

BACHELOR OF INFORMATION TECHNOLOGY EXAMINATION, 2017
2nd year, 1st semester

Database Management Systems

Time: 3 Hours

Marks: 100

Note: Answer any five questions.

1. (a) What is the advantage of DBMS over file processing system?
 (b) Explain the three levels of data abstraction?
 (c) What is weak entity set? How will you implement it in a relational database?
 (d) What is Structured Query Language? Describe the difference between Join and Cartesian product?
 (e) Are the result of DROP and DELETE Operation same?

(3+6+4+2+3+2)

2. (a) Design an ER diagram for keeping track of the details of your favorite sports team. You should store the matches played, the scores in each match, the players in each match, and individual player statistics for each match. Identify the entities, relationships and also mention the cardinality etc. on the ER diagram.
 (b) Schemas for a company database are following :
EMPLOYEE (EMP_NO, NAME, AGE, SAL, DEPT_NO)
DEPARTMENT (DEPT_NO, NAME, DESIGNATION)
EMPLOYEE_TELEPHONE (EMP_NO, DEPT_NO, EXTENSION)
 Specify the following queries using SQL commands:
 (i) Find the names of employee who are working as Readers in mechanical engineering department having age below 40.
 (ii) Find the details of employees who are of the same age as employee John.
 (iii) Select details of all employees who either work in DEPT_NO 10 and get annual salary more than 80,000/- or work in DEPT_NO 12 and get annual salary more than 90,000/-.
 (iv) Find the id of all employees who work in DEPT_NO 20 and whose Designation is not same as "John".

(10+4x2.5)

3. (a) Explain 2-phase locking protocol. Can deadlock and starvation be prevented using this method?
 (b) What is time stamping method of concurrency control? Describe with examples.
 (c) What do you mean by redo and undo? What is write-ahead logging?

(5+3+6+3+3)

4. (a) What is the difference between Third Normal Form and BCNF?
 (b) Consider the following database relation: R (P, Q, R, S, T, U, V, W) with following functional dependencies: { P->QR, T->PQUV, SP->WV }
 Decompose the relation R up to the 3rd normal form. Also state the reason behind each decomposition.

(c) What is a candidate key and super key? Is there any difference between a Primary key and a candidate key?

(3+8+4+3)

5. (a) What do you mean by Deferred Log-based recovery? How it is different from immediate database modification?

(b) What is 'checkpoint mechanism'?

(c) Describe the shadow paging recovery technique. How it is different from Log based recovery technique?

(3+3+5+6+3)

6. (a) Explain properties of a transaction with the help of an example.

(b) Consider three transactions T1, T2, T3 with the following schedule. Verify if the schedule is serializable or not? Is schedule S conflict serializable?

S:	T ₁	T ₂	T ₃
	Read (X)	-----	-----
	-----	Read (Z)	-----
	Read (Z)	-----	-----
	-----	-----	Read (X)
	-----	-----	Read (Y)
	Write (X)	-----	-----
	-----	-----	Write (Y)
	-----	Read (Y)	-----
	-----	Write (Z)	-----
	-----	Write (Y)	-----

(c) What is cascading rollback? Why it is necessary?

(5+10+5)

7. (a) What is Query Optimization? Write down the steps for query processing.

(b) What are the metrics we can use to calculate query cost?

(c) Give the optimized Query tree corresponding to the given query:

List name the employees who had born on or before 1975 and working as a Branch Manager in Kolkata branch.

The available tables are

employee (Emp_id, emp_name, address, dateOfBirth)

works (Emp_id, job, salary, bank_code)

bank (bank_code, bank_name, city)

(3+5+4+8)