Indian Institute of Engineering Science and Technology, Shibpur
B.Tech(CS) 5th Semester Final Examinations, Dec 2021

Database Management Systems (CS 3102)

F. M. = 50 **Time – 1 hr 30 min.**

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

1. Define the following:

a) Physical data independence
b) Cardinality
c) Primary key
d) 3NF
e) Lock compatibility matrix

[5x2=10]

2. a) What is the purpose of normalization?
b) Consider the relation ORDER (order#, parts, supplier, unit_price, qty) with functional dependencies as follows:

order# → parts supplier qty
supplier parts → unit_price

Is it in 3NF? Justify your answer.
c) What is dependency preserving decomposition? Write such an algorithm which achieves 3NF also.

[5+5+10]

3. a) Draw the state transition diagram of a transaction starting from partially committed state.
b) What is lost-update problem? Which property of transaction management is mostly violated in such a problem?
c) What is Wait-Die scheme?
d) Is it a deadlock avoidance or deadlock prevention scheme? Justify your answer.

[4x5]

4. a) Do a point wise comparison between B-Tree and hashed file organisation from the perspective of Query processing applications in DBMS.

b) Consider a file with n records organised into a B-tree with parameters d and e (d for index block, e for data block). If there are i nodes on paths from the root to leaves, derive expression for estimating number of block access for searching, insertion, deletion and modification.

[15+5]

5. Write short notes on the following:

a) Multivalued dependency
b) Redo/Undo operation

[10+10]