

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION
DURATION: 2 HOURS

WINTER SEMESTER, 2023-2024
FULL MARKS: 120

SWE 4101: Introduction to Software Engineering

Programmable calculators are not allowed. Do not write anything on the question paper.

Answer all 4 (four) questions. Figures in the right margin indicate full marks of questions with corresponding COs and POs in parentheses.

1. An operating system (OS) manages computer resources, providing an interface for user interaction. It allocates memory and processing power, facilitates multitasking, and schedules processes and jobs. Process scheduling ensures fair CPU time allocation, while job scheduling manages program execution order. Common OS include Windows, macOS, and Linux, each with unique features. Modern OS also support mobile devices, cloud computing, and virtualization.
 - a) Explain the concept of "Process" in terms of process management by an operating system. What states a "Process" can be in? 5
(CO1)
(PO1)
 - b) Define a deadlock and list the necessary conditions for a deadlock. What is deadlock avoidance and deadlock prevention? 5 + 3
(CO1)
(PO1)
 - c) In a computer system, there are currently 5 processes P1, P2, P3, P4, P5 with the following arrival time and burst time. Draw the gantt chart of a queue that represents the CPU Scheduling of the processes according to shortest job first scheduling (non-preemptive) and find out the average turn-around time and average waiting time. 10
(CO1)
(PO1)

Table 1: Table for Question 1.c

Process ID	Arrival Time	Burst Time
P1	3	1
P2	1	4
P3	4	2
P4	0	6
P5	2	3

- d) How does the paging scheme overcome the problem of fragmentation caused by the traditional multiple partition memory allocation strategy? 7
(CO1)
(PO1)
2. Software process models outline the structured phases of software development, including planning, design, coding, testing, and maintenance. The choice of model depends on the project's requirements and complexity.
 - a) In medical devices, software is especially critical, as any failure can have fatal consequences. Which SDLC model is mostly used in medical device industry and provide a proper justifications as to why this model would be an appropriate choice in medical industry. 6
(CO2)
(PO2)

b)	How does the iterative nature of the Agile model contribute to flexibility and continuous improvement in software development, and what are the key benefits of this approach over traditional models like Waterfall.	8 (CO1) (PO1)
c)	What are the key factors to consider for choosing the right SDLC (Software Development Life Cycle) model for the project success?	10 (CO1) (PO1)
d)	Which of the model incorporates risk management, and in which type of project is it most advantageous?	6 (CO1) (PO1)
3.	Your company has developed a new web application that handles online shopping. The application has been deployed, and the team is now planning performance testing to ensure it can handle a large number of users. Maintenance is important for ensuring that application continues to meet user needs and perform optimally over time.	
a)	What is the purpose of software testing in the development process? Describe the different types of software testing.	10 (CO1) (PO1)
b)	Describe the key aspects of performance testing. Explain why performance testing is critical for the above mentioned web application.	3 + 5 (CO1) (PO1)
c)	Explain the differences between black-box testing and white-box testing.	5 (CO1) (PO1)
d)	Define software maintenance. Give examples of different types of software maintenance needed for the mentioned web application.	2 + 5 (CO2) (PO2)
4.	a) A retail store wants to implement QR code-based payments for customers. Customers can scan a QR code on the checkout screen to pay using their mobile phones. i. Explain the key components of a QR code. ii. Explain the process of QR code-based payment from a technical perspective. iii. What security measures would ensure safe QR code transactions for customers? iv. Discuss the differences between a QR code and a traditional barcode.	5 × 4 (CO1) (PO1)
b)	Explain the phases of computer viruses. List some common malware types.	10 (CO1) (PO1)