

Q2. (a) Explain *business rule* and how it is used in the creation of an accurate database model. (4 marks)

(b) Draw an Entity Relationship Diagram (ERD) for the following scenario, using a Crow's Foot Model notation. You are required to resolve any many-to-many relationship.

Satellite Movie Sdn Bhd, a TV and movie broadcasting company, offers a few packages for subscription. A customer may register for one or more packages (the Registration_Date is recorded). The Customer entity consists of attributes Customer_No, Customer_Name and Contact. The package entity consists of attributes Package_ID, Package_Name and Package_Price. A package offers many channels. A channel may be offered by more than one package. A Start_Date is used to indicate when the package begins to offer a particular channel. The channel entity consists of attributes Channel_ID, Channel_Title and Description. (9 marks)

(c) Based on the scenario given in Q2 (b), produce a list of attributes using Database Design Language (DBDL) for all the entities that you have identified. Show all the primary and foreign keys (if any) clearly. *You are required to underline all the primary keys and identify the foreign keys with an asterisk (*)*. (12 marks)

Q2. (a) A **data model** is a simple representation of real-world data structure. A well-designed data model can foster a better understanding of the organisation for which the database is designed.

Briefly describe any **TWO (2)** reasons why data model is important in the above context. (4 marks)

(b) While data model represents real-world data structure, **business rules** are used to identify and define the basic modeling component within a specific real-world environment.

Briefly explain any **TWO (2)** reasons why the process of identifying and documenting **business rules** is important to database design. (4 marks)

Q2. (c) Aloha Enterprise is a medium-size boutique that sells women's apparels and accessories such as dress, blouse, pants, necklace etc. Customers must first register themselves as members. Attributes for **MEMBER** include MemberID (identifier), Name, Address and ContactNo. Each member may place one or more orders and each order is generated by a particular member. Attributes for **ORDER** include OrderNo (identifier), OrderDate, OrderTime and TotalAmount.

An order may list one or more product items (eg dress, bracelet etc). Each product item may be included in one or more orders. Attributes for **PRODUCT** include ProductNo, Description, Price and Category. Each time when an order is made, the quantity of each product ordered will be recorded.

The company provides shipment services for orders made. Attributes for **SHIPMENT** are ShipmentNo (identifier), ShipmentDate and Remarks. Each shipment may include one or more orders but each order must be delivered through one shipment only.

- (i) Draw an **Entity-Relationship Diagram** (ERD) to illustrate the above scenario using Crow's Foot notation. Resolve many-to-many relationship (if any). (11 marks)
- (ii) For each of the entities in the ERD drawn in Q2 (c)(i) above, list all relevant attributes using **Database Design Language** (DBDL). In your listing, show all the primary keys and foreign keys (if any) clearly. Underline all the primary keys or composite keys and identify the foreign keys with an *. (6 marks)

- Q2. (a) (i) The collection of data becomes meaningful only when it reflects the properly defined business rules. Explain the term **business rules** in the context of database. (2 marks)
- (ii) Briefly explain any **THREE (3)** reasons why the process of identifying and documenting **business rules** is important to database design. (6 marks)

- (b) ChaCha Tea is a chain of beverage outlets which set up their outlets in various locations. The company has decided to develop and implement a database management system to maintain and manage all the outlets' transactions. They have hired you as the database designer and you are required to study the following business rules derived from their requirements:

Every outlet will record their sales transactions. The attributes for **OUTLET** are OutletID (identifier), location and telNo.

Every transaction may list one or more types of beverages purchased and each type of beverage may be recorded in various transactions. The attributes for **TRANSACTION** include Sale_No (identifier), SaleDate and TotalAmount. Attributes for **BEVERAGE** are BeverageID (identifier), Description and Price. Each time when a transaction is made the quantity of the beverage purchased will be recorded.

Each outlet will also maintain their staff's record. Each staff may handle more than one transactions during their duty but each transaction may only be handled by one staff. The attributes for **STAFF** are StaffID(identifier), Name, Address, Staff telNo and ICNo.

- (i) Draw an **Entity-Relationship Diagram (ERD)** to illustrate the above scenario using Crow's Foot notation. Resolve many-to-many relationship (if any). (11 marks)
- (ii) For each of the entities in the ERD drawn in Q2 (b)(i) above, list all relevant attributes using **Database Design Language (DDL)**. In your listing, show all the primary keys and foreign keys (if any) clearly. Underline all the primary keys or composite keys and identify the foreign keys with an *. (6 marks)

Q2. (a) **Business rules** - Brief, precise, and unambiguous description of a policy, procedure, or principle within a specific organization's environment. (2 marks)

(b) **Three reasons why business rules are important to database design:**

- They are a communication tool between users and creators, and they also help standardize the company's view of the data.
- They help to define a conceptual model of the business of an organisation and how they are applied to information systems.
- They are used for the organization that stores or uses data to be an explanation of a policy, procedure, or principle.

(Any 3 reasons: 2 marks x 3 = 6 marks)

Q2. (a) Business rules are used to identify and define the basic data-modeling components within a real-world environment. Briefly explain any **THREE (3)** reasons why identifying and documenting **business rules** are important in database design. (6 marks)

(b) TreasureHunt Co. plans to create a website for online shopping which is similar to eBay. The website will be used by small businesses to open an online store. The following are the business rules:

To use the online shopping facilities, member registration is required. The attributes for **MEMBER** are MemberID (identifier), Name, Address, Country and email.

A shopping cart will be given to make a purchase transaction. Each shopping cart is unique for a purchase (i.e. a different cart will be given to the member on separate purchases). Attributes for **CART** include CartNo (identifier), PurchaseDate and TotalAmount.

A shopping cart **must** contain one or more items. Each item **may** be added to one or more shopping carts. Each time when a transaction is made the quantity of the items purchased will be recorded. Attributes for **ITEM** are ItemCode (identifier), Description, Price, QuantityOnHand and SupplierName.

The company provides warehouses to store the items purchased before delivery. Upon confirming the purchase, the member can choose to keep their cart at a specific warehouse. Each warehouse can receive one or more carts. The attributes for **WAREHOUSE** are WarehouseID(identifier) and location.

(i) Draw an **Entity-Relationship Diagram (ERD)** for the above scenario using Crow's Foot notation. Resolve many-to-many relationship (if any). (11 marks)

(ii) For each of the entities in the ERD drawn in Q2 (b)(i) above, list all relevant attributes using the **Database Design Language (DBDL)** format. Underline all the primary keys and identify the foreign keys with an *. (8 marks)

Question 2

- (b) Consider the following narrative of an online movie subscription company.

Movie Flix Sdn. Bhd. is a new start-up company that provides online movie subscription with different subscription packages. The company offers two categories of subscription packages. The attributes in the CATEGORY relation include CategoryID, Category_Type and Price. Movie Flix has a database to maintain the scheduled movies which are shown on specific date and time. The attributes of MOVIE_SCHEDULE are Schedule_No, Movie_Title, Movie_Date, Movie_Time. Every customer is allowed to watch the movie(s) available in the category subscribed. A customer can have many subscriptions and a category can appear in many subscriptions. The attributes of SUBSCRIBE are Subscribe_No and Description. The attributes in the CUSTOMER relation include Customer_ID, Customer_Name, Customer_IC, Customer_Contact_No and Address.

- (i) Draw an Entity-Relationship Diagram (ERD) to illustrate the scenario narrated using Crow's Foot notation. Resolve any many-to-many relationship. (7 marks)
- (ii) For each of the entities in the Entity Relationship Diagram (ERD) drawn in Q2 (b) (i), list all the relevant attributes using the Database Design Language (DBDL) format. In the list, show all the primary keys and foreign keys (if any) clearly. Underline all primary keys and indicate the foreign keys with an asterisk (*).

(11 marks)

Question 3

- (a) Define business rule and describe any **FOUR (4)** importance of specifying business rules in an organization. (8 marks)
- (b) Explain conceptual data model and identify **TWO (2)** tools for producing the model. (5 marks)