22/11/19

INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY, SHIBPUR
B.TECH (CS) 5th SEMESTER FINAL EXAMINATION, 2019

Database Management Systems (CS – 501)

F. M. = 70 **Time – 3 hrs.**

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

1. Answer the following:

a) Relation R has eight attributes ABCDEFGH where the attributes of R contain only atomic values. The set of fds F = {CH → G, A→ BC, B → CFH, E → A, F → EG}

Which normal forms does R maintain?

b) Which of the following statement is not true for view?
i. View is a virtual table
ii. Update through view is sometimes ambiguous
iii. View can be used as security mechanism
iv. None of the above is true for view

c) Checkpoint is used for
i. Recovery ii. Concurrency control iii. Table creation iv. None of the above

Choose the correct answer from the above.

d) In Log based recovery with immediate update which of the following operations are needed?
i. redo and undo ii. Only redo iii. Only undo iv. None

e) Which of the following statements is not true?

i. Wound-wait is a deadlock avoidance scheme
ii. Wait-for-graph is a deadlock avoidance scheme
iii. Two-phase locking protocol guarantees serializability
iv. Wait-die is a deadlock prevention scheme

[5x2=10]

2. a) What are anomalies in database design? Consider the relation FLIGHT (flight#, type-of-aircraft, date, source, destination). The given fds are:

flight# → type-of-aircraft
flight# date → source destination

In which normal form the relation is? Justify your answer.

b) Consider the relation Employee (emp_name, project_name, dependent_name). The given fds are:

emp_name -->> project_name
emp_name -->> dependent_name

Here dependent_name is independent of project_name. Convert the relation in 4NF.

[10+10]

3. a) If $\rho = (R_1, R_2)$ is a decomposition of R , and F is a set of functional dependencies, then under what conditions ρ has a lossless join w.r.t. F ?

b) State the conditions for F' to become minimal cover of F.

c) Consider a relation scheme CTHRSG. The fds are as follows:

$C \rightarrow T$, $HR \rightarrow C$, $HT \rightarrow R$, $CS \rightarrow G$, $HS \rightarrow R$

The key is HS. Do lossless join decomposition into BCNF and explain with the help of a tree structure.

[5+5+10]

4. a) Draw state transition diagram for transaction execution and explain each of the states.

b) What are the properties of Isolation and Consistency? Which components of DBMS take care of such properties?

c) Explain lock compatibility matrix.

[10+5+5]

5. a) State reasons in favour of allowing concurrency? What are the needs for controlling concurrency?

b) What are the Lost Update and Dirty Read Problem?

[10+10]

6. Write short notes on the following:

a) Query Optimization techniques
b) Fragmentation and Replication in Distributed DBMS

[10+10]