II B.E. Examination June 2021 Information Technology ITR4C4

Database Management System

Duration: 3 hours

Maximum Marks: 60

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	Note: Attempt any two parts from each question. Take suitable assumptions	
0.1()	wherever necessary. Attempt all part of a question in one place.	
Q.1(a)	Compare and contrast among 1-tier, 2-tier and 3-tier database architecture in DBMS.	6
(b)	Describe the database development life cycle with a neat sketch diagram.	6
(c)	Consider the following relations: Doctor(SSN, FirstName, LastName, Specialty, YearsOfExperience, PhoneNum) Patient(SSN, FirstName, LastName, Address, DOB, PrimaryDoctor_SSN) Medicine(TradeName, UnitPrice, GenericFlag) Prescription(Id, Date, Doctor_SSN, Patient_SSN) Prescription_Medicine(Prescription Id, TradeName, NumOfUnits) Write SQL query for the following: • List the first and last name of patients whose primary doctor named 'John Smith'. • List the first and last name of doctors who are not primary doctors to any patient. • For medicines written in more than 20 prescriptions, report the trade name and the total number of units prescribed. • List the SSN of patients who have 'Aspirin' and 'Vitamin' trade names in one	6
Q.2(a)	 prescription. List the SNN of distinct patients who have 'Aspirin' prescribed to them by doctor named 'John Smith'. List the trade name of generic medicine with unit price less than 50. Explain various constraints used in mysql with example. 	6
(b)	Assume we have the following application that models soccer teams, the games they play, and the players in each team. In the design, we want to capture the following: • We have a set of teams, each team has an ID (unique identifier), name, main stadium, and to which city this team belongs. • Each team has many players, and each player belongs to one team. Each player has a	6

number (unique identifier), name, DoB, start year, and shirt number that he uses.

- Teams play matches, in each match there is a host team and a guest team. The match takes place in the stadium of the host team.
- For each match we need to keep track of the following:
- o The date on which the game is played
- o The final result of the match
- o The players participated in the match. For each player, how many goals he scored, whether or not he took yellow card, and whether or not he took red card.
- o During the match, one player may substitute another player. We want to capture this substitution and the time at which it took place.
- Each match has exactly three referees. For each referee we have an ID (unique identifier), name, DoB, years of experience. One referee is the main referee and the other two are assistant referee.

Design an ER diagram to capture the above requirements. Make sure cardinalities and primary keys should be clear.

- (c) Map the above ER diagram to a relational model using the mapping rules. Identify the relational model constraints applicable on it.
- Q.3(a) Define functional dependency. What is the various inference rule used in it? Consider the following function dependency over R (A, B, C, D, E):

F: $A \rightarrow C$ G: $A \rightarrow CD$ AC $\rightarrow D$ E \rightarrow H

Check whether F and G are equivalent?

(b) Consider a relational Schema R(ABCDEFGHIJ) and following functional dependency: 6 AB \rightarrow C A \rightarrow DE D \rightarrow IJ

 $B \rightarrow F$ $F \rightarrow GH$

Convert the above relational schema to BCNF. Also Write the primary key and foreign key for each relation.

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- Consider the following schema: Suppliers (sid: integer, sname: string, address: string)
 Parts (pid: integer, pname: string, color: string) Catalog(sid: integer, pid: integer, cost: real). The key fields are underlined, and the domain of each field is listed after the field name. Thus, sid is the key for Suppliers, pid is the key for Parts, and sid and pid together form the key for Catalog. The Catalog relation lists the prices charged for parts by Suppliers. Write the following queries in relational algebra.
 - (a) Find the names of suppliers who supply some red part.
 - (b) Find the name of suppliers who supply some red or green part.
 - (c) Find the sids of suppliers who supply every red part.
- Q.4(a) Define PL/SQL. Consider a relation Employee (id, name, DoB, Addrees, Salary), create a trigger for Salary column. Explain the effect of this trigger during execution of insert, update and delete command.
- (b) Discuss ACID property of transaction. Explain state transaction diagram. Discuss various problems which arise during concurrent execution.
- (c) Compare and contrast among basic 2-PL, conservative 2-PL, strict 2-PL and rigorous 2- 6 PL with example.

Q.5(a)	What are the fundamental pillars of Database Security?	6
(b)	Differentiate between dynamic and extendible hashing. Also how would you insert	6
	following keys in a $B+$ tree with order $p=3$.	
	23, 65, 37, 60, 46, 92, 48, 71, 56, 59, 18, 21, 10, 74, 78, 15, 16, 20, 24, 28, 39	
(C)	Write Short Note on:	6
	(ii) Generic two-level data warehousing architecture	
	(iii) Data mining	