Indian Institute of Engineering Science and Technology, Shibpur
B.Tech (CS) 5th Semester End-Semester Examinations, Nov-Dec 2023

Database Management Systems (CS 3102)

Full Marks: 50

Time: 3 hrs

Answer Question No. 1 and any two from the rest.

1. Define the following:

   a) Generalization & Specialization
   b) Candidate key
   c) DDL & DML
   d) 2NF
   e) Check point

[5x2=10]

2. a) Define domain dependency and data dependency. Give example for each of these types of dependencies.

   b) Consider the following set of functional dependencies
      {AB → C   D → EG   C → A   BE → C
      BC → D   CG → BD   ACD → B   CE → AG}
      Prove that BD is a candidate key.

   c) Consider a relation RENT_DUE (qtr#, emp_id, date_of_occupancy, rent) with fds as follows :
      qtr# date_of_occupancy → emp_id rent
      emp_id → qtr#

   Is it in 2NF, 3NF or BCNF ? Justify your answer.

[5+5+10]

3. a) What are general strategies for query optimisation?
   b) Write Associative laws for joins and products relevant for query optimization.
   c) Explain the usage of laws and strategies in query optimization citing one example.

[5+5+10]

4. a) What is atomicity and consistency? Who guarantee these two?
   b) What can be achieved by concurrency control?
   c) What is lock compatibility matrix?
   d) What is wait-for-graph scheme? Does it prevent or avoid deadlock?

[4x5]

5. Write short notes on the following:

   a) B-tree
   b) Log-based recovery

[10+10]