The Open University of Sri Lanka
Faculty of Engineering
BSE Honours Degree Programme

Department	: Electrical and Computer Engineering
Level	: 3
Name of the Examination	: Final Examination
Course Title and - Code	: Information Systems and Data Management – EEI3266
Academic Year	: 2023/24
Date	: 20/08/2024
Time	: 01.30pm – 04.30pm
Duration	: 3 hrs.

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **four (4)** questions in **four (4)** pages.
3. Answer all **four (4)** questions. Each question carries 25 marks.
4. Answer for each question should commence from **a new page.**
5. Draw fully labelled diagrams where necessary.
6. Write answers in clear and concise format appropriately in points/bullet form.
7. Involvement in any activity that is considered as an exam offense will lead to punishment.
8. Use blue or black ink pen to answer the questions.
9. Clearly state your index number in your answer script in every page.

Answer All Questions.

Question 1

Scenario: AgriGen Farmhouse is a very successful agricultural business that offers breakfast services to visitors. The management system is designed to efficiently handle both farming operations and hospitality services. Guests can make reservations online or in person, each with a unique Guest ID. The farmhouse offers various types of rooms, each with specific features and prices. The farm grows crops and raises livestock, both of which require careful management. Livestock includes various animals with detailed records of health and production. The farmhouse employs staff for different roles, each with a unique Employee ID.

The farmhouse purchases supplies from multiple suppliers, who have profiles with contact information and product details. The Farm produces vegetables, fruits, eggs, and milk are sold to guests and external customers through orders, which include details of products, quantities, and customer information.

A. Based on the AgriGen Farmhouse scenario, identify and classify the entities as either strong or weak entities. **(6 marks)**

B. For the entities in the AgriGen Farmhouse scenario, identify the following types of attributes and mention the relevant entity for each. **(8 marks)**

   i. Primary Key Attributes
   ii. Derived Attributes
   iii. Multivalued Attributes
   iv. Composite Attributes

C. Draw an Entity Relationship Diagram (ERD) for the AgriGen Farmhouse scenario. Include and indicate the cardinality and constraints for each relationship. Clearly state any assumptions you make while creating the ERD. **(11 marks)**

Question 2

A university has a table that records students and the courses they are enrolled in. Each row in the table contains the following information:

StudentID: The unique identifier for each student, **StudentName**: The name of the student

Age: The age of the student, **CourseID**: The unique identifier for each course

CourseName: The name of the course, **Instructor**: The name of the course instructor

Department: Relevant department

StudentID	StudentName	Age	CourseID	CourseName	Instructor	Department
1	Heshani	21	MHZ2520	Mathematics	Mr. Ravi	Mathematics
1	Heshani	21	EEX4373	Data Science	Ms. Suba	Statistics
2	Hannah	22	MHZ2520	Mathematics	Mr. Ravi	Mathematics
3	Akil	20	AGM3263	English	Mr.Peter	Languages

A. Are all the values in each field of this relation atomic? **(01 marks)**

B. Transform the above table into Second Normal Form (2NF). **(10 marks)**

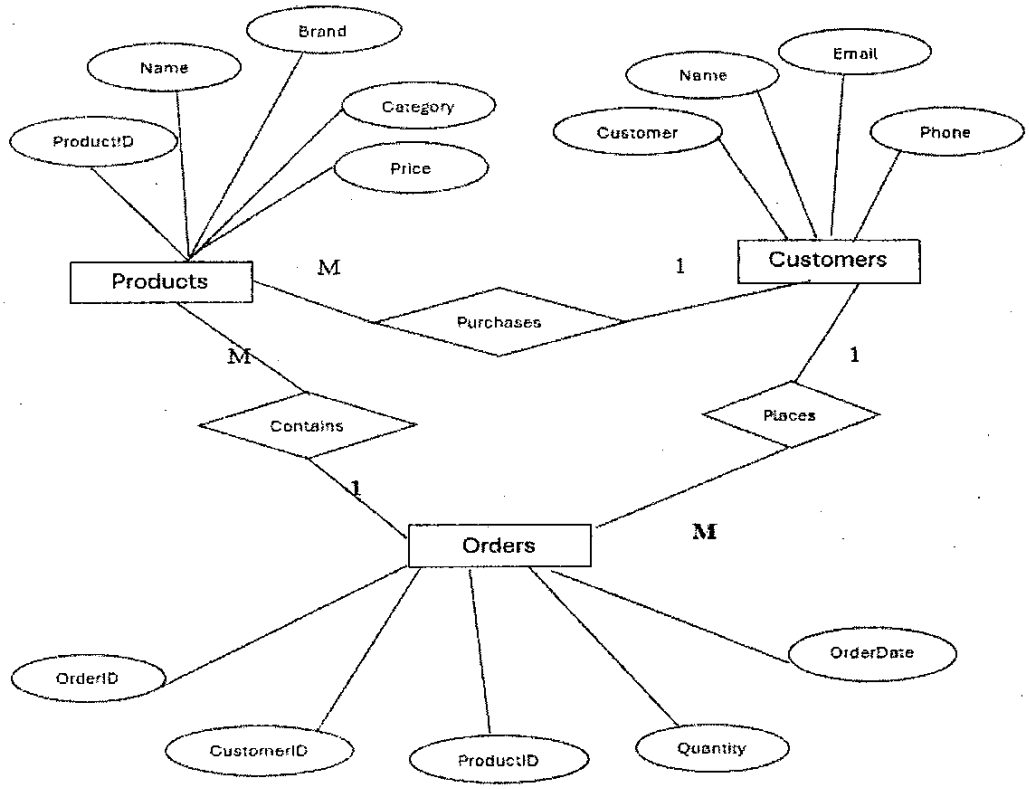
C. Identify any transitive dependencies present in this relation. **(04 marks)**

D. Based on the table structure from question (B), further normalize it to Third Normal Form (3NF). **(04 marks)**

E. Draw the relational schema for the normalized tables from question (D). **(06 marks)**

Question 3

As a manager of a boutique online retail establishment specializing in electronics, you oversee a comprehensive database designed to efficiently manage crucial information about products, customers, and orders. Your database needs to handle a variety of tasks, including tracking inventory levels, processing customer orders, managing customer details, and analyzing sales trends. Refer to the ER diagram provided below to answer the given questions.



Write SQL queries for the following referring to the above scenario:

A. Create a database named "Sales". **(02 Marks)**

B. Create relations (tables) with SQL. Use suitable data types to define attributes in each of the relations. Define Primary key/foreign key constraints and other integrity constraints at the creation of relations. **(06 Marks)**

C. Write a SQL query to insert a data point into the relations created. You may use sample data for a relation created in question (B). **(06 Marks)**

D. Write a SQL view function to display the Name and Price columns from the Products table. **(02 Marks)**

E. Find the order date which is ordered by CustomerID=2 from the Orders table. **(03 Marks)**

F. Delete the record with CustomerID=3 and ProductID=5 from the Orders table. **(03 Marks)**

G. Find the most expensive product from the Products table. **(03 Marks)**

Question 4

A. Identify three categories of information systems used in Operations Support Systems (OSS) and three categories used in Management Support Systems (MSS). **(06 Marks)**

B. Explain the role of an Enterprise Resource Planning (ERP) system in a business. Provide an example to illustrate your answer. **(04 Marks)**

C. Define Database Management Systems (DBMS) and briefly explain the features and functions of a Student Database Management System. **(05 Marks)**

D. List and explain the three levels or views of Database Architecture. **(05 Marks)**

E. Identify and discuss the steps involved in the Database Life Cycle. **(05 Marks)**

End of Paper