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Daffodil International University

**Faculty of Science & Information Technology**

**Department of Software Engineering**

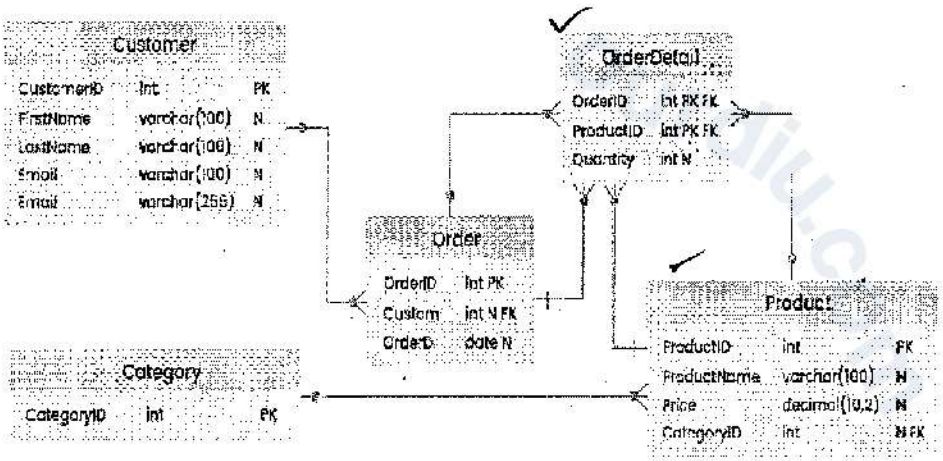
**Midterm Examination, Summer 2026**

**Course Code: SE 223; Course Title: Database Systems**

**Sections & Teachers: NJN(A,C,H),TRT(B,D,G),KRA(E),MKH(F,I,J),ZNM(K),FT(L)**

**Time: 1:30 Hrs** **Marks: 25**

**Answer ALL Questions**

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|---|---|---|---|---|
| **1.** | |  | | **CLO-1, Level-4** |
| | *a)* | Consider the following scenario:<br>An online retail company currently manages its business data, including Customer records, Orders, Order Details, Products, and Product Categories, using a traditional File Processing System (FPS). Each department (Sales, Inventory, and Billing) maintains its own separate files. For example, the Sales department stores customer and order data in a flat file, the Inventory department keeps product and category details in a separate spreadsheet file, and the Billing department duplicates customer and order information in yet another file for invoice generation.<br><br>**Analyze** this scenario and identify any three major problems that would arise from managing this retail data using a File Processing System. | **[Marks-3]** | |
| | *b)* | Using the database schema as your scenario, **explain** the THREE levels of data abstraction. **Justify** how each level hides complexity from the level above it. | **[Marks-4]** | |
| | *c)* | **Identify** which database architecture is most appropriate for this schema and provide a detailed justification. | **[Marks- 3]** | |

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| 2. | *a)* | **Illustrate** a complete Entity-Relationship (ER) Diagram based on the provided schema image. | [Marks-3] | CLO-2 *Level-4* |
| | *b)* | Using the schema, **figure out** the relational algebra expressions for each of the following operations:<br>i. Retrieve all products with a price greater than 500.<br>ii. Display only the FirstName, LastName, and Email of all customers.<br>iii. Retrieve order information along with corresponding customer details.<br>iv. Join OrderDetail and Product tables where the quantity ordered is greater than 2.<br>v. List all ProductIDs that appear in OrderDetail OR that belong to a specific category.<br>vi. Find CustomerIDs that have placed at least two different orders on the same date.<br>vii. Find all CustomerIDs who have registered but have NOT yet placed any order. | [Marks-7] | |
| 3. | *a)* | **Show** the Candidate key and Foreign key types with reference to the schema diagram. | [Marks- 2] | [CLO-3, Level-3] |
| | *b)* | **Complete** the following SQL operations. You must write and execute each SQL statement:<br>i. Create the Product and Category tables with appropriate data types and key constraints as defined in the schema.<br>ii. Insert at least FOUR rows of realistic sample data into each table.<br>iii. Add a new column StockQuantity (integer, NOT NULL, default 0) to the Product table using an ALTER TABLE statement. | [Marks-3] | |

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