



## **Semester 1 Examinations, 2021/2022**

<b>Exam Code</b>	3BCT
<b>Exam</b>	3 <sup>rd</sup> University Examination in Computer Science and Information Technology
<b>Module Code</b>	CT5106
<b>Module</b>	Software Engineering II
<b>Paper No.</b>	1
<b>External Examiner</b>	Dr Ramona Trestian
<b>Internal Examiners</b>	Prof. Michael Madden Dr. Stephen Bradshaw * Dr. Karl Mason
<b>Instructions</b>	Each Question has a total of 25 marks. Answer four of five.
<b>Duration</b>	2hrs
<b>No. of Answer Books</b>	1
<b>Requirements</b>	None
<b>No. of Pages</b>	6

**1. Answer all of the questions below**

- a) Explain the difference between the following 2 lines of JSP code, and what will happen when they are executed:

```
<%! int numVisits1 = 0; %>

<% int numVisits2 = 0; %>
```

[3 marks]

- b) What is the purpose of doPost() and doGet()? Include in your answer some differences between the two methods.

[3 marks]

- c) What does it mean to say a Session Bean is Stateful ?

[2 marks]

- d) Give two examples of JEE Frameworks.

[2 marks]

- e) Explain the purpose of urlPattern annotations as found in servlets, and how they can be used in servlets to turn them into routers for HTTP requests? Is there another way of maintaining servlet addresses?

[2 marks]

- f) Explain using a simple diagram, how the Model View Controller architecture can be implemented in a Java Enterprise application ?

[3 marks]

- g) What is a servlet?

[2 marks]

- h) A servlet is not initialised until it is called. What advantage do you see in that procedure?

[2 marks]

- i) What is a *transitive dependency*?

[2 marks]

- j) What is *semantic versioning*?

[2 marks]

- k) Why would one not set a variable using JSP Expression Language (el)?

[2 marks]

**Total: 25 Marks.**

**2. Answer all of the questions below**

(a) What is the role of an architect in software development?

[3 marks]

(b) What is a POM file?

[3 marks]

(c) What are the quality characteristics of system that are considered when engaging with architectural design?

[3 marks]

(d) What is a design constraint and why would an architect chose to include one when designing a system?

[3 marks]

(e) Name a design pattern that is associated with a system architecture of your choice. Explain why the pattern aids efficient implementation of said architecture.

[3 marks]

(f) Briefly explain how Test Driven Development is done.

[2 marks]

(g) In what folder do all Maven generate artifacts get placed?

[1 mark]

(h) What is a GAV in relation to Maven ?

[2 mark]

(i) Name two phases of a Maven lifecycle.

[2 marks]

(j) Name two things that one is likely to find in the POM.

[2 marks]

(k) In relation to MVC, what area is JSP associated with ?

[1 mark]

**Total: 25 marks**

**3.** Answer all of the following parts.

- (a) Explain what Conway's Law is, and how it may have a bearing on a system during development.

[3 marks]

- (b) Define and distinguish between REST and SOAP.

[3 marks]

- (c) In Layered Architecture explain the difference between open and closed layers. Why are the factors that influence the decision of using one over the other ?

[3 marks]

- (d) What is meant by *the inverted pyramid of reuse* ?

[1 mark]

- (e) What is the purpose of a Daily Scrum meeting in Agile, and what questions should scrum team members answer?

[3 marks]

- (f) Outline 3 changes that came when Java 8 was introduced ?

[3 marks]

- (g) Using a real life example discuss the experiences of a company implementing or changing their architecture. What were the challenges/results from making the change/selecting their architecture?

[9 marks]

**Total: 25 Marks**

**4.** Answer all of the following parts.

- a) Describe and contrast two Software Architectural Patterns that we have engaged with in class. Include in your answer the strengths and weaknesses of each, and why one would consider using one over the other in a given situation?

[15 marks]

- b) What is Maven and what are the characteristics of it, that would encourage a software engineer to use it in a project?

[6 marks]

- c) Name and contrast two project methodologies that we have talked about in class.

[4 marks]

**Total: 25 Marks**

**5. Answer all of the following parts.**

- a) Given the following table create a diagram of the critical path of the project.

[10 marks]

Task	Description	Duration (days)	Predecessors
A	Requirements Analysis	5	
B	System Design	15	A
C	Programming	25	B
D	Telecoms	15	B
E	Hardware installation	30	B
F	Integration	10	C,D
G	System Testing	10	E,F
H	Training/Support	5	G
I	Handover and Deployment	5	H

- b) Taking the critical path as reference, how many days will this project take to complete ?

[3 marks]

- c) What is the difference between Synchronous and Asynchronous Interactions ?

[3 marks]

- d) In Service Orientated Architecture (SOA) what is a component?

[2 marks]

- e) Give a concise definition of SOA.

[2 marks]

- f) What do we mean when we say a service is language agnostic ?

[1 mark]

- g) Distinguish how SOA is at odds with Object Orientated principles.

[4 marks]

***Total: 25 Marks***