

**Jaypee University of Engineering & Technology, Guna**

T-T-T (Odd Semester 2023)

18B11CI312 – Database Systems

Maximum duration: 1 Hour 30 minutes

Maximum Marks: 25

**Notes:**

1. This question paper has 6 questions.
2. Answer the questions in serial order.
3. Write relevant answers only.
4. Do not write anything on question paper (Except your Er. No.).

		Marks	CO No.
Q1.	Let $R = (ABCDEF)$ with these FDs: $AC \rightarrow F$ , $CEF \rightarrow B$ , $C \rightarrow D$ , $DC \rightarrow A$ . (a) Does it follow that $C \rightarrow F$ ? Show by finding $F^+$ first and then by using attribute closure method. (b) Does it follow that $ACD \rightarrow B$ ? Show by finding $F^+$ first and then by using attribute closure method.	[04]	CO3
Q2.	(a) Consider $R = (A, B, C, D, E, F, G, H)$ with a set of FDs $F = \{CD \rightarrow A, EC \rightarrow H, GH \rightarrow AB, C \rightarrow D, EG \rightarrow A, H \rightarrow B, BE \rightarrow CD, EC \rightarrow B\}$ . Find all the candidate keys of $R$ . (b) For any schema show that $F \models XY \rightarrow Q$ where $F = \{XY \rightarrow W, Y \rightarrow Z, WZ \rightarrow P, WP \rightarrow QR, Q \rightarrow X\}$ by using Armstrong Axioms (inference rules).	[04]	CO3
Q3.	Let there be a Relational Scheme $\rightarrow \{\text{studio, movie, budget, studio\_city}\}$ with Key attribute being $\{\text{studio, movie}\}$ and a set of functional dependency $[\{\text{studio, movie}\} \rightarrow \{\text{budget}\}, \{\text{studio}\} \rightarrow \{\text{studio\_city}\}]$ . (a) In which normal form the above relational scheme is in? (b) Why is the above relation in that normal form? (c) Which attribute is not a part of the key? (d) What are the tables for the next higher normal form?	[04]	CO2
Q4.	For the following schema branch (branch-name, branch-city, assets) customer (customer-name, customer-street, customer-only) account (account-number, branch-name, balance) loan (loan-number, branch-name, amount) depositor (customer-name, account-number)	[03]	CO4

borrower (customer-name, loan-number)

Write the english statements for the following relational algebra statements

- $\Pi_{\text{customer-name}}(\text{borrower}) \cup \Pi_{\text{customer-name}}(\text{depositor})$
- $\Pi_{\text{customer-name}}(\text{borrower}) \cap \Pi_{\text{customer-name}}(\text{depositor})$
- $\Pi_{\text{loan-number}}(\sigma_{\text{amount} > 1200}(\text{loan}))$

**Q5.** Using below above mentioned COMPANY's relational database schema write MySQL queries for following:  
Schema diagram for a COMPANY's relational database is given below.  
Use this database schema wherever mentioned.

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno
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PROJECT

Pname	Pnumber	Plocation	Dnum
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WORKS\_ON

Essn	Pno	Hours
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- Display records of all employees whose salary is ranging from 30000 to 50000. [01] CO3
- Retrieve sum of the salaries, maximum salary, minimum salary, and average salary of for female employees. [01] CO3
- Retrieve details of all male employees whose first name starts with 'a'. [01] CO3
- Display project number and number of employees working on each project for all projects where the number of employees is greater than 2. [02] CO3

**Q6.** Considering schema given in question no 5 write the MySQL statement for following:

- Display number of employees whose date of birth falls in the month of February. [01] CO3
- Retrieve details of all employees whose first name and last name ends with 'n'. [01] CO3
- Retrieve details of all employees in descending order of department number and then ascending order of salary for all female employees. [01] CO3
- Display details of all employees having a supervisor. [02] CO3