UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INFORMATION TECHNOLOGY

FINAL EXAMINATION

MARCH 2025 SEMESTER

COURSE CODE	:	ISB37804
COURSE TITLE	:	REUSE AND COMPONENT BASED-DEVELOPMENT
PROGRAMME NAME	:	BACHELOR IN INFORMATION TECHNOLOGY (HONS) IN SOFTWARE ENGINEERING
DATE	:	25 JUNE 2025
TIME	:	9:00AM - 11:00AM
DURATION	:	2 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of ONE sections.
4. Section A consist of five questions. Answer FOUR (4) questions only.
5. Please write your answer on the answer booklet provided.
6. Please answer all questions in English only.
7. Refer to the attached Formula/ Appendies. ☐ *Tick if applicable*

THERE ARE 7 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 100 marks)

Answer FOUR (4) questions.

Please use the answer booklet provided.

Question 1

The following questions are based on component.

(a) Differentiate between Provide and Requires interface.

(6 marks)

(b) Component can be categorized as development for reuse and development with reuse. Explain each categories with examples.

(10 marks)

(c) WeatherLibrary is Java Class Library that contains the following abstract method in WeatherModel java interface.

public abstract String DisplayMessage (Weather weather) ;
Write the complete concrete method in WeatherModelimpl.java that implements the WeatherModel within the EJB component. The message is based on the following statements:
Drizzle or **rain** is based on the size of the droplets. If the water droplets are smaller than 0.5mm it's known as drizzle; 0.5mm or bigger and it becomes rain.

(9 marks)

Question 2

You, as a software engineer developed a web service that will be use in an **agricultural advisory application**, farmers input soil and environmental data to receive recommendations on fertilizer type and quantity. The system uses an if-else structure to suggest the right fertilizer based on **soil type**, **crop type**, **rainfall level**, and **previous fertilizer use**.

(a) Describe THREE (3) key standards of web service.

(6 marks)

(b) Write the complete Web service method definition named recommendFertilizer. The purpose of this web service is to return the recommendation note based on the following conditions.

Soil Type	Rainfall	Crop Type	Previous Fertilizer Use	Recommendation	Reasoning
Sandy	Low	Corn	No	Use organic compost with high nitrogen	Matches `soilType == "sandy"` and `rainfall == "low"`
Clay	Moderate	Rice	No	Use phosphorus-rich fertilizer	Matches `soilType == "clay"` and `cropType == "rice"`
Loam	High	Wheat	Yes	Use balanced NPK fertilizer	Matches `cropType == "wheat"` and `previousFertilizerUse == true` and `rainfall == "high"`
Loam	Low	Wheat	Yes	Reduce nitrogen, increase potassium	Same as above but with `rainfall == "low"`
Loam	Moderate	Corn	No	Use general-purpose fertilizer	Does not match any specific condition — falls to default case

(13 marks)

(c) Write the complete SOAP response based on the following input :

- soilType = "clay"
- cropType = "rice"
- rainfall = "moderate"
- previousFertilizerUse = false

(6 marks)

The XYZ software house decided to build a reusable asset in personal financ management system aimed at helping users track expenses, manage budgets, and se savings goals across multiple platforms. The reusable asset was designed as a share library, allowing seamless integration with mobile apps, desktop dashboards, and third-part banking APIs.

(a) Define what are reusable assets in the context of the above scenario.

(6 marks)

(b) Write the complete method definition named getFinancialAdvise. The method is within the shared library and the purpose of this method is to retun the advisory note based on the following conditions.

Advice	Example Income	Example Expenses	Income Level	Has Debt	Goal Type	Reasoning
High spending – reduce expenses before saving	5000	4500	Medium	False	Emergency	expensesRatio = 4500 / 5000 = 0.9 → Greater than 0.8
Focus on paying off debt first	3000	2000	Low	True	Retirement	expensesRatio = 0.66 and low income – debt triggers this branch
Maximize retirement savings	8000	5000	High	False	Retirement	Retirement goal – high income triggers this branch
Build emergency fund	4000	3000	Medium	False	Emergency	Emergency goal – no debt triggers this branch
Moderate savings plan	6000	4000	Medium	True	Short-term	Doesn't match other cases, falls into default case

(13 marks)

(c) The method in question (b) of the shared library is within the class named Advisory. While , the consumer of the shared library is a Java Swing desktop dashboard application. Write the method invocation within the ***private void jButton2ActionPerformed(java.awt.event.ActionEvent evt).***
Accept value from jTextField .Create an object named adv by calling the default constructor.

(6 marks)

Question 4

Case Study: Software Product Line for Training Management Systems

A software company specializing in learning and development solutions adopted a Software Product Line (SPL) approach to create a family of Training Management Systems (TMS) for different types of clients—corporate training departments, educational institutions, and government agencies. Instead of developing separate systems from scratch for each client, the company designed a core platform with shared features like course scheduling, trainee registration, progress tracking, certification generation, and reporting. Variability was managed through configurable modules and plug-ins, allowing each client to select or customize features such as e-learning integration, compliance tracking, or multi-language support based on their specific needs.

Using SPL, the company reduced development effort, streamlined maintenance, and improved time-to-market for customized deployments. For example, a corporate client needed integration with an HR system and gamified learning paths, while a university required semester-based course structures and student portals. Both were delivered by reusing the core assets and only developing the necessary extensions. This approach led to increased customer satisfaction, more predictable costs, and a scalable framework for future clients with varying training management requirements

(a) What is the definition of Software Product Line (SPL) defined by the Software Engineering Institute (SEI) ?

(5 marks)

(b) Based on the case study, define the Software Product Line for Training Management Systems and derive 3 products/software which include the core and variable modules or features.

(10 marks)

(c) Explain 3 benefits of a software house specializing in teaching and learning domains in adopting a Software Product Line (provide example) ?.

(10 marks)

Question 5

Case Study: Developing a Veterinary Management System Using JSF Framework

A software development team was commissioned to build a Veterinary Management System (VMS) for a local animal clinic using the JavaServer Faces (JSF) framework. The goal was to create a web-based application to manage pet records, owners, appointments, and treatment history. The team began by designing the core entities—Pet, Owner, Appointment, and Treatment—using Java Persistence API(JPA) with a relational database. Session beans and controllers were created for each feature to handle CRUD operations and connect the UI with the business logic. Using JSF facelets, they built web pages for owner registration, pet profiles, appointment scheduling, and treatment logs, ensuring a responsive and user-friendly interface.

The JSF framework simplified development by providing component-based UI design and server-side validation. Features like pagination in pet records, date pickers for appointments, and dropdowns for selecting treatment types were easily implemented using JSF components. Security was handled using container-managed authentication, restricting access to vet staff and admins. By structuring the application with JSF's MVC architecture and using reusable templates, the team delivered a scalable and maintainable solution that streamlined clinic operations and improved record accuracy.

(a) JavaServer Faces (JSF) framework is a type of application framework. Describe the FIVE (5) Web Application Framework (WAF) features with examples from the case study.

(15 marks)

(b) Based on the case study, describe the Model View Controller (MVC) with relevant examples.

(10 marks)

END OF EXAMINATION PAPER