

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION

SUMMER SEMESTER, 2022-2023

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 with corresponding COs and POs in parentheses.

1. a) Explain the purpose of %ROWTYPE attribute. Can it be used to inherit the constraints of the underlying entity? Briefly explain. 5
(CO1)
(PO1)
- b) Briefly comment on the value of %ISOPEN attribute for both implicit and explicit cursor. 5
(CO1)
(PO1)
- c) Consider a table EMP (ID, Name, DOB, Salary). Write an SQL to update the salary of the employees by 10% who now receives lower than the existing average salary. 10
(CO1)
(PO1)
Write an anonymous block that will execute the aforementioned update statement. If none of the records are affected by the statement, then it will print "NO RECORDS ARE UPDATED". Otherwise, it will count the total number (x) of updated records and will print the message "A TOTAL OF x RECORDS ARE UPDATED".
2. Read the following system description of a Banking System:
- ABC is a large bank which has a number of branches over the country. Customers can open their account after creating their basic profile which includes Name, Date of Birth (DOB), Address, and Contact Number. Once a profile is complete, they can open multiple account reusing the same personal information. Again, more than one person can open a single account (called Joint Account). In other words, one account may be owned by more than one person for joint account. Account includes Account Number, Title of the account, and Current Balance. Once account is opened, regular transactions can be made which will store Transaction ID, Account Number, Transaction Type (withdraw or deposit), Amount, and DateTime.
- a) Make the ERD and DDL for the aforementioned system. 10
(CO3)
(PO3)
- b) Write a PL/SQL function to meet the following requirements: 5
(CO1)
(PO1)
- Input:** Any valid Transaction ID
Output: A string containing the name(s) of the account owner who make the transaction.
Algorithm: If the account associated with the transaction is operated by exactly one person, then it will return a string "This is a single account and name of the owner is Mr. X" (assuming Mr. X is the owner of the account). Otherwise, it will return a string "This is a joint account and names of the owner are Mr. X, Mr Y, ..." listing the names of the owners.
- c) Consider that account holds the current balance which is a derived attribute. Whenever any transaction is made, the balance should be updated accordingly (i.e., for deposit and withdraw the amount will increase and reduce respectively as per the amount). 5
(CO1)
(PO1)
Your task is to automate the process using a suitable mechanism. Show the implementation in PL/SQL.

3. a) In reference to Question 2, the Transaction ID should be generated automatically as per the following format:
YYDDMM.NNNNN where YYDDMM is the year month and day of the transaction while NNNNN is the incremental number. Your task is to write PL/SQL code to automate the generation process. 5
(CO2)
(PO2)
- b) Consider the following 2 cases:
Case 1: There is a Library Management Software in IUT Library. There are books and students can borrow books for a specific time. Once the specific time is over they must be returned. **Case 2:** Book shop in Dhaka New Market intends to use a software to ease the process of selling books. Customers come to the shop and buy books. 10
(CO2)
(PO2)
- It seems both cases should have similar mapping cardinality in its main process (i.e., books vs. borrow or sell). Justify your position and write appropriate DDLs for each case.
- c) Consider the following relational tables: 10
(CO1)
(PO1)
- ```
Districts(ID(pk), Name, TotalPopulation, Size)
Citizens(CID (pk),Name,Address, DistrictID(fk{Districts}))
```
- The total population for a district is a derived value and must be in accordance with the records found in Citizen table. Again, if the total population is more than 50000, then we call it a **LARGE** district, otherwise, it is a **SMALL** district, which should be stored in the Size attribute of Districts Table.
- Your task is to write a PL/SQL subprogram to automate the process i.e. after executing the program both values will be updated correctly.
4. a) Define cuboid. Suppose you have 3 dimensions such as Items, Location and Year. Draw the cuboid for these dimensions. Write the equivalent SQL for both apex and base cuboid. The aggregate function is *summation* in this regard. 10  
(CO1)  
(PO1)
- b) Briefly outline the disadvantages of both Star Schema and Snowflake Schema for building Data Warehouse. 5  
(CO1)  
(PO1)
- c) Suppose you have developed a web application with a view to easing food order for IUT students and staff members. Initially, it was capable to satisfy user request without any major issue, as the the number of request surged it was not responding properly. As a database designer, briefly outline the steps that can be taken to solve the problem efficiently and economically. 5  
(CO1)  
(PO1)
5. a) "NoSQL database is designed to tolerate inconsistency for a brief period of time"- Justify this statement using a suitable application scenario. 5  
(CO1)  
(PO1)
- b) Traditional relational data model and aggregates data model both have their strength and weakness. Briefly outline them. 5  
(CO1)  
(PO1)
- c) There are cases where it is unwise to use Key-Value Database. Briefly mention them. 5  
(CO1)  
(PO1)