

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION
DURATION: 1 HOUR 30 MINUTES

WINTER SEMESTER, 2022-2023
FULL MARKS: 75

CSE 4307: Database Management Systems

Programmable calculators are not allowed. Do not write anything on the question paper.

Answer **all 3 (three)** questions. Figures in the right margin indicate full marks of questions whereas corresponding CO and PO are written within parentheses.

1. Consider the relational instances shown in Table 1 and 2:

Table 1: Customer table for Question 1

Name	DOB	Phone	Address
Alen	26-09-01	0290678	Anytown
Alexa	26-09-01	0290678	Springfield
Alen	27-01-02	9015842	Anytown

Table 2: Transaction table for Question 1

TID	AccNo	OpeningDate	Amount
1021	3456	2023-09-25 14:30	11000
1022	9012	2023-09-25 15:45	50.00
1023	6789	2023-09-25 16:20	75.50

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- a) Determine the Primary Key of Customer table using a systematic procedure and provide explanation for your choice. 7
(CO1)
(PO1)
- b) With appropriate examples, explain the properties that are needed to be followed to ensure the correctness and consistency of a transaction in a database. 8
(CO1)
(PO1)
- c) What is self-referencing? Imagine you need to store information about transfers and/or refunds in a Transaction table that contains the Transaction ID (TID) associated with the respective transfer. How can you design the schema to ensure that inserting or deleting such transactions can be done without errors, especially when it comes to rollback or refund operations? 7
(CO1)
(PO1)
- d) Suppose R and S are two relations. Mention the two conditions that must be met in order to concatenate (i.e. UNION operation) R and S . "Even if these two conditions are satisfied the result of concatenation could be erroneous" - justify the statement. 6
(CO1)
(PO1)

2. Consider the following relations (Here, underline means primary key, fk<x> means foreign key referencing entity x):

Student (SID, SName, Department, Program, Batch)
Course (CCode, CName, OfferedBy, Credit, Semester)
CourseEnroll (SID{fk<Student>}, CCode{fk<Course>}, AcademicYear)
ExamSchedule (CCode{fk<Course>}, ExamDate, ExamTime)

- a) Write SQL statements to answer the following queries:

5 × 2

- ✓ i. Find the names of the students who have not enrolled in any courses of 3 credits in the academic year 2023.
ii. List the course code, academic years, and the number of total enrolled students for each course during an academic year, and sort them in ascending order of academic year and then course code.
✓ iii. Find the duration in days between the first and last exams of the current year's "Fall" semester.
✓ iv. List all students' name, their departments, and course count in the academic year 2023. If they have not enrolled in any courses, the course count should be 0.
✓ v. Find the course name(s) with the highest number of students enrolled so far.

(CO1)

(PO1)

- b) What is the purpose of a materialized view? Consider the view definitions shown in Code Snippet 1:

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(CO1)

(PO1)

```
1 Create or replace view CSE_Course
2 as Select CCode, CName, nvl(Credit,0) as CCredit, Semester
3 From Course
4 Where OfferedBy='Computer Science';
5
6 Create or replace view Course_Wise_Student
7 as select CCode, SID
8 from CourseEnroll
9 Where AcademicYear='2023'
10 Order by CCode;
```

Code Snippet 1: View definition for Question 2.b)

Is it allowed to insert data through these views? Justify your opinion.

3. Consider the following high-level description of a sales company:

ABC is a large company that sells different electronic items, such as laptops, smartphones, smart-watches, etc. Each item has its name, a short description, and unit price. The country has a number of divisions. Each division has a number of districts. The company has branches in different districts of the country. Employees have basic information such as name, DOB (date of birth), contact number, and current branch location (i.e. division and district). The company has a number of departments, such as sales, accounts, admin, etc. Each employee must be attached to a specific department. Only customers, who are pre-registered with basic information such as name, contact number, and address can buy items. The company also provides rental service for items, such as laptops/smartphones for its employees for a specific time duration, after which the items must be returned.

Based on the description, answer the following questions:

- a) Draw the Entity-Relationship Diagram (ER-D) using the standard notations and symbols.

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(CO2)

(PO3)

- b) Implement the ER-D from Question 3.a) using standard SQL.

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(CO2)

(PO3)