Tutorial 1 : Object Orientation

Question 1

Describe the relationship between classes and objects.

Question2

Assuming that the Course class is part of a Course Registration System:

- Construct an UML class diagram for the Course class and include some messages that a Student class may wish to send to the object of the Course class.
- Construct an UML object diagram for the Course object.

Question 3

Define the term ***polymorphism***. Explain how a message passing to different objects by applying polymorphism concept. You may explain with an example.

Question 4

Identify and describe the relationship for the classes below with the correct association.

Employee, Manager and Engineer

- Construct UML class diagram for the classes above with the appropriate class name and properties.

- Based on the above solutions, construct an UML object diagram from one of the classes above.

Question 5

Suppose you work for a university that needs to manage basic information about staff and students. The information about each staff is such as name, address, telephone number, date employed and position. The information about each student is name, date of birth, course and year of study.

- Draw an UML class diagram with generalization/ inheritance relationship between the classes based on the scenario above. (Note: Do not include the operations)

- Discuss the benefits of using *inheritance* in object-oriented.

Tutorial 2 : Modeling Concepts

Question 1

Unified Software Development Process (USDP) is a generic software development process for object-oriented analysis and design. Describe the best practices of USDP approach in software development.

Question2

Identify the major criticisms of the information system projects that are developed using traditional waterfall approach.

Question 3

Construct an ***activity diagram*** for the **bus tickets reservation processes** as described below:

The customer is allowed to place bus tickets reservation based on the bus schedule availability via online. If the bus schedule is available, the system will check the seat availability. If the seat is available, the system will request customer's personal details. The system will check the customer's status. If he or she is a new customer, the system will register the customer details into the system; else the customer can proceed to make the reservation.

Once the reservation transaction is done, the system will display the total amount payable and the customer should make online payment one day before the departure date and time; else the system will automatically cancel the reservation. Once the payment transaction is done, the system should be able to generate the online ticket receipt and the customer is required to print out the receipt as a proof.

You are required to include the relevant object flows and swim lanes in your activity diagram.

Area	Marks
Correct swim lanes and object creation	3
Correct notation	2
Logic and correct object flows	6

Question 4

Commerce Bank provides an e-banking services such as e-billing, e-statement, online share trading, fund transfer, etc. The customers can apply for online services by filling in an application form to open a new account at customer service counter. Then, the application form and the photocopy of the customer's identity card with finger print verification will be submitted to the manager for approval purpose. The application will be reviewed and processed within 20 minutes. If the application is approved, the customer needs to deposit RM300 as deposit for opening an e-banking account. After that, an approved statement will be given to the customer including a 6 digit PIN code for online service access.

On the same day, the customer is required to login to the system with the PIN code given. For first time login, a customer needs to change his / her own password. After that, the customer can use the online services. At the end, he/she must log out the system and return to the main menu.

Analyze the above scenario and construct an activity diagram for the online customer e-banking account opening process as described above. You are required to include the relevant object flows and swim lanes in your activity diagram.

Area	Marks
Correct swim lanes and object creation	3
Correct notation	2
Logic and correct object flows	6

Tutorial 3: Requirements Capture

Question 1

Asia Pacific Berhad is an airline company which operates scheduled domestic and international flights to more than 150 destinations spanning over 25 countries. The company has implemented a Flight Ticket Reservation System and allowing the customers to book flight tickets and manage their booking online. The targeted users of this system are customers and staff. The Flight Ticket Reservation System consists of the following system functionalities:

The system should allow customers to:

- Search flight schedule
- Book flight ticket with seat selection option
- Make online payment
- Generate e-ticket
- Check-in flight
- Check flight status

The system show allow staff to:

- Cancel flight ticket
- Maintain flight schedule
- Generate report
- Access all functions that are accessible by customers.

Construct a *use case diagram* that depicts the functional requirements for the Flight Ticket Reservation System.

Area	Marks Allotted
Correct actors	2
Define system boundary and Name	1
Correct use of include and extend relationship	2
Correct use cases	8
Correct generalization relationship	1
Correct notation	1

Question 2

Delicious Pizza Sdn. Bhd is a fast-growing pizza delivery company in Malaysia. The pizza chain has growth to more than 200 restaurants ll over the country. The company has implemented an Online Pizza Ordering System and allowing customers to order pizza from a wide variety of selections. The company also provide free delivery service when the order has reached the minimum order amount. The Online Pizza Ordering System consists of the following system functionalities:

The system should allow customer to:

- Register user account
- Search store locations
- Place order with add on beverages option
- Make payment
- Generate receipt
- Track order status

The system should allow staff to:

- Receive order
- Deliver order
- Generate report
- Access all functions that are accessible by customers

a) Construct a *use case diagram* that depicts the functional requirements for the Online Pizza Ordering System.

Area	Marks Allotted
Correct primary and supporting actors	2
Define system boundary	1
Correct use of include and extend relationship	2
Correct use cases	8
Correct generalization relationship	1
Correct notation	1

b) Write a *use case description* to document the basic scenario for the main flow and alternative flow of events for "*Register user account*" use case.

Use Case Name:	
Actor:	
Brief Description:	
Main Flows of Events	
Actor Action	System Responses
2.	1.
4.	3.
	5.
	6. If the value entered by user is correct, …..
7.	8. If user select "confirm",….
	9.
Alternative Flow: A1. Step 6 If the value entered by user is incorrect,…. A2. Step 8 If user select "cancel",…..	

Area	Marks Allotted
Logic main flow of events	6
Logic alternatives flow events	2

c) Recommend **TWO** suitable non-functional requirements for the Online Pizza Ordering System and provide reasons to justify why these non-functional requirements should be included.

Question 3

A local college has started a project of college Bus Tracking System. Registered college students/staffs are able to view the bus daily schedule with details such as destination, departure time, expected arrival time, and bus registration number (plat number). Users can also set notification when a particular bus is arriving. A bus is assigned tobone specific route and a driver (part time or full time) is in-charge of one bus only to ensure service effectiveness. The following questions are based on the college bus tracking system:

a) List the actors and identify the suitable functional requirements for college Bus Tracking System.

b) Based on the solutions given in a), Construct a ***use case diagram*** that depicts the functional requirements for college Bus Tracking System.

Area	Marks
Correct actors	1
Define system boundary and name	1
Correct use of include and extend relationship	2
Correct main use cases	6

Tutorial 4: Requirements Analysis

Question 1

Based on the case given in T3Q1 (Flight Ticket Reservation System), construct an *analysis class diagram* with the following descriptions:

"*There are two categories of customer: ordinary customer and premium customer. To be entitled as a premium customer, a customer is required to subscribe for annual membership fee. Premium customer is able to earn premium points based on flight miles accrued. Each customer can place at least one booking. For each booking, customer can book up to nine passengers including adults and children. For each flight schedule, it consists of at least one booking and each booking is referring to only one flight schedule.*"

Area	Marks Allotted
Correct Entity Classes and Attributes	8
Correct Associations and Multiplicities	3
Correct Generalization	1
Correct notation	1

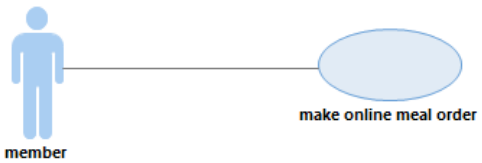
Question 2

Construct an *analysis class diagram* based on the following assumptions:

"*The college staff and students are able to view an announcement at anytime through the bulletin board system. A publisher can post one or many announcements, each announcement should be approved by an administrator. The administrator can approve one or many announcements at a time. The approved announcement will send to many recipient groups. A recipient group can receive many announcements*".

Area	Marks Allotted
Correct Entity Classes and Attributes	5
Correct Associations and Multiplicities	4
Correct notation	1

Question 3



(a) Develop a ***use case realization*** for the use case "***Make online meal order***" based on the above use case diagram.

(b) Construct an ***analysis class diagram*** for the online meal ordering system based on the following descriptions:

"A customer can make many orders for several meals. Each order should include the delivery details. Payment should be made by the customer once the order is completed".

The class diagram should include entity classes with appropriate attributes, associations and multiplicity of the associations.

Question 4

What is a Class-Responsibility-Collaboration card and why should an analyst create them? Explain it with an example of CRC apply in class diagram.

Tutorial 5: Refining the Requirements Models

Question 1

a) Explain the differences between aggregation and composition relationship in a class diagram.

b) Differentiate between the abstract class and concrete class. Provide an example for each of the class.

Question 2

Identify the relationship for the classes below with the correct association (composition/ aggregation/ generalization):

a) Transportation, Air transportation and Land transportation

b) Hotel campus, Hotel buildings and Hotel rooms

Question 3

Construct a relevant UML diagram to show either aggregation or composition for the following:

"*An email inbox has many incoming emails daily. Each email has a header, a body and optionally it may consist of one or many attachment files"*.

Question 4

A local college has started a project of college Bus Tracking System. Registered college students/staffs are able to view the bus daily schedule with details such as destination, departure time, expected arrival time, and bus registration number (plat number). Users can also set notification when a particular bus is arriving. A bus is assigned one specific route and a driver (part time or full time) is in-charge of one bus only to ensure service effectiveness. The following questions are based on the college bus tracking system.

Construct an ***analysis class diagram*** with appropriate attributes to show *Generalization, Composition*, and *Aggregation* relationship.

Area	Marks Allotted
Correct Entity Classes and Attributes	6
Correct Associations and Multiplicities	3
Correct Generalization	1
Composition and Aggregation	2

Question 5

ORDER

Order Number: Ord00006
Date: 1 June 2021

Shipping Date: 3 June 2021
BILL TO: Customer ID: C0001
QESdn. Bhd.
23 Jalan D9
42100, PetalingJaya,Selangor

Payment Method: Cheque
Chequenumber: 7898888 (PBB)
Account Number: 04316540120

Item No	Description	Quantity	Unit Price(RM)	weight	Sub Total(RM)
1111	**Table**	**10**	**100.00**	**0.5kg**	**1000.00**
2222	**Printer**	**1**	**1000.00**	**1 kg**	**1000.00**
3333	**office Chair**	**10**	**200.00**	**2.5kg**	**2000.00**
Shipping cost charge 5%					**200.00**
Total Payment:					RM4200.00

Construct a ***design class diagram*** that models sample order form above.

The class diagram must include attributes with data type, operations, associations, generalization, multiplicities, and correct aggregation/composition relationships.