Candidate Seat no. _____

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

Fourth Semester of B. Tech. (CE/CSE) Examination

Apr-May 2019

CE246 Database Management System

Date: 01.05.2019, Wednesday **Time: 10:00 a.m. To 01:00 p.m.** **Maximum Marks: 70**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.

SECTION-I

Q-1 Answer the Following Questions

a) Why is it not desirable to force users to make an explicit choice of a query processing strategy? Explain your answer. [01]

b) Show the steps involved in processing a query with neat diagram. [02]

c) List four significant differences between a file-processing system and a DBMS. [04]

Q-2 Answer the Following Questions

a) Differentiate database schema and Database Instance. [02]

b) Define the following terms. [02]

1) Procedural Language
2) Nonprocedural Language

c) Which symbol is used for rename operation? With an example explain rename. [02]

d) Consider a relation Product having attributes (Product_Id, P_Name, P_Quantity). All products Id's and Names are unique and not null. By looking at the relation derive Primary, Candidate and Super Keys. [03]

e) Write SQL statements for relational expressions given below. [05]
[Note: P=Project and R= select]

1) PName(RAge>25(User))
2) RId>2∨Age!=31(User)
3) RUser.OccupationId=Occupation.OccupationId(User X Occupation)
4) User ⋈ Occupation ⋈ City
5) PName,Gender(RCityName="Boston"(User ⋈ City))

OR

Q-2 Answer the Following Questions

a) In a relation Employee, one of the attribute is marital_status. If an employee is not married then he did not insert value for that attribute so what value would be there in database for the attribute marital_status? Justify your answer. [02]

b) Define the following terms. [02]

1) Referencing Relation

2) Referenced Relation

c) Why tuple relational calculus is used? How a query in the tuple relational calculus is written? [02]

d) List out and brief various types of Functional Dependencies. [03]

e) Formulate queries in relational algebra using relational schema given below. [05]

student(id, name)
enrolledIn(id, code)
subject(code, lecturer)

1) Who teaches cs1500 or cs3020?
2) Who teaches at least two different subjects?
3) What are the names of students in cs1500 or cs3010?
4) What are the names of students in both cs1500 and cs1200?
5) What are the names of students in at least two different subjects?

Q-3 Answer the Following Questions

a) What is the difference between specialization and generalization? [02]

b) Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted. [04]

c) **Do as Directed**

1 List out any two major difference between Ordered and Hash Indices. [02]

2 Indices speed query processing, but it is usually a bad idea to create indices on every attribute, and every combination of attributes, that is a potential search keys. Explain why. [02]

3 Construct B+ tree for the following set of key values: 2, 5, 7, 10, 13, 16 and 20. Assume Degree=3. [04]

OR

c) Can I create an Index using Non-primary key attribute or Multiple attributes? And also create a B+ tree of order 4 from scratch for the given EMP_NO's: 5, 3, 21, 9, 1, 13, 2, 7, 10, 12 and 4. [08]

1) Delete value 12 (after insertion)
2) Delete 5 (after 1st deletion)

SECTION-II

Q-4 Do as Directed

a) Describe total and partial participation constraints. [02]

b) Suppose relation R(A, B, C, D, E) and the set of functional dependencies are given below. [02]

(1) $A \rightarrow BC$
(2) $CD \rightarrow E$
(3) $B \rightarrow D$
(4) $E \rightarrow A$

Show that the decomposition of R into R1(A, B, C) and R2 (A, D, E), is a lossless-join decomposition.

c) Compute the closure of the following set F of functional dependencies for relation schema R = {A, B, C, D, E}. [03]

(1) $A \rightarrow BC$

(2) $CD \rightarrow E$

(3) $B \rightarrow D$

(4) $E \rightarrow A$

List any two candidate keys for R.

Q-5 Answer the Following Questions

a) In designing a relational database, why might we choose a non-BCNF design? [02]

b) Consider a builder, who is boss of many employees and working on many construction projects. Till now he was working on file based system. Now, he wants to make his system digital. He has communicated with your boss regarding the same. [04]

The attributes builder was using were Project number, Name, Employees assigned to the project, Employee number, Name, Job classification. The company charges its clients by billing the hours spent on each project and the hourly billing rate is dependent on the employee's position.

Your Boss has given you a task to normalize this relation up to 3NF.

c) **Answer the Following Questions [Any *two*]** [08]

1 Consider the following two transactions and schedule (time goes from top to bottom). Is this schedule conflict-serializable? Explain why or why not.

Transaction T_0	Transaction T_1
$r_0[A]$	
$w_0[A]$	
	$r_1[A]$
	$r_1[B]$
	c_1

2 Why concurrency control is needed? Explain any three problems that would arise when concurrency control is not provided by the database system.

3 What is deadlock of transaction? Explain wound wait technique for prevention of deadlock.

4 What is transaction? List and explain ACID property of transaction with example.

Q-6 Answer the Following Questions

a) Define Transaction Processing Monitors (TP monitors). And also differentiate Process–per-client and single-server model. [03]

b) Let relation r contains exactly the following tuples: [03]

Branch_Id	Branch_Name	City	Emp_Head
B001	KALUPUR	AHMEDABAD	Anil
B002	KAROLI BAUG	VADODRA	Dhani
B003			
B005			Mukesh

Find the truth value for the following expressions

1. EXISTS V(is_unk(V.Branch_Name) and (is_unk(V.City)) and(is_unk(V.Emp_Head)))
2.FORALL V (is_unk(V.Branch_Name))
3.EXISTS V(MAYBE ((V.Emp_Head="XXX")))

OR

b) Differentiate Authentication and Authorization. [03]

c) **Answer the Following Questions [Any *two]*** [08]

1 Is a high-performance transaction system necessarily a real-time system? Why or why not?

2 Encrypt & Decrypt message "hi" with the help of RSA algorithm where values for p, q and e are 17, 11 and 7 and what would be the Private and Public Key Pairs?

3 Differentiate the following

1) View and Materialized View

2) Main memory database and Real time database.

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