Alter table <table name>

7) The CREATE TRIGGER statement is used to create the trigger. THE _____ clause specifies the table name on which the trigger is to be attached. The _____ specifies that this is an AFTER INSERT trigger.

Options-
i) for insert, on
ii) on, for insert
iii) for, insert
iv) both a and c

8) Which join is equivalent to Cartesian Product?

Options-
i) INNER JOIN
ii) OUTER JOIN
iii) CROSS JOIN
iv) NATURAL JOIN

9) Evaluate this SQL statement:

SELECT employee_id, e.department_id, department_name, salary
FROM employees e, departments d
WHERE e.department_id = d.department_id;

Which SQL statement is equivalent to the above SQL statement?

Options-
i) SELECT employee_id, department_id, department_name, salary
FROM employees
WHERE department_id IN (SELECT department_id
FROM departments);

ii) SELECT employee_id, department_id, department_name, salary
FROM employees
NATURAL JOIN departments;

iii) SELECT employee_id, d.department_id, department_name, salary
FROM employees e
JOIN departments d
ON e.department_id = d.department_id;
iv) None of these

10) What is true about views among all the given below statements:

Options -
i) View never references actual table for which it is created.
ii) View can't use JOIN in it's query.
iii) The performance of the view degrades if they are based on other views.
iv) Only option to safeguard data integrity.

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Question No.	Section B	Max. Marks
Q 4	**Attempt any four.** i) Explain Select and Project operations in Relational Algebra with suitable syntax and example. - Select operation (2.5 M) and Project operation (2.5 M). ii) What is Normalization ? Explain with example requirements of Boyce Codd Normal Form (BCNF) - Normalization definition (2M) and BCNF (3M). iii) Explain different features of good relational database design. iv) Describe the difference between static hashing and dynamic hashing with example. - Static hashing (2.5 M) and dynamic hashing (2.5 M). v) Explain in brief with suitable example Full functional dependency & partial dependency. - Full functional dependency (2.5 M) and partial dependency (2.5 M). vi) Define Indexing. Describe Primary indexing with suitable structure. - Indexing Definition (2M) and Primary indexing (3M).	20 M
Q 5	**Attempt any four.** i) Describe the significance of Thomas write rule in concurrency control process. ii) Explain the recovery process using log based. iii) Draw and explain State diagram of Transaction. iv) Describe Shadow paging v) Show how Deadlock is handled with wait for graph. vi) Write a note on recoverable and cascadeless schedule. Justify your answer with valid example.	20 M
Q 6	**Attempt the following. (2M for each question)** 1) A database of research articles in a journal uses the following schema. (volume, number, startpage, endpage, title, year, price) The primary key is (volume, number, startpage, endpage) and the following functional dependencies exist in the schema. (volume, number, startpage, endpage) -> title (volume, number) -> year (volume, number, startpage, endpage) -> price	10 M

The database is redesigned to use the following schemas.
(volume, number, startpage, endpage, title, price)
(volume, number, year)
Which is the weakest normal form that the new database satisfies, but the old one does not?
Options-
i) 1NF
ii) 2NF
iii) 3NF
iv) BCNF

2) Let the set of functional dependencies F= {QR→S, R→P, S→Q} hold on a relation schema X = (PQRS). X is not in BCNF. Suppose X is decomposed into two schemas Y and Z, where Y = (PR) and Z = (QRS).
Consider the two statements given below.
I. Both Y and Z are in BCNF.
II. Decomposition of X into Y and Z is dependency preserving and lossless.
Which of the above statements is/are correct?
Options-
i) Both I and II
ii) I only
iii) II only
iv) Neither I nor II

3) Consider a relation R = {ABCDEG} with the following set of dependencies:
AB-→C
AC→B
AD→E
B→D
BC→A
E→G
Then the decomposition (ABC, ACDE, ADG) is
Options-
i) lossless but not dependency preserving
ii) dependency preserving but not lossless
iii) lossless and dependency preserving
iv) neither lossless nor dependency preserving

4) A table has fields F1, F2, F3, F4, and F5, with the following functional dependencies:
F1→F3
F2→F4
(F1, F2) → F5
in terms of normalization, this table is in
Options-
i)1NF
ii)2NF
iii)3NF
iv) None of the mentioned

5) Assume that we have a relation R(A, B, C, D, E) with a multi-valued dependency A →→BC (A multi-determines BC). Which of the following statements are correct?

	Options- i) For a given A, the values of BC and DE are dependent of each other. ii) For a given A, the values of BC and DE are independent of each other iii) The values of BC can determine that of DE iv) The values of DE can determine that of BC	