

MIDTERM EXAM ODD SEMESTER ACADEMIC YEAR 2025/2026
INFORMATION SYSTEM STUDY PROGRAM
FACULTY OF ENGINEERING AND INFORMATICS
UNIVERSITAS MULTIMEDIA NUSANTARA

Subject	: IS104 Operating System Concepts	Date	:
Lecturer(s)	: Ir. Raymond Sunardi Oetama, MCIS Melissa Indah Fianty, S.Kom., MMSI Fransiscus Ati Halim, S.Kom., MM	Time	:
Form	: Essay	Type	: Take home

EXAM CONDITIONS / INSTRUCTIONS:

- (1) Read the questions carefully.
- (2) Answer all questions thoroughly.
- (3) Type your answers in Microsoft Word.
- (4) Draw the OS structures and Gantt charts by hand, then take photos and insert them into your answer.
- (5) Save the file as IS104_2526_Odd_NIM_Name.docx.
- (6) Submit to e-learning before the due date.

COURSE SUB LEARNING OUTCOMES (SUB-CLO):

SUB LEARNING OUTCOMES (SUB-CLO)		ELO
Code	Description	
Sub-CLO021-1	Students are able to describe the fundamental components and functions of an operating system, and explain basic concepts related to process and thread management.	ELO B
Sub-CLO021-2	Students are able to explain fundamental concepts of CPU scheduling, process synchronization, and deadlock handling in operating systems.	ELO B

PROBLEM/QUESTIONS:

1. Question 1: Sub-CLO021-1, Weight (50%)

Mention four types of operating system structures that are not hybrid, draw (a) a diagram for each structure with a reasonable explanation, and (b) make a comparison table of the four structures covering the following aspects:

1. Core concept
2. Components in the kernel
3. Performance (latency)
4. Reliability & isolation
5. Security
6. Maintainability
7. Extensibility
8. IPC overhead
9. Example OS
10. Suitable for

ASSESSMENT RUBRIC (per question):

Rated aspect	Assessment criteria				
	Very Poor < 45	Poor 45-54	Satisfactory 55-69	Good 70-84	Excellent (Score ≥ 85)
Correctness	Zero or one structure has a diagram that is correctly drawn and	Two structures have diagrams that are correctly drawn and well-explained.	Three structures have diagrams that are correctly	Four structures have diagrams that are correctly drawn and	Four structures have a diagram that is correctly drawn and

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Rated aspect	Assessment criteria				
	Very Poor	Poor	Satisfactory	Good	Excellent
	< 45	45-54	55-69	70-84	(Score ≥ 85)
	well-explained.		drawn and well-explained.	well-explained. But the table is incorrect	well-explained, and the table is correct

11. Question 2: Sub-CLO021-2, Weight (50%)

You are given four processes with the following information: the **Arrival Time** is the moment a process first enters the ready queue and becomes available for scheduling, the **Burst Time** represents the total CPU time required by the process for execution, and the **Priority** is a value assigned to each process where a smaller number indicates a higher priority. Use the five CPU scheduling methods, such as First-Come First-Served, Shortest Job First, Shortest Remaining Time First, Priority Scheduling, and Round Robin (use a time quantum of 3 ms).

Process	Arrival Time	Burst Time	Priority
P1	0 ms	8 ms	3
P2	1 ms	4 ms	1
P3	2 ms	9 ms	4
P4	3 ms	5 ms	2

For each scheduling method, draw (a) the Gantt chart for each method, (b) Average Waiting Time (AWT), (c) Average Turnaround Time (ATAT), and (d) Average Response Time (ART).

ASSESSMENT RUBRIC (per question):

Rated aspect	Assessment criteria				
	Very Poor	Poor	Satisfactory	Good	Excellent
	< 45	45-54	55-69	70-84	(Score ≥ 85)
Correctness	Zero or only one method has the correct Gantt chart and the correct AWT, ATAT, and ART calculations.	Two methods have the correct Gantt chart and the correct AWT, ATAT, and ART calculations.	Three methods have the correct Gantt chart and the correct AWT, ATAT, and ART calculations.	Four methods have the correct Gantt chart and the correct calculations for AWT, ATAT, and ART.	All methods have the correct Gantt chart and AWT, ATAT, and ART calculations.

References:

Abraham Silber Schatz, et al. 2018. Operating System Concepts. Tenth Edition. ISBN 978-1-119-32091-3.

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This document has been approved by:

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