



**UNIVERSITY OF COLOMBO, SRI LANKA**

**UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING**

**BACHELOR OF SCIENCE IN COMPUTER SCIENCE  
BACHELOR OF SCIENCE IN INFORMATION SYSTEMS  
BACHELOR OF SCIENCE HONOURS IN COMPUTER SCIENCE  
BACHELOR OF SCIENCE HONOURS IN SOFTWARE ENGINEERING  
BACHELOR OF SCIENCE HONOURS IN INFORMATION SYSTEMS**

*Academic Year 2021/2022 – Third Year Examination – Semester I – 2021*

***SCS3203/ IS3108 Middleware Architecture***

***TWO (2) HOURS for both Part A and Part B***



**Part A**

***To be completed by the candidate***

Examination Index No: .....

**Important Instructions to candidates:**

The medium of instruction and question is **English**.

If a page or a part of this question paper is not printed, please inform the supervisor immediately.

Note that questions appear on both sides of the paper. If a page is not printed, please inform the supervisor immediately.

Write your index number on each and every page of the Question paper.

This paper has **02** questions and **09** pages.

Answer **ALL** questions. All questions carry equal marks (25 marks).

**This paper consists of two parts, Part A (Question No 1 and Question No 2) and Part B (Question No 3 and Question No 4) and submit separately.**

Any electronic device capable of storing and retrieving text including electronic dictionaries and mobile phones are **not allowed**.

Calculators are **not allowed**.

**For Examiner's use  
only**

<b>Question No</b>	<b>Marks</b>
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<b>1</b>	
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<b>2</b>	
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<b>Total</b>	
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Index No: .....

**Question 1**

- (a)
- (i) State the **importance** of *the communications link* and *the protocol*, elements in a middleware.

[2 Marks]


- (ii) State **two (2)** elements out of four (4) *elements of middleware*, which ensure the required degree of performance, reliability etc.

[2 Marks]


- (b)
- (i) State and briefly explain the *two types of scalabilities* in a distributed system using suitable diagrams.

[6 Marks]


Cont.

Index No: .....


- (ii) Mention **two (2)** system *failures in middleware* and briefly explain each of them.

[4 Marks]

[illegible]

Index No: .....

- (c)  
(i) State the difference between *Open group* and *Close group*.

[4 Marks]


- (ii) *Total Order Multicast (TOM)* is a property which needs to be applied in *multicasting*. Briefly explain the TOM using a suitable diagram.

[7 Marks]


Cont.

[illegible]

Index No: .....

**Question 2**

- (a)
- (i) State the importance of *stub* and *skeleton* generated by the Interface Definition Language in Remote Procedure Calls.

[4 Marks]


- (ii) “It is a good practice to avoid using pointers in remote procedure calls”, justify this statement.

[4 Marks]


Cont.

Index No: .....


- (b) *SQL Parsing* and *Calling Stored Procedures* are two methods used in Remote Database Access. Define and compare those two methods considering their advantages and disadvantages.

[5 Marks]

[illegible]

- [6 Marks]

[illegible]



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- (d) Briefly explain the significant failure of *message queuing middleware* using a suitable example.

[6 Marks]

[illegible]

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**Part B**



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For Examiner's use only	
Question No	Marks
3	
4	
Total	

Index No: .....

**Question 3**

- (a)
- (i) Describe *Monolithic* architecture and *Micro-services* architecture in your words.

[4 Marks]

**Monolithic Architecture:**


**Micro-services Architecture:**


- (ii) Write down *two (2)* advantages and disadvantages of *serverless computing*.

[4 Marks]

**Advantages:**


**Disadvantages:**


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(b)

- (i) “Cloud” is a widely used term in computing domain. State whether the following statement is true or false with justifications.

“Cloud is a technology”

[3 Marks]


- (ii) List down *four (4)* main cloud deployment models.

[4 Marks]


1000

(c)

Draw a suitable diagram to illustrate Common Object Request Broker Architecture (*CORBA*). You should label the necessary components correctly and show the flow of communication using arrow heads.

[10 Marks]

[illegible]

Index No: .....

**Question 4**

- (a) For the years JavaEE has evolved to a greater extent and been well recognized & adopted by the industry. One of the key highlights is that *JEE* getting its new name '*Jakarta EE*' under the Eclipse Foundation.
- (i) JEE Server is considered to be one of the main components of JakartaEE specification. JEE Servers differ from the Java Web Servers (i.e. Servlet Containers). Name at least *two* (2) products available for each "*JEE Server*" and "*Java Web Server*" in the market.

[4 Marks]

<b>JEE Server:</b>
<b>Java Web Server:</b>

- (ii) Name *two* (2) open-source *Microprofile.io* runtimes currently available in the market.

[2 Marks]


(b) Briefly describe the following *five (05)* terms.

- i. Java Servlets
- ii. EJBs
- iii. Micro Services Architecture
- iv. GraalVM
- v. Grafana Dashboards

[2 x 5 = 10 Marks]

[illegible]

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- (c) Assume that you have been appointed as the lead engineer for implementing a Fuel Filling Station Locator API which will be consumed by the front-end developers for developing the Fuel Filling Station Locator mobile application.

The functionalities are listed but not limited to;

- Add/View/Update/Delete fuel filling stations
- Self-register and login users
- Rate/Comment real-time on fuel filling station stocks availability
- Search for fuel filling stations with stocks and shorter queues, etc.

Answer questions (i) to (iv) based on the above scenario.

- (i) Pick a *MicroProfile.io* runtime of your choice and justify the selection.

[2 Marks]


- (ii) Name and justify the "*Content-type*" you suggest for the communication between API and UI.

[2 Marks]




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- (iii) Name and justify the “*Webservice type*” you choose among *SOAP*, *RESTful* and *gRPC* to implement the API.

[2 Marks]


- (iv) Both *back-end* and *mobile-app-dev* teams are expected to start development in parallel. State any solution for front-end developers to continue on a non-existent implementation.

[3 Marks]


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