21/05/2025 SE CSE-AIML SEM-IV C-SCHEME OS QP CODE: 10079705

Duration: 3hrs **[Max Marks:80]**

N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

Q. 1 Attempt any FOUR [20]

a Explain the types of Multiprocessor Systems [5]

b Differentiate between context switching and interrupt handling [5]

c A counting semaphore S is initialized to 10. Then, 6 P operations and 4 V operations are performed on S. What is the final value of S? [5]

d Calculate the effective memory access time in nanoseconds if the hit ratio to a TLB is 80%, and it takes 15 nanoseconds to search the TLB, and 150 nanoseconds to access the main memory. [5]

e What is file? Explain File attributes [5]

Q. 2 a Explain Producer Consumer Problem with solution using Semaphore [10]

b Explain one system call of each type of system calls with an example [10]

Q. 3 a Draw a Gantt Chart and Calculate average waiting time and average turnaround time for FCFS, Pre-emptive Priority, SJF Pre-emptive and Round Robin algorithm (Time Quantum=2) for the following set of processes with arrival time (in milliseconds) and CPU burst time (in milliseconds). [10]

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

b Consider the following snapshot of a system. [10]

Processes	Allocation			Request			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	0	0	0	0	0	0
P1	2	0	0	2	0	2			
P2	3	0	3	0	0	0			
P3	2	1	1	1	0	0			
P4	0	0	2	0	0	2			

Answer the following questions using the Deadlock Detection algorithm:

i. Check if the system is in a safe state? If Yes find out safe sequence state 5

ii. If a request from process P2 arrives for (0,0,1), can the request be granted immediately? 3

iii. Determine the total instances of each type of resource. 2

Q. 4	a	Explain Belady's Anomaly with an example and how to solve it. Calculate Hit Ratio and Miss Ratio for the page replacement policy of LRU's Counter implementation method and LRU's Stack implementation method for given reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1. Assuming three frame size for counter method and Five frame size for Stack method.	[10]
	b	Explain Disk scheduling criteria with example	[10]
Q. 5	a	Explain steps for handling page fault in virtual memory.	[10]
	b	Explain the Five state process model with two suspended state	[10]
Q. 6		Write short notes on Following	[20]
	a	Multithreading Models	[5]
	b	Resource Allocation Graph	[5]
	c	File Allocation Methods	[5]
	d	Virtual Memory Paging Vs Virtual Memory Segmentation	[5]