Set. C

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

May-June 2025
Program: B. Tech Computer Engineering Scheme: III
Examination: Regular SY Semester: IV
Course Code: CEC403 and Course Name: Operating systems
Date of Exam: 23/5/25 Duration: 02.5 Hours Max. Marks: 60

Instructions:
(1)All questions are compulsory.
(2)Draw neat diagrams wherever applicable.
(3)Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT level
Q 1	**Solve any two questions out of three: (05 marks each)**	10		
a)	Explain Functions of Operating Systems. Explain the importance of System Calls in various categories.		CO1	U
b)	Explain Inter Process Communication and its methods with suitable diagrams.		CO2	U
c)	Explain Resource Allocation Graphs with suitable examples. Write its advantages and limitations in operating systems.		CO3	U
Q 2	**Solve any two questions out of three: (05 marks each)**	10		
a)	Explain the Microkernel architecture with a suitable diagram.		CO1	U
b)	Explain types of File Access Mechanisms in OS in detail.		CO5	U
c)	Explain DMA method of I/O Organization in brief with suitable diagram		CO6	U
Q.3	**Solve any two questions out of three. (10 marks each)**	20		
a)	Consider following processes with their arrival time and CPU Burst time in milliseconds as follows. Draw Gantt Chart and calculate Completion time, Average Turnaround time and Average Waiting time using **FCFS and SJF non- preemptive scheduling algorithm.**		CO2	AP

Process	Arrival Time	CPU Burst Time
P1	2	8
P2	4	3
P3	1	2
P4	0	1
P5	4	4

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b)	Consider a system with 5 processes (P0 to P4) and 3 resource types (A, B, and C). The Allocation matrix is given below. i. Calculate the need matrix and check if the system is in safe state. [4M] ii. Write process execution sequence. [2M] iii. Determine the total sum of each type of resource? [2M] iv. Calculate total count of each resource type.		CO3	AP
c)	For following page requests calculate the Page Fault Ratio and Page Hit Ratio with 3 Page frames using LRU algorithm. Page Requests: 1,4,6,2,6,3,6,4,2,1,1		CO4	Ap
Q.4	**Solve any two questions out of three. (10 marks each)**	**20**		
a)	i. Explain necessary and sufficient conditions for deadlock to occur. [5M] ii. Explain different deadlock prevention techniques. [5M]		CO4	U
b)	i. List various file types with extensions in operating system.[3M] ii. Explain different file organization techniques? [7M]		CO5	U
c)	Assume disk head position at 26. Calculate total head movements using C-SCAN and SSTF Disk Scheduling Algorithm for following requests: 20,54,23,76,54,32,23. Assume the disk head is moving towards 0. Analyze your results.		CO6	AP

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	1	1	2	4	3	3	2	1	0
P1	2	1	2	3	2	2			
P2	4	0	1	9	0	2			
P3	0	2	0	7	5	3			
P4	1	1	2	1	1	2			

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