DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD -402 103
Semester Winter Examination – December - 2019

Branch: Computer Science and Engineering   **Sem.:- 5th**

Subject with Subject Code:-Database Systems BTCOC501   **Marks: 60**

Date:-09/12/2019   **Time:- 3 Hr.**

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Instructions to the Students
- 1. Each question carries 12 marks.
- 2. Attempt **any five** questions of the following.
- 3. Illustrate your answers with neat sketches, diagram etc. wherever necessary.
- 4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

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	Marks

Q. 1 a) Explain the difference between two-tier and three-tier architectures. Which is better suited for Web applications? Why? **(6)**

b) Construct an E-R diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Each insurance policy covers one or more cars, and has one or more premium payments associated with it. Each payment is for a particular period of time, and has an associated due date, and the date when the payment was received. **(6)**

Q. 2 a) Let the following relation schemas be given **(6)**

$$R = (A, B, C), \quad S = (A, D, E)$$

Let relations r (R) and s (S) be given. Give an expression in SQL that is equivalent to each of the following queries.

     (1) $\prod_{A,E}(\sigma_{C=D} (r \times s))$

     (2) $r \bowtie s$

     (3) $\prod_A (r) \cap \prod_A (s)$

b) Consider the following database **(6)**

     Student(name, s_no, class, major)

     Course(c-name, c_no, credit_hours, department)

     Write SQL statements to do the following update on the database schema

     (1) Insert a new student,<'Johnson',25,1,'Math'>,in the database.

     (2) Change the credit_hours of course 'Data Science' to 4.

(3) Delete the record for the student whose name is 'Smith' and whose student number is 17.

Q. 3 a) Compute the closure of the following set F of functional dependencies for relation schema (6)

$$r (A, B, C, D, E).$$

A→BC

CD→E

B→D

E→A

List the candidate keys for R.

b) Illustrating the concept of fully functional dependency, explain 2NF with example. (6)

Q. 4 a) Let relations r1(A, B,C) and r2(C, D, E) have the following properties : r1 has 20,000 tuples, r2 has 45,000 tuples, 25 tuples of r1 fit on one block, and 30 tuples of r2 fit on one block. (6)
Estimate the number of block transfers and seeks required, using each of the following join strategies for r1 ⋈ r2: (r1 Natural Join r2)

   1. Nested-loop join.
   2. Block nested-loop join.

b) Explain Query processing? Explain various steps in query processing with the help of neat sketch. (6)

Q. 5 a) Construct a B+-tree for the following set of key values: (6)
   (2, 3, 5, 7, 11, 17, 19, 23, 29, 31)
   Assume that the tree is initially empty and values are added in ascending order. Construct
   B+ tree for the cases where the number of pointers that will fit in one node is as follows:
   i. Four   ii. Six

b) Define ordered indices. Differentiate between Dense and sparse indices with suitable example. (6)

Q. 6 Write short note on following : (12)
   (1) ACID properties of transaction

   (2) View serializable schedule

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