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

SEMESTER FINAL EXAMINATION   SUMMER SEMESTER, 2021-2022
DURATION: 3 HOURS   FULL MARKS: 100

CSE 4409: Database Management Systems II
Programmable calculators are not allowed. Do not write anything on the question paper.
Answer all 5 (five) questions. Figures in the right margin indicate full marks of questions whereas corresponding CO and PO are written within parentheses.

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1. a) Briefly outline the major guidelines for the formation of a primary key. Consider a Payroll Management System where the employees must have IDs. How will you construct the ID of employees? Justify your selection.

    5
    (CO1)
    (PO1)

    b) "Foreign key ensures that a data will come from a specific source" - Justify with suitable example.

    2
    (CO1)
    (PO1)

    c) Explain the concept of Positional Notation and Named Notation in PL/SQL sub-program.

    3
    (CO1)
    (PO1)

    d) Consider the banking transactions involving the following entities:

    10
    (CO1)
    (PO1)

    - *Customers(CID(pk), Name, Address)*
    - *Transactions(CID(fk[Customers], DateTranction, Amount, TypeTransaction)*

    Here, *TypeTransaction* will be 0 for withdraw, 1 for deposit.

    Your task is to write a function in PL/SQL as follows:

    Input: CID
    Outputs: Status of the customer, current balance
    Algorithm: Status is 'Elite' if total transaction amount (including both deposit and withdrawal) between January 1, 2023 and June 30, 2023 is greater than 2000000.
    If it is between 1000000 and 2000000, then status is 'Royal'.
    Otherwise, it is 'Ordinary'.

    Current Balance is the difference between total deposit and withdrawal at any time.

2. a) In a Payroll Management System of a company additional bonus is granted based on the current salary of the employees. The rules of determination of the bonus amount as shown in Table 1.

    15
    (CO1)
    (PO1)

    Table 1: Rules for determining bonus amount for Question 2.a)

Condition	Bonus
Monthly Salary above 100000	2% of the salary
Monthly Salary between 50000 and 100000	5% of the salary
Monthly Salary below 50000	10% of the salary

    Note that the bonus amount is not added to the original salary of the employees, rather a separate transaction (of amount determined by the business logic as stated) is made against each employee.

    Your tasks are:

- Create necessary DDLs to reflect the above requirement
- Write a PL/SQL procedure to automate the bonus process for all employees

b) In question 2.a), it may happen that while running this process some employees may be given additional increment (which is added to the salary) and as a result the salary is updated. Briefly outline the problem of the system. Also propose a suitable solution in this regard.

3. a) What is %ROWTYPE attribute? State one example to demonstrate its benefit.

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(CO1)
(PO1)

b) Consider the following data stored in a file named input.txt:

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(CO1)
(PO1)

```
100$Thomas$Sales$5000
200$Jason$Technology$5500
300$Mayla$Technology$7000
. . . . . . . . . . . . . . . . . . . . . .
```

Here, $ is the column separator while columns represent ID, Name, and Salary of the employees, respectively.

Your task is to use SQL Loader to import the data into an appropriate table. Show each step.

c) Consider the following statistic for the number of students in each department shown in Table 2.

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(CO1)
(PO1)

Table 2: Name and number of students of each department for Question 3.c)

Dept	No of students
CSE	765
EEE	658
MPE	547
CEE	580
TVE	250
BTM	310

Write an anonymous block in PL/SQL to print the name and total number of students using the concept of Key-Value pair.

4. In IUT, a system should be developed to automate the leave applications for the employees. As part of the automation one employee first fills up a leave request form where he/she mentions starting and ending dates of leave. The system then calculates the actual leave needed using the following guidelines:

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(CO3)
(PO3)

- Saturday and Sunday are weekly holidays.

- Apart from weekly holidays, the university remains closed on national holidays, such as Independent Day, Victory Day, and so on.

- Holidays for Eids in each year vary, but before the year begins, it is possible to mention them in academic calendar.

So these days should always be excluded in calculating total days for leave needed. Your tasks are as follows:

i. Create the required DDLs

ii. Write a subprogram in PL/SQL to calculate total number of days needed based on the start and end dates of leave.

5. a) Briefly outline the strength and weakness of star schema and snowflake schema.

5
(CO1)
(PO1)

b) Explain Roll-up and Drill-down OLAP operations.

5
(CO1)
(PO1)

c) Differentiate between ACID and BASE properties. Mention one application scenario where BASE is preferable to ACID properties.

10
(CO1)
(PO1)