



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2023/2024**

- COURSE NAME : TECHNOLOGY OF WEB SERVICES
- COURSE CODE : BIW20404
- PROGRAMME CODE : BIW
- EXAMINATION DATE : JULY 2024
- DURATION : 3 HOURS
- INSTRUCTIONS :
1. ANSWER ALL QUESTIONS
  2. THIS FINAL EXAMINATION IS CONDUCTED VIA
    - Open book
    - Closed book
  3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK.

THIS QUESTION PAPER CONSISTS OF SEVEN (7) PAGES.

**PART A**

Instruction: Choose the correct answer.

**Q1** Which of the following scenarios is an example of using Software as a Service (SaaS)?

- (a) A company hosts its email server on its own premises and manages it internally.
- (b) A marketing team uses a cloud-based project management tool to collaborate on campaigns.
- (c) A software development company builds a custom application for internal use.
- (d) A university develops its own learning management system to deliver online courses.

(1 mark)

**Q2** In a Web Service Description Language (WSDL) file, what does the 'portType' element define?

- (a) The operations supported by the web service and the messages involved.
- (b) The Uniform Resource Identifier (URI) endpoint of the web service.
- (c) The data types used in Simple Object Access Protocol (SOAP) messages exchanged by the web service.
- (d) The transport protocol for communication.

(1 mark)

**Q3** Which of the following best describes the Java API for XML Web Services (JAX-WS)?

- (a) A Java library for building RESTful web services.
- (b) A Java library for building SOAP-based web services.
- (c) A JavaScript library for client-side web development.
- (d) A Java framework for microservices architecture.

(1 mark)

**Q4** The root element of a SOAP message is the \_\_\_\_\_.

- (a) Header element
- (b) Envelope element
- (c) Body element
- (d) Fault element

(1 mark)

- Q5** Which of the following is **NOT CORRECT** about microservices?
- (a) Developers cannot build microservices using whichever tools best suit the business value they intend to provide.
  - (b) Each service in microservices focuses only on a single functionality of the application and is isolated from the others.
  - (c) Once built, the microservice is available to any consumer.
  - (d) Risk mitigation is one of the benefits of microservices.
- (1 mark)
- Q6** In which situation that Service Virtualization might be particularly useful?
- (a) When deploying monolithic applications with few external integrations
  - (b) When there is limited access to external services or dependencies for testing purposes.
  - (c) When developing applications with minimal reliance on external Application Programming Interface (API).
  - (d) When testing independent components in isolation from external dependencies.
- (1 mark)
- Q7** Select the characteristic that does **NOT** depict SOAP as an eXtensible Markup Language (XML) based messaging framework.
- (a) Extensible.
  - (b) Interoperable/neutral.
  - (c) Simple configuration.
  - (d) Independent.
- (1 mark)
- Q8** Identify the main goal of a Denial of Service (DoS) attack?
- (a) To disrupt or prevent legitimate users from accessing a service.
  - (b) To modify or delete data on the target system.
  - (c) To gain unauthorized access to sensitive information.
  - (d) To steal login credentials from unsuspecting users.
- (1 mark)

- Q9** Which of the following statements about service description is **NOT CORRECT**?
- (a) It comprises the details of the interface and implementation of the service.
  - (b) It includes its data types, operations, binding information, and network location.
  - (c) It cannot be published to a service requestor or a service registry.
  - (d) It can also categorize other metadata to enable discovery and utilize by service requestors.
- (1 mark)

- Q10** Manage and authenticate message exchanges between parties, including security context exchange and establishing and deriving session keys.

This description best applies to \_\_\_\_\_.

- (a) WS-Authorization
- (b) WS-Secure Conversation
- (c) WS-Trust
- (d) WS-Privacy

(1 mark)

**PART B**

Instruction: State **TRUE** or **FALSE** for the following statements.

- Q11** The web service stack consists of three layers: the XML messaging layer, the service description layer, and the transport layer.
- (1 mark)
- Q12** SOAP faults can only be sent as a response to a SOAP request.
- (1 mark)
- Q13** Authentication and authorization are not important in web service security because messages exchanged between service providers and consumers are always encrypted.
- (1 mark)
- Q14** Service registry is the application that is looking for and invoking or initiating an interaction with a service.
- (1 mark)
- Q15** In REST-based, resources have URIs and are manipulated through Hypertext Transfer Protocol (HTTP) header operations.
- (1 mark)

## PART C

Instruction: Answer all questions.

**Q16** Web service refers to the realization of the Service Oriented Architecture (SOA) concept on Web.

- (a) Explain your understanding of platform-independent interfaces. (3 marks)
- (b) Define **TWO (2)** main features of the SOAP-based model's applicability in Web service. (4 marks)
- (c) Describe the main role of Universal Description, Discovery, and Integration (UDDI) in Web service. (3 marks)

**Q17** Convert the following XML schema definition (XSD) in **Figure Q17.1** into an XML data model. Apply **TWO (2)** appropriate data values for each element.

(5 marks)

```
<xs:schema attributeFormDefault="unqualified"
elementFormDefault="qualified"
xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="class2024">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="student" maxOccurs="unbounded"
minOccurs="0">
          <xs:complexType>
            <xs:sequence>
              <xs:element type="xs:string" name="firstName"/>
              <xs:element type="xs:string" name="lastName"/>
              <xs:element type="xs:byte" name="age"/>
              <xs:element type="xs:string" name="studentID"/>
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

Figure Q17.1

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**Q18** Consider a simple account-management and order processing system. The accounting personnel use a client application built with Apache NetBeans to create new accounts and enter new customer orders.

- (a) Explain the steps for performing the web service client operation based on the case study above.

(6 marks)

- (b) Assume that a request file contains an invalid customer IC, a SOAP fault message could be returned. It may contain messages that assist the client in resolving an error or unexpected condition.

Create a SOAP fault file that displays the error message INVALID IC.

(6 marks)

**Q19** Based on the following scenario, answer **Q19(a)** - **Q19(c)**.

Mabruk Enterprise is a retail company, wants to implement a web service to automate their inventory management system (IMS). They want to provide a way for their suppliers to access and update product information via an API and have those changes automatically reflected in their inventory system.

- (a) Discuss **THREE (3)** potential benefits of implementing a Web service for the Mabruk Enterprise IMS?

(6 marks)

- (b) Describe **THREE (3)** security measures that Mabruk Enterprise can implement to protect the security of their web service and prevent unauthorised access or change of their inventory data.

(6 marks)

- (c) Assume a DoS attack occurred on the Mabruk Enterprise IMS. Outline **TWO (2)** indicators that may happen to the IMS during a DoS attack.

(4 marks)

**Q20** Based on the following scenario, answer **Q20(a) – Q20(d)**.

In the education loan programme offered by Community Bank, the education loan service needs to discover the Best Rate (BR) service before using it. The BR is a reference rate established by Bank Negara Malaysia.

The BR Web service is listed in the UDDI registry as a Web service capable of offering information about the Community bank's BR. When the loan service is initiated, the UDDI registry is retrieved and searched for a Web service that providing the bank's BR information.

The UDDI registry returned the BR service's URI and details about how to access the BR service, which are derived from the WSDL interface.

- (a) Illustrate the Web service discovery process based on the scenario above.  
(6 marks)
- (b) Describe the discovery process in detail based on your answer in **Q20(a)**.  
(4 marks)
- (c) Demonstrate the possible WSDL document to describe the service. You are only required to write down the elements that come with tags `<message></message>` and `<portType><portType>`.  
(8 marks)
- (d) There are several options for securing Web service messages. In your opinion, what is the most appropriate method for securing data messaging for user validation before applying for an education loan? Justify your answer.  
(4 marks)

- END OF QUESTIONS -