

End Term (Odd) Semester Examination November 2025

no...23.61162.71.....

Roll

Name of the Course and semester: BTech 5th Semester

Name of the Paper: Database Management System

Paper Code: TCS-503

Time: 3 hour

Maximum Marks: 100

Note:

- (i) All the questions are compulsory.
- (ii) Answer any two sub questions from a, b and c in each main question.
- (iii) Total marks for each question is 20 (twenty).
- (iv) Each sub-question carries 10 marks.

Q1.

a. what is an ER diagram? Explain all its components with the help of suitable examples. (2X10=20 Marks)

b. What is Database normalization? Why is it used? Define BCNF. Is it stricter than 3rd Normal form, if yes then how?

c. What are the differences between: candidate key, primary key, super key.

Q2.

a. In schedule s1 there are 4 transactions t1,t2,t3,t4. How many serial and concurrent and total schedules are possible? (2X10=20 Marks)

b. Consider relation R(ABCDEFGH) with below given FD's:

AB--->CD

E--->FG

F--->H

B--->G

Find out the highest normal form for the relation R.

c. Given a schedule S(r1(a) w1(a) r2(a) w2(a) r1(b) w1(b) r2(b) w2(b))
find out if schedule S is conflict serializable or not. If so then find out the equivalent serial schedule.

Q3.

a. Consider the following relational schemas:

(2X10=20 Marks)

EMPLOYEE (Ename , Street, City)

WORKS _FOR (Ename , company name, salary)

COMPANY (Company_name, City)

MANAGES (Ename, Manager_name)



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Write the following queries in SQL and Relational Algebra (RA):

- i. Find names of employees who work in IBM.
 - ii. Find the total and average salary paid by each company.
 - iii. Find the names and cities of residence of employees working in HCL and earning more than 40000.
 - iv. Find the names of employees who are not working in WIPRO.
- b. Find out if $\{AB \rightarrow C, D \rightarrow E, E \rightarrow C\}$ is the minimal cover of $\{AB \rightarrow C, D \rightarrow E, AB \rightarrow E, E \rightarrow C\}$
- c. What is the lost update problem? Explain with the help of a working example. Which conflict is involved in this problem?

Q4.

- a. What are ACID properties in transactions? Explain each element with an example. (2X10=20 Marks)
- b. What is view serializability? Find out if the schedules below are view equivalent or not.
 $S1(r1(a) w1(a) r2(a) w2(a) r1(b) w1(b) r2(b) w2(b))$
 $S2(r2(a) w2(a) r2(b) w2(b) r1(a) w1(a) r1(b) w1(b))$
- c. What is 2PL? Why is it used? Which problems it is solving? Explain in detail.

Q5.

- a. What is lossless and dependency preserving decomposition? Explain with the help of an example. (2X10=20 Marks)
- b. A given Relation R(ABCD) is with FD's given below is decomposed into (AB, BC, CD). Find out the decomposition is lossless and dependency preserving or not?
FD's
 $\{A \rightarrow B, B \rightarrow C, C \rightarrow D, D \rightarrow A\}$
- c. Given a relation R(ABCDEF) and FD's $\{A \rightarrow FC, C \rightarrow D, B \rightarrow E\}$ check for the highest normal form of the relation.