



**EAST WEST UNIVERSITY**  
**Department of Computer Science and Engineering**  
**B.Sc. in Computer Science and Engineering Program**  
**Mid Term Assessment I (Online), Spring 2022 Semester**

**Course:** CSE 302 Database Systems (Section 2)  
**Instructor:** Dr. Mohammad Rezwanul Huq, Associate Professor, CSE Department  
**Full Marks:** 100 (15 will be counted for final grading)  
**Time:** 1 Hour 30 Minutes + 10 Minutes for uploading the answer

**Note:** There are 6 (SIX) questions. Answer ALL of them. Course outcome, cognitive level and the mark of each question are mentioned at the right margin.

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1. User submits query as a SQL command to the database and then gets the result back. [CO1, C2, 10]  
**Explain** the process of how queries are being processed within a database system.
2. Consider the following database schema. [CO1, C3, 15]
  - Customer (CCode, CName, CGender, CAddress, CPostCode, CBalance)
  - Vendor (VCode, VName, VAddress, VPostCode)
  - Product (PCode, PName, PPrice, PDiscount, VCode)
  - Invoice (InvoiceNumber, CCode, InvoiceDate)
  - Cart (InvoiceNumber, ItemNumber, PCode, ItemUnits, ItemPrice)

**Customer** relation contains customer details and CCode is the primary key.

**Vendor** relation contains vendor (supplier) details and VCode is the primary key.

**Product** relation contains product details and PCode is the primary key. VCode is the foreign key referencing Vendor relation.

**Invoice** relation contains invoice details such as invoice number, customer code (CCode) and an invoice date. InvoiceNumber is the primary key and CCode is the foreign key.

**Cart** relation contains the products sold under a given invoice. The primary key in this relation is (InvoiceNumber, ItemNumber) in which item number is more like a serial number, i.e., 1, 2, 3 and so on, depending on the number of products sold under the same invoice. Invoice number is a foreign key referencing the Invoice relation and product code (PCode) is another foreign key referencing Product relation. Item units refers to the quantity of that item and ItemPrice refers to the price of the item.

**Draw the schema diagram of the above-mentioned database schema.** You must show the primary key and the referential integrity constraints appropriately in your diagram.

3. Based on the database schema given in Question 2, **Construct SQL Statements** for [CO2, C3, 16]  
the following queries.

a) Write a SQL Statement to create the Cart relation. Use appropriate data type. Define appropriate constraints. Make sure that ItemUnits and ItemPrice cannot be NULL and both must be a positive value.

b) Write a SQL Statement to add a new attribute CPhone in Customer relation. Use appropriate data type. Assume that the Vendor relation is already created for you.

c) Write a SQL Statement to decrease the price of the product with code 'P1-AB-01' by 20%.

d) Write a SQL Statement to delete all the products with a discount.

4. Based on the database schema given in Question 2, **Construct SQL Statements** for [CO2, C3, 18]  
the following queries.

a) Show customer code and name who are 'female' and balance are not in between 10000 and 20000 (both bounds are inclusive).

b) Find product name, product price and vendor name of those products in which their name ends with 'Oil'.

c) Generate a listing of all purchases made by customers according to the columns in the result relation shown below.

CCode	InvoiceNumber	InvoiceDate	PName	ItemUnits	ItemPrice
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d) List all the products supplied by 'ACI Limited' in the ascending order of their price.

5. Using the same database schema as given in Question 2, **Write Relational Algebra Expressions** for the following queries. [CO1, C3, 25]

a) Find the product code, product name and product price supplied by the vendor 'Samsung'.

b) Find the customer's name and address who has the lowest balance.

c) Find the number of products supplied by the vendor 'Samsung'.

d) Calculate the total amount for each invoice. Total amount can be calculated by summing up the multiplication of item units and item price of all items under the same invoice.

e) Using the appropriate set operator, find the product code and name of those products which have not been sold yet.

6. Consider the following relations as shown below.

[CO1, C3,  
16]

Relation1

A	B	C
A1	B1	C1
A2	B2	C2
A4	B2	C3
A3	B3	C4
A5	B3	C5

Relation2

C	D	E	F
C1	D1	E1	F1
C2	D3	E2	F1
C2	D2	E3	F1
C3	D4	E2	F3

**Determine** the output of the following expressions.

a) Relation1  Relation2

b) Relation1  Relation2