Graphic Era
HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sanshya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Odd) Semester Examination November 2025

Roll no. 2318484

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. (2X10=20 Marks)

a. what is an ER diagram? Explain all its components with the help of suitable examples.

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. (2X10=20 Marks)

a. In schedule s1 there are 4 transactions t1,t2,t3,t4. How many serial and concurrent and total schedules are possible?

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. (2X10=20 Marks)

a. Consider the following relational schemas:
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-→C, D-→E, E-→C} is the minimal cover of {AB-→C, D-→E, AB-→E, E-->C}

c. What is the lost update problem? Explain with the help of a working example. Which conflict is involved in this problem?

Q4. (2X10=20 Marks)

a. What are ACID properties in transactions? Explain each element with an example.

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. (2X10=20 Marks)

a. What is lossless and dependency preserving decomposition? Explain with the help of an example.

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-→B, B-→C, C-→D, D-->A}

c. Given a relation R(ABCDEF) and FD's {A-→FC, C-→D , B-→E}
check for the highest normal form of the relation.