

Examination question paper: May 2023

Module code:	CS5002
Component number:	003
Module title:	Software Engineering
Module leader:	Mr Ramzi Djemai

Date:	09 May 2023
Start time:	10:00
Duration:	2 Hours

Exam type:	Unseen, Prepared
Materials supplied:	Answer book
Materials permitted:	Writing instruments and a scientific calculator
Warning:	Candidates are warned that possession of unauthorised materials in an examination is a serious assessment offence.

Instructions to candidates:	Answer questions as instructed in Sections A and B. Section C provides the 'Seen Case Study'. You are NOT allowed to take the question paper out of the examination room. Question papers will be collected by the invigilator at the end of the exam Do not turn page over until instructed
------------------------------------	---

Section A (50 marks)

There are three questions in this section. Answer any **TWO** out of the following THREE questions.

Each question is worth **25** marks.

A1) Question

a) The overall goal of project planning is to establish a pragmatic strategy for controlling, tracking, and monitoring a complex technical project.

Using the Basic COCOMO 81 model,

- a) Calculate the effort required (in person-months)
- b) The overall development time (in months)
- c) The number of personnel required for each project described below.

Note that KLOC refers to the number of thousands of lines of code.

Therefore if 25,000 lines of code are predicted, as in the examples below, then the value of KLOC will be 25 (not 25000)

BASIC COCOMO

Effort = a * KLOC^b person-months

Duration = c * Effort^d months

Number of people = Effort/ Duration

Software Project type	a	b	c	d
Organic	2.4	1.05	2.5	0.38
Semi-detached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

Project 1: An embedded mode projects delivering 25,000 lines of code.

Project 2: An organic mode projects delivering 25,000 lines of code.

Project 3: A semi-detached mode projects delivering 25,000 lines of code.

[18 marks]

b) Describe how any **Two** of the following cost drivers can influence the amount of effort that will be required in the development of a software system.

- Reliability
- Reusability
- Analyst capability
- Multisite development
- Development schedule

[7 marks]

A2) Question

A small company has over the years used software development methods that rely on documented specifications and designs. Agile methods are being considered seriously in the pursuit of growth and internationalisation of the business.

a) Write a brief that explains the agile principles for rapid software development, and recommend and justify an appropriate method for adoption.

[17 marks]

b) Discuss the view that modern life cycle models with their emphasis on prototyping, create systems that are often fragmented and difficult to integrate; of unsatisfactory reliability, performance, and functionality; and of limited longevity.

[8 marks]

A3) Question

According to Project Management Institute (PMI), 14% of projects fail. However, that number only represents the total failures. Of the projects that didn't fail outright, 31 % didn't meet their goals, 43 % exceeded their initial budgets, and 49 % were late.

Reflecting on IT project successes and failures that you are aware of, list any **FOUR** reasons for the software project failures. Elaborate any **THREE** of these with suitable explanation, using examples where necessary.

[25 marks]

Section B (50 marks)

The SEEN CASE STUDY is in Section C

Answer question B.1 and one of questions B.2 or B.3

B.1 a) Produce a Use Case diagram for FerryTravels.com [10 marks]

- b) For the Register Customer use case produce:
- i) High Level Use Case Description and
 - ii) Expanded Use Case Description

[8 marks]

- c) For the Book Package Use Case produce:
- i) High Level Use Case Description,
 - ii) Expanded Use Case Description, and
 - iii) Activity diagram.

Make any reasonable assumptions about the interactions.

[12 marks]

Answer only ONE of the two questions below only

B.2 a) Explain how you would decide which domain objects were needed for a Collaboration Diagram

[4 marks]

b) Produce a Collaboration Diagram for the *Register Customer* Use Case.

[16 marks]

B.3 Produce an Analysis Class Diagram showing the main Domain Classes for FerryTravels.com

Your diagram should include relevant attributes for each class – but does not have to include operations.

[20 marks]

Seen Case Study description follows in Section C.....

Section C

SEEN CASE STUDY DESCRIPTION

FerryTravels.com

Ferry Travels is a ferry company serving routes throughout Europe. The company offers a variety of holiday packages to the general public. Holiday packages are offered according to their destination, duration (e.g. number of days) and itineraries.

Customers can just walk to the company's office and buy a package on the spot. They can also buy it through the company's website.

Walk-in customers need to place a deposit before confirming their purchases. For a package deal, the deposit is 25% of the total package price or £100 depending on whichever is higher. For a holiday scheduled within the next two-week period, deposits will not be allowed and the customers must pay the full amount upfront to secure a confirmed place.

Internet customers have to pay full amount of the package price but are entitled to 5% discount. The Internet booking is closed three working days before the departure date. This is to allow time for the company to process credit card transactions and make arrangements.

The company charges premium for holiday during the peak travel period. The premium depends on the travel dates and destinations.

The company encourages customers to buy travel insurance. The total insurance premium they have to pay is based on the number of days that they travel. The basic insurance coverage includes ferry delays, lost luggage and accidents. Insurance costs per day for the basic coverage is £10.

The company already has a 15-year-old computer system implemented that no longer meets the current business requirements. Management is looking into implementing a completely new system that can support customer enquires over the phone as well as through the website.

Customers booking online will need to register in advance as "premium" customers. They would be issued a username/password through e-mail notification. They would then be able to browse the website for details of all available holiday packages and book them directly online.

****** End of Paper ******