

**MTech in Data Science
IIT Palakkad**

DS5003A : Data Engineering

0800-0850

Test 2 (17 Oct 2025)

Marks : 10

Instructions

1. Use Blue/ Black ink (red ink and pencils are not allowed). If your answer is not legible, you will not get any marks for that.
2. Do not use any language specific syntax or library routines.

Consider the following schema and answer the questions. Note that each question should be answered with a single SQL statement.

instructor(ID, name, dept_name, salary)
student(ID, name, dept_name, tot_cred)
hostel(ID, room_number, building)
course(course_ID, title, dept_name, credits)
department(dept_name, building, budget)
teaches(ID, course_ID, sec_ID, semester, year)
takes(ID, course_ID, sec_ID, dept_name, semester, year, grade)
prereq(course_ID, prereq_ID, dept_name)

- ✓ 1. Indicate the primary keys in the above schema. (1)
2. Given the above schema, there are some unnecessary attributes. Some attributes are even making the schema invalid. Refine the schema by removing those unnecessary attributes. Provide a one-line justification for your change. Consider the refined schema for the following questions. (1)
- ✓ 3. Show the name of the department with the highest individual salary. (1)
- ✓ 4. Show the names of the students who have taken a course from a department other than their enrolled department in 2024. (1)
5. Show the names of the student, instructor pair where the student has taken more than one course taught by the instructor from 2023 to 2024. (1)
- ✓ 6. Show the names of the courses which have prerequisite from the same department. (1)
- ✓ 7. Modify the schema to include projects in the database, where multiple students can team up to do the project under a mentor, where mentor, and team mates can come from various departments. Indicate the primary key. Provide a brief justification for your schema. (2)
- ✓ 8. Check the validity of the tot_cred attribute considering remaining data in the database. Can we remove tot_cred attribute from the schema ? (2)