QP Code: R264A028 | Reg. No | | | | | | | | | | | AY 23

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B. Tech (Fourth Semester – Regular/Supplementary) Examinations, April 2026

23BCSPC24004/23BCMPC24004/23BCDPC24004– Operating System

(CSE, CSE(AIML),CSE(DS))

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions		CO #	Blooms Level
a.	Differentiate between Symmetric and Asymmetric Multiprocessing.	CO1	K2
b.	What is a Process Control Block (PCB)? List its key components.	CO2	K2
c.	Distinguish between User-level threads and Kernel-level threads.	CO2	K2
d.	A system uses 16-bit addresses and a page size of 2 KB. Calculate the number of entries in the page table.	CO4	K3
e.	Define "Access Matrix" and list the two primary entities that form its rows and columns.	CO6	K1

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions		Marks	CO #	Blooms Level
2. a.	Define Operating System and explain the various types of Operating Systems?	5	CO1	K2
b.	Illustrate the Five-State process transition model with a neat diagram.	5	CO2	K2
	(OR)			
c.	Differentiate between a Program and a Process. Explain the concept of Context Switching.	5	CO2	K2
d.	Compare Long-term, Short-term, and Medium-term schedulers.	5	CO2	K2
3.a.	Describe Peterson's solution for the Critical Section problem and prove how it satisfies mutual exclusion.	5	CO3	K3
b.	Explain the differences between fixed and variable memory partitioning with diagrams.	5	CO4	K2
	(OR)			
c.	What is Non-Preemptive Priority Scheduling? Calculate the average Turn Arround Time, Waiting Time and Response Time for the following process using Non-Preemptive Priority scheduling algorithm with higher the number higher the priority?	5	CO2	K3

Process	Arrival Time	Burst Time	Priority
P1	2	4	5
P2	0	2	4
P3	5	3	3
P4	4	5	2
P5	7	8	0
P6	6	1	1

d.	Calculate the average Turn Arround Time, Waiting Time and Response Time for the following process using Round Robin scheduling algorithm with Time Quantum = 4?	5	CO2	K3

Process	Arrival Time	Burst Time
P1	0	4
P2	3	8
P3	6	12
P4	8	6
P5	12	16

4.a.	Illustrate the Producer-Consumer problem and show how Semaphores are used to solve it.	5	CO3	K3
b.	State critical section problem? Discuss three solutions to solve the critical section problem?	5	CO3	K2
	(OR)			
c.	Describe the Dining Philosophers Problem and provide a semaphore-based solution.	5	CO3	K3
d.	Define Deadlock in Operating system? List the Coffman 4 conditions for a deadlock situation to arise?	5	CO4	K2
5.a.	Explain semaphores and their implementation. Solve the bounded-buffer problem using semaphores.	5	CO3	K3
b.	What is the role of the Memory Management Unit (MMU)? Explain logical to physical address translation.	5	CO4	K2
	(OR)			
c.	For the given reference strings : 1, 2, 3, 4, 1, 2, 5, 1, 2, 0, calculate page hits and page faults using FIFO and LRU algorithms with 3 frames.	5	CO4	K3
d.	Consider a system with 5 processes and 3 resource types (A, B, C). Resource A has 10 instances, B has 5 instances, and C has 7 instances. At a given point in time, the system state is as follows:	5	CO3	K3

Process	Allocation	Maximum
P0	1,1,1	7,5,3
P1	2,0,1	3,2,2
P2	3,0,1	9,0,2
P3	2,1,0	2,2,2
P4	0,1,2	4,3,3

The current Available resources are [5, 5, 3]. Using the Banker's Algorithm, check whether the system is in a safe state. If yes, identify the safe sequence.

6.a.	Solve the following disk scheduling problem using LOOK, SCAN. Calculate the total seek time for each algorithm. Disk size: 500 cylinders (0-499) Current head position: 215 Requests: 123, 374, 87, 267, 79, 360, 12	5	CO5	K3
b.	Define Thrashing. Analyze its causes and its impact on CPU utilization?	5	CO4	K2
	(OR)			
c.	Discuss the "Goals of Protection" and explain the difference between Access Control Lists (ACL) and Capability Lists.	5	CO6	K2
d.	Discuss different file access methods with advantages and limitations.	5	CO5	K2

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