Roll No												

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

MID TERM EXAMINATION

Winter Semester: 2021 - 22
Course Code: CSE 2074
Course Name: DATABASE MANAGEMENT SYSTEMS
Program & Sem: B.TECH & 2

Date: 12/MAY/2022
Time: 10:00 AM – 11:30 AM
Max Marks: 50
Weightage: 25%

Instructions:

(i) Read the all questions carefully and answer accordingly.
(ii) Question paper consists of three parts (Parts A, Part B and Part C)
(iii) Part A consists of objective type MEMORY RECALL Questions (10Q x 1M = 10 Marks)
(iv) Part B consists of Thought Provoking Questions. (4Q x 5M = 20 Marks)
(v) Part C consists of Problem Solving based questions. (2Q x 10M = 20 Marks)

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries ONE mark. (10Qx1M= 10M)

1. **The DBMS acts as an interface between _____ and _____ of an enterprise-class system. (C.O.No.1) [Knowledge]**
   a) Data and the DBMS
   b) Application and SQL
   c) Database application and the database
   d) The user and the software
2. **A collection of tables to represent both data and the relationships among the data is known as (C.O.No.1) [Knowledge]**
   a) Entity-Relationship Model
   b) Relational Model
   c) Object Based Data Model
   d) Semi Structured data Model
3. **A _____ is an association among several entities. (C.O.No.1) [Knowledge]**
   a) Relationship
   b) Association
   c) Set
   d) Combination
4. **What are composite attributes? (C.O.No.1) [Comprehension]**
   a) They are those attributes which cannot be further divided into other attributes
   b) They are those attributes which can further be divided into other attributes
   c) They are those attributes which are essentially the primary keys of the relation
   d) None of the mentioned

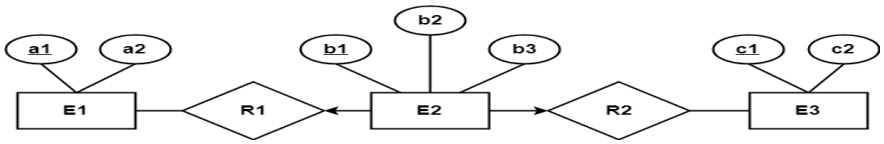
5. **Let E be an entity set in a relationship set R. If every entity in E participates in at least one relationships in R, Then the participation of E in R is _____**
(C.O.No.1) [Comprehension]
   a) Partial
   b) Total
   c) Complete
   d) Incomplete
6. **What does the following relational operation perform? (C.O.No.2) [Comprehension]**
   ρx(A1,A2,A3…) (E)
   a) It returns the result of expression E with the previous attribute names
   b) It returns the result of expression E renaming the attributes as A1, A2, …
   c) It returns the result of the relation E but saves the old attributes
   d) None of the mentioned
7. **What does the following relational algebra expression do?**
(C.O.No.2) [Comprehension]
   $\sigma_{amount} > 1200$ (loan)
   a) Finds all the tuples in loan
   b) Finds the tuples in loan where the amount is greater than 12000
   c) Finds all the tuples in loan where the amount is greater than 1200
   d) Finds all the amounts in loan where the number of values is greater than 1200
8. **Updating, Deleting and Inserting in relational algebra is done using the _____ operator** **(C.O.No.2) [Comprehension]**
   a) Assignment
   b) Modification
   c) Alteration
   d) Inclusion
9. **The project operation's function in relational algebra is identical to the _____ clause in SQL** **(C.O.No.2) [Comprehension]**
   a) where
   b) from
   c) select
   d) none of the mentioned
10. **_____ produces the relation that has attributes of R1 and R2.**
(C.O.No.2) [Comprehension]
   a). Cartesian product
   b). Difference
   c). Intersection
   d). Product

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries FIVE mark. (4Qx5M=20M)

11. Differentiate between Schema and Instance in DBMS and give examples for each.
(C.O.No.1) [Analysis]

12. Find the minimum number of tables required to represent the given ER diagram in relational model and identify the primary for each relation. **(C.O.No.1) [Application]**



13. Consider the following tables and perform the following operations:

(C.O.No.2) [Application]

(i) Union (2)
(ii) Union all (2)
(iii) Intersection (2)
(iv) Student – Instructor (2)
(v) Instructor – Student (2)

Student

Fn	Ln
Susan	Yao
Ramesh	Shah
Johnny	Kohler
Barbara	Jones
Amy	Ford
Jimmy	Wang
Ernest	Gilbert

Instructor

Fname	Lname
John	Smith
Ricardo	Browne
Susan	Yao
Francis	Johnson
Ramesh	Shah

14. Considering the schema Sailors **(C.O.No.2) [Application]**
(sid , sname , rating, age)
Boats (bid, bname , color)
Reserves (sid, bid, day)
Write relational algebraic queries for the following:
i) Find names of sailors who have reserved boat # 103. (1M)
ii) Find names of sailors who have reserved a red boat. (2M)
iii) Find names of sailors who have reserved a red or green boat. (2M)

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries 10 mark. (2Qx10M=20M)

15. Design and Draw ER Diagram for Banking Database**.** **(C.O.No.1) [Application]**
16. Consider the following relational database schema consisting of the four relation schemas:

(C.O.No.2) [Application]

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 queries:-

i. Get the details about all flights from Chennai to New Delhi.(2M)
ii. Get the details of flights that are scheduled on both dates 01/06/2022 and 02/06/2022 at 16:00 hours. (2M)
iii. Find the passenger names for passengers who have bookings on at least one flight. (2M)
iv. Get the complete details of all flights to New Delhi. (2M)
v. Find the passenger id, flight id who booked on 10/05/2022.(2M)

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END TERM EXAMINATION

Winter Semester:	2021 - 22	**Date**:	29th June 2022
Course Code:	CSE2074	**Time**:	1:00 PM to 04:00 PM
Course Name:	DATABASE MANAGEMENT SYSTEMS	**Max Marks**:	100
Program & Sem:	B.TECH – II Sem	**Weightage**:	50%

Instructions:

(vi) Read the all questions carefully and answer accordingly.

(vii) Draw relevant diagrams wherever applicable.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries ONE marks. (20Qx1M= 20M)

1. Physical Level of database contains? (C.O.No.1) [Knowledge]
   A. Searching Techniques B. Sorting Techniques
   C. Data Schemas D. All of the above
2. Record is also known as? (C.O.No.1) [Knowledge]
   A. Tuple B. Entity
   C. Row D. Column
3. A _____ in a table represents a relationship among a set of values. (C.O.No.1) [Knowledge]
   A. Column B. Key
   C. Row D. Entry
4. 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. (C.O.No.1) [Knowledge]
   A. Instance, Schema B. Relation, Schema
   C. Relation, Domain D. Schema, Instance
5. Course (course_id, sec_id, semester). (C.O.No.1) [Comprehension]
   Here (course_id, sec_id, semester) are _____ and Course is a_____.
   A. Relations, Attributes B. Attributes, Relation
   C. Tuple, Relation D. Tuple, Attributes
6. Which one of the following is a set of one or more attributes taken collectively to uniquely identify a record? (C.O.No.2) [Knowledge]
   A. Candidate Key B. Sub Key
   C. Super Key D. Foreign Key
7. This Query can be replaced by which one of the following? (C.O.No.2) [Comprehension]
   SELECT name, course_id from instructor, teaches where instructor_ID = teaches_ID;
   A. Select name, course_id from teaches, instructor where instructor_id = course_id;
   B. Select name, course_id from instructor natural join teaches;
   C. Select name, course_id from instructor;
   D. Select course_id from instructor join teaches;

8. The most commonly used operation in relational algebra for projecting a set of tuple from a relation is (C.O.No.2) [Knowledge]

A. Join B. Projection

C. Select D. Union

9. The basic data type char(n) is a _____ length character string and varchar(n) is _____ length character string and varchar(n) is _____length character. (C.O.No.2) [Comprehension]

A. Fixed, Equal B. Equal, Variable

C. Fixed, Variable D. Variable, equal

10. Updates that violate _____ are disallowed. (C.O.No.2) [Comprehension]

A. Integrity Constrains B. Transaction Control

C. Authorization D. DDL Constraints

11. Let R(A,B,C,D,E,P,G) be a relational schema in which the following FDs are known to hold: AB → CD, DE → P, C→ E, P→ C, B → G Then the Relation R is (C.O.No.3) [Comprehension]

A. in BCNF B. in 3NF, but not in BCNF

C. in 2NF, but not in 3NF D. not in 2NF

12. The process to properly define the database tables to provide flexibility, minimized redundancy and data integrity is called _____ (C.O.No.3) [Knowledge]

A. Design Rationalism B. ER Diagram

C. Data Normalization D. Database Design

13. A relation in which every non-key attribute is fully functionally dependent on the primary key and which has no transitive dependencies is said to be in: (C.O.No.3) [Knowledge]

A. BCNF B. 2NF

C. 3NF D. 4NF

14. Consider a relational table R that is in 3NF, but not in BCNF, which one of the following statements is TRUE? (C.O.No.3) [Comprehension]

A. R has a nontrivial functional dependency X→A, where X is not a superkey and A is a prime attribute.

B. R has a nontrivial functional dependency X→ A, where X is not a superkey and A is a non-prime attribute and X is not a proper subset of any key.

C. R has a nontrivial functional dependency X → A, where X is not a superkey and A is a non-prime attribute and X is a proper subset of some key.

D. A cell in R holds a set instead of an atomic value.

15. Boyce Codd Normal Form is slightly stronger version of which of the form of database normalization? (C.O.No.3) [Knowledge]

A. 4NF B. 3NF

C. 2NF D. 1NF

16. _____Problem occurs if we don't implement a proper locking strategy (C.O.No.4) [Knowledge]

A. Dirty Reads B. Phantom reads

C. Lost Updates D. Unrepeatable reads

17. _____refers to the ability of the system to recover committed transaction updates if either the system or the storage media fails. (C.O.No.4) [Knowledge]

A. Isolation B. Atomicity

C. Consistency D. Durability

18. Consider money is transferred from (1) account-A to account-B and (2) account-B to account-A. Which of the following form a transaction? (C.O.No.4) [Comprehension]

A. Only 1 B. Only 2

C. Both 1 and 2 Individually D. Either 1 or 2

19. For a transaction to be durable, its changes need to be written to _____ storage.
(C.O.No.4) [Knowledge]

A. Volatile Storage
B. Non Volatile Storage
C. Stable Storage
D. Dynamic Storage

20. If transaction T1 is holding an exclusive lock (X) on data item 'A', then which of the following locks requested on data item 'A' by another transaction T2 cannot be granted in locking protocol?
(C.O.No.4) [Comprehensive]

A. Intension shared (IS)
B. Shared (S)
C. Exclusive (IX)
D. Both B & C

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries TEN marks. (5Qx10M=50M)

21. Discuss with neat diagram how the database system hides certain details of how the data are stored and maintained by using different levels of Abstraction. (C.O.No.1) [Knowledge]

22. Consider the following relational schema for a library:

member(memb_no, name, dob)
books(isbn, title, authors, publisher)
borrowed(memb_no, isbn, date)

Write the following queries in relational algebra. (C.O.No.2) [Apply]

a. Find the names of members who have borrowed any book published by "McGraw-Hill".
b. Find the name of members who have borrowed all books published by "McGraw-Hill".
c. Find the name and membership number of members who have borrowed more than five different books published by "McGraw-Hill".
d. For each publisher, find the name and membership number of members who have borrowed more than five books of that publisher.
e. Find the average number of books borrowed per member. Take into account that if an member does not borrow any books, then that member does not appear in the borrowed relation at all.

23. Perform the following operations for the employee and project table. (C.O.No.2) [Apply]

EMPLOYEE

EMP_ID	EMP_NAME	CITY	SALARY	AGE
1	Angelina	Chicago	200000	30
2	Robert	Austin	300000	26
3	Christian	Denver	100000	42
4	Kristen	Washington	500000	29
5	Russell	Los angels	200000	36
6	Marry	Canada	600000	48

PROJECT

PROJECT_NO	EMP_ID	DEPARTMENT
101	1	Testing
102	2	Development
103	3	Designing
104	4	Development

i. Right outer join (3)

ii. Left outer join (3)
iii. full join (4)

24. Examine the following table and apply suitable normalization techniques to normalize the table forms in 1NF, 2NF, 3NF. (5) (C.O.No.3) [Apply]

FULL NAMES	PHYSICAL ADDRESS	MOVIES RENTED	SALUTATION
Janet Jones	First Street Plot No 4	Pirates of the Carribean	Ms.
Janet Jones	First Street Plot No 4	Clash of the Titans	Ms.
Robert Phil	3rd Street 34	Forgetting Sarah Marshal	Mr.
Robert Phil	3rd Street 34	Daddy's Little Girls	Mr.
Robert Phil	3rd Street 34	Clash of the Titans	Mr.

25. (i) Describe the following problem of concurrent transactions with suitable examples and suggest solutions to handle the problems (5) (C.O.No.4) [Apply]

a) Lost update problem
b) Dirty Read Problem
c) Incorrect Summary Problem

(ii) Consider the given schedule S1 with transactions T1 and T2; if the value of X at the beginning of the transactions is 100, what will be the value of X at the end of the transactions? Also, find the problem with the given schedule. (5) (C.O.No.4) [Apply]

Transaction T1	Transaction T2
READ X X:=X - 20 WRITE X	 READ X X:=X - 30 WRITE X

Part C [Problem Solving Questions]

Answer both the Questions. Each question carries FIFTEEN marks. (2Qx15M=30M)

26. Given a relational table with DID,DNAME,EID,ENAME,PID,PNAME,BTIME. Determine whether the given table is in 3NF.If not convert in into 3NF? (15) (C.O.No. 3) [Apply]

DID	Dname	EID	Ename	PID	Pname	Btime
10	Finance	1	Huey	27	Alpha	4.5
10	Finance	5	Dewey	25	Beta	3
10	Finance	11	Louie	22	Gamma	7
14	R&D	2	Jack	26	Pail	8
14	R&D	4	Jill	21	Hill	9

27. For each of the schedules below, indicate whether they are conflict serializable. If you answer yes, then give the equivalent serial order of the transactions. (C.O.No. 4) [Apply]

(i) Schedule S1: R1(A), R1(B), W1(A), R2(B), W2(D), R3(C), R3(B), R3(D), W2(B), W1(C), W3(D) (8)

(ii) Schedule S2: R1(A), R1(B), W1(A), R2(B), W2(A), R3(C), R3(B), R3(D), W2(B), W1(C), W3(D) (7)

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(viii) Read the all questions carefully and answer accordingly.
(ix) Question paper consists of three parts (Parts A, Part B and Part C)
(x) Part A consists of objective type MEMORY RECALL Questions (10Q x 1M = 10 Marks)
(xi) Part B consists of Thought Provoking Questions. (4Q x 5M = 20 Marks)
(xii) Part C consists of Problem Solving based questions. (2Q x 10M = 20 Marks)

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries ONE mark. (10Qx1M= 10M)

17. The DBMS acts as an interface between _____ and _____ of an enterprise-class system. (C.O.No.1) [Knowledge]

a) Data and the DBMS
b) Application and SQL
c) Database application and the database
d) The user and the software

18. A collection of tables to represent both data and the relationships among the data is known as (C.O.No.1) [Knowledge]

e) Entity-Relationship Model
f) Relational Model
g) Object Based Data Model
h) Semi Structured data Model

19. A _____ is an association among several entities. (C.O.No.1) [Knowledge]

a) Relationship
b) Association
c) Set
d) Combination

20. What are composite attributes? (C.O.No.1) [Comprehension]

a) They are those attributes which cannot be further divided into other attributes
b) They are those attributes which can further be divided into other attributes
c) They are those attributes which are essentially the primary keys of the relation
d) None of the mentioned

21. Let E be an entity set in a relationship set R. If every entity in E participates in at least one relationships in R, Then the participation of E in R is _____
(C.O.No.1) [Comprehension]

a) Partial
b) Total
c) Complete
d) Incomplete

22. What does the following relational operation perform? (C.O.No.2) [Comprehension]

ρx(A1,A2,A3…) (E)

a) It returns the result of expression E with the previous attribute names
b) It returns the result of expression E renaming the attributes as A1, A2, …
c) It returns the result of the relation E but saves the old attributes
d) None of the mentioned

23. What does the following relational algebra expression do?
(C.O.No.2) [Comprehension]

$\sigma_{amount} > 1200$ (loan)

a) Finds all the tuples in loan
b) Finds the tuples in loan where the amount is greater than 12000
c) Finds all the tuples in loan where the amount is greater than 1200
d) Finds all the amounts in loan where the number of values is greater than 1200

24. Updating, Deleting and Inserting in relational algebra is done using the _____ operator **(C.O.No.2) [Comprehension]**

a) Assignment
b) Modification
c) Alteration
d) Inclusion

25. The project operation's function in relational algebra is identical to the _____ clause in SQL **(C.O.No.2) [Comprehension]**

a) where
b) from
c) select
d) none of the mentioned

26. _____ produces the relation that has attributes of R1 and R2.
(C.O.No.2) [Comprehension]

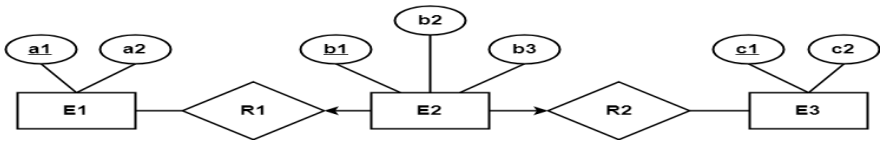
a). Cartesian product
b). Difference
c). Intersection
d). Product

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries FIVE mark. (4Qx5M=20M)

27. Differentiate between Schema and Instance in DBMS and give examples for each.
(C.O.No.1) [Analysis]

28. Find the minimum number of tables required to represent the given ER diagram in relational model and identify the primary for each relation. **(C.O.No.1) [Application]**



29. Consider the following tables and perform the following operations:

(C.O.No.2) [Application]

(vi) Union (2)

(vii) Union all (2)

(viii) Intersection (2)

(ix) Student – Instructor (2)

(x) Instructor – Student (2)

Student **Instructor**

Fname	Lname
John	Smith
Ricardo	Browne
Susan	Yao
Francis	Johnson
Ramesh	Shah

Fn	Ln
Susan	Yao
Ramesh	Shah
Johnny	Kohler
Barbara	Jones
Amy	Ford
Jimmy	Wang
Ernest	Gilbert

30. Considering the schema Sailors **(C.O.No.2) [Application]**

(sid , sname , rating, age)

Boats (bid, bname , color)

Reserves (sid, bid, day)

Write relational algebraic queries for the following:

iv) Find names of sailors who have reserved boat # 103. (1M)

v) Find names of sailors who have reserved a red boat. (2M)

vi) Find names of sailors who have reserved a red or green boat. (2M)

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries 10 mark. **(2Qx10M=20M)**

31. Design and Draw ER Diagram for Banking Database**.** **(C.O.No.1) [Application]**

32. Consider the following relational database schema consisting of the four relation schemas:

(C.O.No.2) [Application]

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 queries:-

vi. Get the details about all flights from Chennai to New Delhi.(2M)
vii. Get the details of flights that are scheduled on both dates 01/06/2022 and 02/06/2022 at 16:00 hours. (2M)
viii. Find the passenger names for passengers who have bookings on at least one flight. (2M)
ix. Get the complete details of all flights to New Delhi. (2M)
x. Find the passenger id, flight id who booked on 10/05/2022.(2M)
xi.