NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA
THEORY EXAMINATION

Question Paper

Month and year of the Examination: **Dec-2020**

Programme: **B.Tech.** Semester: - **3rd Semester**

Subject: **- Database systems** Course No: - **ITPC-25**

Number of Questions to be Attempted: **5** Maximum Marks: - **50**

Total No. of Questions: **5** Time Allowed: - **$2\frac{1}{2}$ Hours**

Total No. of Pages used: **2**

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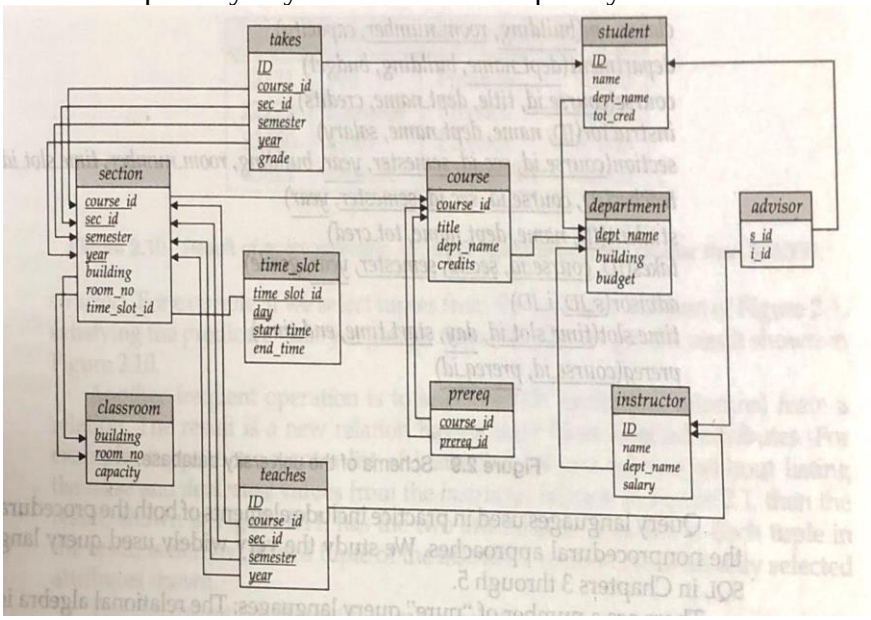
Note: - There will be internal choice in Question no. 4

Ques 1 (a)	Describe the three-schema architecture. Why do we need mappings between schema levels? How do different schema definition languages support this architecture?	(5)
Ques 1 (b)	What is meant by a recursive relationship type? Give some examples of Recursive relationship types.	(5)
Ques 2	Write the following queries in SQL, using the university schema. (a) Find the names of all students who have taken at least one Comp. Sci. course; make sure there are no duplicate names in the result. (b) Find the IDs and names of all students who have not taken any course offering before winter 2009. (c) For each department, find the maximum salary of faculty in that department. You may assume that every department has at least one faculty. (d) Find the lowest, across all departments, of the per-department maximum salary computed by the preceding query. (e) Create a new course "CS-001", titled "Weekly Seminar", with 2 credits. (f) Create a section of this course in summer 2009, with *Sec_id* of 1. (g) Enroll every student in the Comp. Sci. department in the above section. (h) Delete enrollments in the above section where the student's name is 'ABC'. (i) Delete the course "CS-001". What will happen if you run this delete statement without first deleting offerings (sections) of this course? (j) Delete all *takes* tuples corresponding to any section of any course with the word "database" as a part of the title; ignore case when matching the word with the title.	(10)
Ques 3 (a)	What is functional dependency? Consider the following two sets of FDs: X = { A→C, AC→D, E→AD, E→H} and Y = {A→CD, E→AH}, check whether they are equivalent or not?	(5)
Ques 3 (b)	What is normalization? Take an example where relation is in 2NF but not in 3NF. What problem may occur in insertion, deletion & modification? Explain suggest solution also.	(5)

Ques 4 (a)	Comparison between Tuple relational calculus and domain relational calculus.	(5)
Ques 4 (b)	A database is being constructed to keep track of the teams and games of a sports league. A team has a number of players, not all of whom participate in each game. It is desired to keep track of the players participating in each game for each team, the positions they played in that game, and the result of the game. Design an ER schema diagram for this application, stating any assumptions you make. Choose your favourite sport (e.g., soccer, baseball, football). Also define the mapping of conceptual schema to logical schema.	(5)
	OR	
Ques 4 (a)	List five responsibilities of a database management system. For each responsibility, explain the problems that would arise if the responsibility were not discharged.	(5)
Ques 4 (b)	What is primary key? Consider the *advisor* relational shown in figure 1, with s_id as the primary key of *advisor*. Suppose a student can have more than one advisor. Then, would s_id still be a primary key of the *advisor* relation? If not, what should the primary key of *advisor* be? Explain your anwer.  Figure 1	(5)
Ques 5 (a)	Show that the two-phase locking protocol ensures conflict serializability, and that transactions can be serialized according to their lock points. What benefit does rigorous two-phase locking provide? How does it compare with other forms of two-phase locking?	(5)
Ques 5 (b)	Define transactions and write the properties of the transaction with example.	(5)