

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular), April-May 2018
B. Tech in Computer Science Engineering, Semester IV

Roll No.....

CSE401: DATABASE MANAGEMENT SYSTEMS

Time: 3 hours

Max. Marks: 100

Instructions to students:

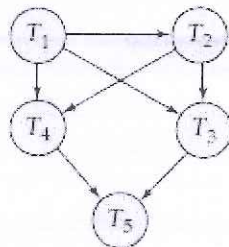
1. Do not write anything other than your roll number on question paper.
 2. Assume suitable data wherever required and mention it clearly.
 3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.
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Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

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- i. The result of a SQL Statement, Select sysdate from dual is _____
a) Current Date; b) Current Time; c) Current Date and Time; d) Logical Error;
- ii. Which is the subset of SQL commands used to manipulate Oracle Database Structures, including tables?
a) Data Definition Language; b) Data Manipulation Language; c) Data Described Language; d) Data Retrieval Language;
- iii. Which of the following refers to an entity which refers to itself?
a) Self-Referential entity; b) Strong entity; c) Weak entity; d) Primary entity;
- iv. IS-A Relationship in ER Diagram depicts
a) Recursion; b) Functional Dependency; c) Transaction; d) Inheritance;
- v. A weak entity set in an E-R diagram is an entity set that :
a) has a primary key; b) must be part of a one to many relationship set; c) is not existence dependent on a dominant entity; d) must not participate as owner in an identifying relationship with another entity set;
- vi. property will check whether all the operation of a transaction completed or none.
a) Atomicity; b) Consistency; c) Isolation; d) Durability;
- vii. Which of the following belong to Data Control Language category of SQL Statements?
a) Grant; b) Commit; c) Select; d) Rollback;
- viii. A table is in BCNF if it is in 3NF and if every determinant is a key.
a) dependent; b) normal; c) candidate; d) Both B & C;
- ix. Disk drives use _____ to detect failures.
a) Handlers; b) Crash Reports; c) Bad Sectors; d) Checksum;
- x. Which of the following can contain duplicate values?
a) Primary Key; b) Foreign Key; c) Candidate Key; d) Super Key;

- Q.2 Short answer type questions (4 questions @ 2.5 marks) 10
- What is the difference between primary index and a secondary index?
 - What undesirable dependencies are avoided when a relation is in 3NF? Given an example.
 - What is the effect of cascade update?
 - Differentiate between unique key and primary key giving an example.
- Q.3A Suppose you are given a relation R with four attributes, ABCD. For the given set of FDs, assuming those are the only dependencies that hold for R, do the following: 05
- Identify the candidate key(s) for R.
 - Identify the best normal form that R satisfies (1NF, 2NF, 3NF, or BCNF).
 - If R is not in BCNF, decompose it into a set of BCNF relations that preserve the dependencies.
- $F = \{AB \rightarrow C, AB \rightarrow D, C \rightarrow A, D \rightarrow B\}$
- Q.3B Which of the following decompositions of $R = ABCDEG$, with the set of dependencies F, is (a) dependency-preserving? (b) lossless-join? 05
- $F = (AB \rightarrow C, AC \rightarrow B, AD \rightarrow E, B \rightarrow D, BC \rightarrow A, E \rightarrow G)$
- (AB, BC, ABDE, EG)
- Q.4A Suppose we are using hashing on a file that contains records with the following search key-values: 05
- 2,3,5,7,11,17,19,23,29,31
- Show the hash structure for this file if the hash function is $h(x) = x \bmod 8$ and buckets can hold three records.
- Q.4B Justify the following statement: Concurrent execution of transactions is more important when data must be fetched from (slow) disk or when transactions are long, and is less important when data is in memory and transactions are very short. 05
- Q.5A Consider the precedence graph of Figure 15.18. Is the corresponding schedule conflict serializable? Explain your answer. 05



- Q.5B Discuss insertion, deletion, and modification anomalies. Why are they considered bad? Illustrate with examples. 05
- Q.6A Consider the relation R, which has attributes that hold schedules of courses and sections at a university; $R = \{Course_no, Sec_no, Offering_dept, Credit_hours, Course_level, Instructor_ssn, Semester, Year, Days_hours,$ 05

Room_no, No_of_students}.

Suppose that the following functional dependencies hold on R:

{Course_no} → {Offering_dept, Credit_hours, Course_level}

{Course_no, Sec_no, Semester, Year} → {Days_hours, Room_no, No_of_students, Instructor_ssn}

{Room_no, Days_hours, Semester, Year} → {Instructor_ssn, Course_no, Sec_no}

Try to determine which sets of attributes form keys of R. How would you normalize this relation?

Q.6B Explain the concept of Cascade and Restrict Operations in DBMS giving two examples of each.

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Q.7 Computer Sciences Department frequent fliers have been complaining to Dane County Airport officials about the poor organization at the airport. As a result, the officials have decided that all information related to the airport should be organized using a DBMS, and you've been hired to design the database. Your first task is to organize the information about all the airplanes that are stationed and maintained at the airport. The relevant information is as follows:

- Every airplane has a registration number, and each airplane is of a specific model.
- The airport accommodates a number of airplane models, and each model is identified by
 - a model number (e.g., DC-10) and has a capacity and a weight.
- A number of technicians work at the airport. You need to store the name, SSN, address, phone number, and salary of each technician.
- Each technician is an expert on one or more plane model(s), and his or her expertise may overlap with that of other technicians. This information about technicians must also be recorded.
- Traffic controllers must have an annual medical examination. For each traffic controller, you must store the date of the most recent exam.
- All airport employees (including technicians) belong to a union. You must store the union membership number of each employee. You can assume that each employee is uniquely identified by the social security number.
- The airport has a number of tests that are used periodically to ensure that airplanes are still airworthy. Each test has a Federal Aviation Administration (FAA) test number, a name, and a maximum possible score.
- The FAA requires the airport to keep track of each time that a given airplane is tested by a given technician using a given test. For each testing event, the information needed is the date, the number of hours the technician spent doing the test, and the score that the airplane received on the test.

a. Draw an E-R diagram.

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b. Map E-R designed in (i) Relational Table.

c. List Functional Dependencies in Each Table and Normalize the Relation.

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d. Prepare Data Dictionary.

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