SEAT NO. DT-22005

NED UNIVERSITY OF ENGINEERING & TECHNOLOGY

THIRD YEAR (Data Science)

SPRING SEMESTER EXAMINATIONS 2025

Time : 3 Hours | Batch 2022 | Dated : 30-MAY-25 | Max Marks : 60

Operating Systems - CT-353

Question 1 [CLO2 – 12 marks]

a) Analyze the following set of processes, with the length of the CPU burst given in milliseconds. (6)

Process	Burst Time	Priority
P_1	10	3
P_2	1	1
P_3	2	3
P_4	1	4
P_5	5	2

The processes are assumed to have arrived in the order P1, P2, P3, P4, and P5 all at time 0.

i. Draw four Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, non-preemptive priority (a smaller priority number implies a higher priority), and RR (quantum = 1).

ii. What is the average waiting time and average turnaround time of each process for each of the scheduling algorithms in part i?

b) Compare different multithreaded models. (3)

c) Relate the use of Light weight process (LWP) in scheduler activations. (3)

Question 2 [CLO2 – 12 marks]

a) Illustrate the windows threads data structures diagrammatically. (4)

b) Analyze the thread cancellation in detail. (4)

c) Examine Amdahl's Law and compare concurrency and parallelism. (4)

Question 3 [CLO2 – 12 marks]

a) Analyze the system with 5 processes <P0, P1, P2, P3, P4> and three resources types A=10, B=5 and C=7. The following information has been given. (6)

Allocation Matrix

	A	B	C
P0	0	1	0
P1	2	0	0
P2	3	0	2
P3	2	1	1
P4	0	0	2

Max Matrix

	A	B	C
P0	7	5	3
P1	3	2	2
P2	9	0	2
P3	2	2	2
P4	4	3	3

Available resources are A=3, B=3, C=2.

i. Find need Matrix

ii. Is the system in safe state?? (If yes find the safe sequence using Banker's Algorithm).

b) Examine the scenario of RPC communication. (3)

c) Investigate semaphore implementation with no busy waiting. (3)

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Question 4

[CLO1 – 12 marks]

a) Explain why monitors are not powerful enough to model some synchronization schemes. (3)

b) Discuss the terms: (3)

iii. Deadlock ii. Starvation iii. Priority Inversion

c) Explain the dining philosopher's problem. (3)

d) Differentiate between preemptive and non-preemptive approaches of critical section handling in OS. (3)

Question 5

[CLO1 – 12 marks]

a) Express the advantages of multi-threaded system architecture. (3)

b) Discuss process states with the help of diagram. (3)

c) Differentiate between synchronous and asynchronous inter process communication of message passing. (3)

d) Discuss the components of Process Control Block. (3)