



**UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INFORMATION TECHNOLOGY**

**FINAL EXAMINATION
MARCH 2026 SEMESTER**

COURSE CODE : ISB37804
COURSE TITLE : REUSE AND COMPONENT BASED-DEVELOPMENT
**PROGRAMME NAME : BACHELOR IN INFORMATION TECHNOLOGY (HONS) IN
SOFTWARE ENGINEERING**
DATE : 23 JUNE 2026
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 6 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 100 marks)

Answer FOUR (4) questions.

Please use the answer booklet provided.

Question 1

The cloud computing and web services are implemented in a smart farming system. In this case, farmers use Internet of Things (IoT) sensors placed in the field to collect real-time data such as soil moisture, temperature, humidity, rainfall, and crop conditions. The data is sent to a cloud platform where it is stored, processed, and analyzed. Through web services, this information can be accessed by different users such as farmers, agricultural officers, suppliers, and researchers using web or mobile applications. For example, when the system detects low soil moisture, it can automatically notify the farmer or trigger an irrigation system. Cloud computing allows the system to handle large amounts of agricultural data without requiring farmers to own expensive servers, while web services enable different applications to communicate and share data easily. This case study shows that cloud-based web services can improve decision-making, reduce water and fertilizer waste, increase crop productivity, and support more efficient farm management.

- (a) Describe cloud computing and web services. Provide relevant examples from the case study (12 marks)
- (b) Write the complete Web service method definition named *decideWatering*. The purpose of this web service is to return the recommendation note based on the following conditions.

No.	Soil Moisture	Temperature	Humidity	Rainfall	Decision
1	Any value	Any value	Any value	> 5 mm	Do Not Water, Rainfall is sufficient
2	< 30%	>= 30°C	< 60%	<= 5 mm	Water Immediately, Soil is very dry and weather is hot
3	< 40%	Any value	Any value	<= 5 mm	Water Soon, Soil moisture is below
4	>= 40%	Any value	Any value	<= 5 mm	Do Not Water, Soil moisture is sufficient

(13 marks)

Question 2

Component-Based Software Engineering (CBSE) can be used to develop a medical domain system by dividing the system into reusable and independent software components. For example, a hospital management system can be developed using separate components such as patient registration, doctor scheduling, electronic medical records, billing, pharmacy management, laboratory test management, and appointment notification. Each component performs a specific function and can be developed, tested, updated, or replaced without affecting the entire system. By integrating reusable components through well-defined interfaces, hospitals and clinics can build flexible systems that support better patient care, efficient medical workflow, and secure management of healthcare data

- (a) Describe THREE(3) characteristics of components.

(12 marks)

- (b) Describe the relevant components and interfaces in this case study.

(13 marks)

Question 3

An e-commerce recommender system can be developed using the Model-View-Controller (MVC) framework to separate the user interface, business logic, and data management. In this system, the Model manages customer profiles, product details, browsing history, purchase records, ratings, carts, and recommendation data using Java Persistence API (JPA). The View is developed using JSP pages, where customers can browse products, search items, view product details, receive personalized recommendations, and manage their cart or orders. The Controller is implemented using Servlets, which receive user requests, process actions, call the Model or service classes, and forward results back to the JSP pages. The recommendation engine can analyze customer preferences, previous purchases, product categories, ratings, and similar customer behavior to suggest suitable products. By applying MVC, the e-commerce recommender system becomes more organized, maintainable, reusable, and easier to upgrade.

- (a) List FOUR(4) possible file in each Model, View and Controller and explain the function of the files (eg: index.jsp in View).

(12 marks)

- (b) Update the Categoryr and Product java code with java persistence API notation.

<pre>public class Category { private Integer categoryId; private String categoryName; public Collection<Product> item; }</pre>	<pre>public class Product { private Integer productId; private String prodName; private Category category; }</pre>
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(13 marks)

Question 4

Tyqus Choimel Software House needs to build reusable assets in-house to improve development efficiency, reduce project cost, and maintain consistent software quality across different client projects. By developing these assets internally, the software house can reuse proven solutions instead of creating similar functions from the beginning for every new system. In addition, in-house reusable assets can become part of the company's software knowledge base and competitive advantage because they reflect the company's technical expertise, best practices, and experience from previous projects.

- (a) Discuss THREE (3) factors to consider building reusable assets in house.

(12 marks)

- (b) A programmer developed a reusable asset in the form of jar file that contains the following static method header for calculating electricity bill.

public static double calculateElectricityBill(double kWh){.....}

- i. Write the complete static method where the electricity provider charges a flat rate of RM0.12 per kilowatt-hour (kWh) for the first 500 kWh and RM0.15 per kWh for any consumption beyond that threshold.

(8 marks)

- ii. Write the example of usage in ***public static void main(String[] args)***. The monthly consumption of electricity is based on previous and current meter reading.

[Hint: previous reading = 25000, current reading = 25500]

(5 marks)

Question 5

Domain engineering is the process of identifying, analyzing, and designing reusable components that are common in rental house systems. In the rental house domain, common features may include tenant registration, landlord registration, property listing, rental application, booking appointment, rental agreement, payment processing, maintenance request, house inspection, notification, and rental report generation. These features can be designed as reusable assets because they are needed in many rental systems such as house rental, apartment rental, room rental, homestay rental, and office space rental. The main purpose of domain engineering is to create a general rental house framework that can be reused to develop different types of rental applications more quickly and consistently.

Application engineering is the process of using reusable components from domain engineering to develop a specific rental house application. For example, if the system is developed for a house rental platform, the application may reuse components such as tenant management, property management, rental application, payment, agreement, and maintenance request. Then, specific features such as monthly rental calculation, deposit payment, tenancy period, house rules, and landlord approval can be added. If the system is developed for homestay rental, the same reusable components can be used, but additional features such as daily booking, check-in and check-out date, guest limit, and cleaning fee can be included. Therefore, application engineering focuses on customizing and integrating reusable components to meet the specific needs of one rental system.

- (a) Based on the case study, differentiate between the development for reuse and development with reuse.

(12 marks)

- (b) Derive TWO (2) products of Application Engineering and specify the FIVE (5) core feature for both product and FOUR (4) variable feature for each products.

(13 marks)

END OF EXAMINATION PAPER