



PRESIDENCY UNIVERSITY

BENGALURU

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| Roll No. | | | | | | | | | | | | | | | | | | | |
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Make Up Examinations – December 2025

Date: 26 – 12- 2025

Time: 9:30am – 12:30pm

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|------------------------------|---|-----------------------|--|
| School: SOIS | Program: BCA (General/DS/AIML) | | |
| Course Code : CSA2003 | Course Name : Relational Database Management Systems | | |
| Semester: MK | Max Marks: 100 | Weightage: 50% | |

| CO - Levels | CO1 | CO2 | CO3 |
|-------------|-----|-----|-----|
| Marks | 26 | 26 | 48 |

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.

10Q x 2M=20M

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|----|--|---------|----|-----|
| 1 | Define Schema. Give an example. | 2 Marks | L1 | CO1 |
| 2 | Define data independence. Why is it essential? | 2 Marks | L1 | CO1 |
| 3 | What is Weak entity? | 2 Marks | L1 | CO1 |
| 4 | What is the necessity of GROUP BY clause in SQL. | 2 Marks | L2 | CO2 |
| 5 | Write a SQL query to create a trigger that executes after insert operation (event) occurs. | 2 Marks | L1 | CO2 |
| 6 | What is the purpose of view in SQL? Give an example. | 2 Marks | L1 | CO2 |
| 7 | Define 3NF and explain how it differs from 3NF. | 2 Marks | L1 | CO3 |
| 8 | What is the importance of dependency preservation during normalization. | 2 Marks | L1 | CO3 |
| 9 | Given R(A,B,C,D,E) FD: {A->B, B->C, C->D, D->E} Find the closure of A, AD, B, AC. | 2 Marks | L2 | CO3 |
| 10 | What is a partial dependency? Provide an example. | 2 Marks | L1 | CO3 |

Part B

Answer the Questions

Total 80 Marks.

| | | | | | |
|------------|-----------|--|-----------------|-----------|------------|
| 11. | a. | <p>Construct an ER diagram for Bank database with following constraints.</p> <ul style="list-style-type: none"> A. A Customer holds account in one or more branches. B. Every Branch is headed by a Manager. C. Each Bank has one or more Branches. D. Branch offers one or more types of Loans. E. Each Branch maintains an account F. Each Customer avails one or more Loans. <p>Identify the entities, their attributes, and the relationships between them. Also mention the Cardinality Ratio and Participations constraints.</p> | 10 Marks | L2 | CO1 |
| | b. | Explain in detail Set operators in SQL with an example for each. | 10 Marks | L2 | CO1 |

Or

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|------------|-----------|--|-----------------|-----------|------------|
| 12. | a. | <p>Create an ER model for a Hospital management system.</p> <p>In the above ER diagram, identify entities, their attributes, and the relationships between them. Also mention the Cardinality Ratio and Participation constraints.</p> | 10 Marks | L2 | CO1 |
| | b. | <p>Explain the following relational algebra operations with an example.</p> <p>i. Select ii. Project iii. Rename iv. Theta join v. Right Outer join</p> | 10 Marks | L2 | CO1 |

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|------------|-----------|---|-----------------|-----------|------------|
| 13. | a. | <h3 style="margin: 0;">University ER Diagram</h3> | 10 Marks | L3 | CO2 |
|------------|-----------|---|-----------------|-----------|------------|

Consider the above ER diagram representing a University database:

- i. **Identify all the strong and weak entities.**
- ii. **List the attributes** associated with each entity.
- iii. Determine the **type of attribute** for all the entities (e.g., simple, composite, derived, primary, multi-valued etc).
- iv. **Describe participation constraint** between the entities.
- v. Identify the **type of relationship** between entities.

Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course:

STUDENT(SSN, Name, Major, Bdate)

COURSE(Course#, Cname, Dept)

ENROLL(SSN, Course#, Quarter, Grade)

BOOK_ADOPTION(Course#, Quarter, Book_ISBN)

TEXT(Book ISBN, BookTitle, Publisher, Author)

Specify the following queries in **SQL** on the database schema given.

b.

- i. List the number of courses taken by all students named 'John Smith' in Winter 1999 (i.e., Quarter = 'W99').
- ii. Produce a list of textbooks {include Courses, BookISBN, Book, Title} for courses offered by the 'CS' department that have used more than two books.
- iii. List any department that has all its adopted books published by 'AWL Publishing'.
- iv. List the course which has more than three textbooks.
- v. List the names of the students who has enrolled in more than one courses.

10 Marks

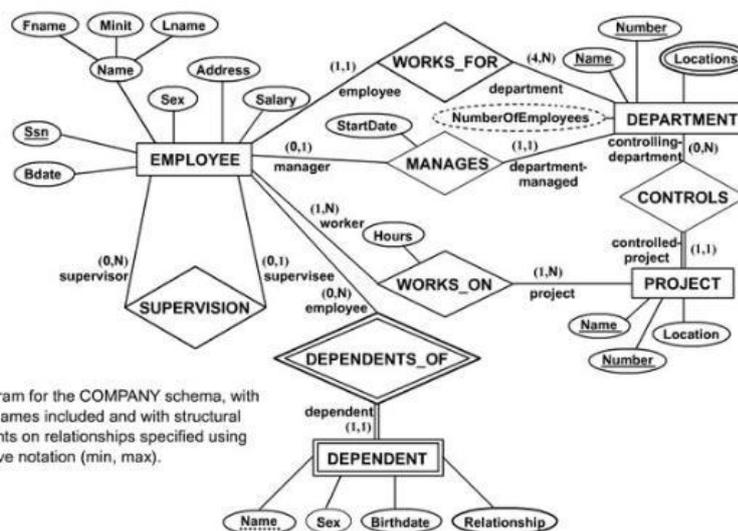
L3

CO2

Or

14.

a.



Consider the above ER diagram representing a Company database:

- i. **Identify all the strong and weak entities.**
- ii. **List the attributes** associated with each entity.

10 Marks

L3

CO2

| | | | | | |
|--|-----------|---|-----------------|-----------|------------|
| | | iii. Determine the type of attribute for all the entities (e.g., simple, composite, derived, primary, multi-valued etc). iv. Describe participation constraint between the entities. v. Identify the type of relationship between entities. | | | |
| | b. | Consider the Sailors-Boats-Reserves database described Sailor (sid, sname, rating, age) Boat (bid, bname, color) Reserves (sid, bid, date) Write each of the following queries in SQL. A. Find the colors of boats reserved by Alber. B. Find all sailor ids of sailors who have a rating of at least 8 or reserved boat 103. C. Find the names of sailors who have not reserved a boat whose name contains the string "storm". Order the names in ascending order. D. Find the sailor ids of sailors with age over 20 who have not reserved a boat whose name includes the string "thunder". E. Find the sailors name where the reserved date is 15-11-2024. | 10 Marks | L3 | CO2 |

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| 15. | a. | Consider a relation scheme $R = (A, B, C, D, E, F)$ on which the following functional dependency hold: $\{AB \rightarrow C, C \rightarrow D, D \rightarrow BE, E \rightarrow F, F \rightarrow A\}$. i. Find candidate keys. ii. Identify prime and non-prime attributes. iii. Find the total number of super keys of relation R. | 10 Marks | L3 | CO3 |
| | b. | Which Normal forms are based on the concept of Partial Dependency and Transitive Dependency? Explain with an example. | 10 Marks | L3 | CO3 |

Or

| 16. | a. | Consider the table and functional dependency given below: <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Stu_id</th> <th>Stu_Name</th> <th>Phone_No</th> <th>Course_Code</th> <th>Course_name</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>John Basu</td> <td>88833 98982</td> <td>1</td> <td>AI</td> <td>40</td> </tr> <tr> <td>2</td> <td>Nithin Reddy</td> <td>89340, 98874</td> <td>1</td> <td>AI</td> <td>40</td> </tr> <tr> <td>3</td> <td>Raga Manasa</td> <td>91223, 99883, 33498</td> <td>3</td> <td>CC</td> <td>60</td> </tr> </tbody> </table> FunctionalDependency: $\{Stu_id \rightarrow Course_Code,$ $Course_Code \rightarrow Course_name,$ $(Stu_id, Course_Code) \rightarrow Marks\}$ Normalize the given table into 1NF, 2NF, 3NF and BCNF along with justifying the reason to decompose the table. | Stu_id | Stu_Name | Phone_No | Course_Code | Course_name | Marks | 1 | John Basu | 88833 98982 | 1 | AI | 40 | 2 | Nithin Reddy | 89340, 98874 | 1 | AI | 40 | 3 | Raga Manasa | 91223, 99883, 33498 | 3 | CC | 60 | 10 Marks | L3 | CO3 |
|------------|--|--|-----------|-------------|-------------|-------------|-------------|-------|---|-----------|----------------|---|----|----|---|--------------|-----------------|---|----|----|---|-------------|---------------------------|---|----|----|-----------------|-----------|------------|
| | Stu_id | Stu_Name | Phone_No | Course_Code | Course_name | Marks | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | John Basu | 88833 98982 | 1 | AI | 40 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Nithin Reddy | 89340, 98874 | 1 | AI | 40 | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Raga Manasa | 91223, 99883, 33498 | 3 | CC | 60 | | | | | | | | | | | | | | | | | | | | | | | | |
| b. | Illustrate Insertion Anomalies, Deletion Anomalies and Updation Anomalies with the help of examples. | 10 Marks | L3 | CO3 | | | | | | | | | | | | | | | | | | | | | | | | | |

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| 17. | a. | Discuss the informal design guidelines for a relational schema with suitable examples. | 10 Marks | L2 | C03 |
| | b. | Explain the causes of transaction failure or why do we need recovery in transaction. | 10 Marks | L2 | C03 |

Or

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|-----|----|--|----------|----|-----|
| 18. | a. | Explain different types of functional dependency in detail. | 10 Marks | L2 | C03 |
| | b. | With a neat diagram explain transition state diagram of a transaction. | 10 Marks | L2 | C03 |

******* BEST WISHES *******