



Dr. Vishwanath Karad
MIT WORLD PEACE
UNIVERSITY PUNE
 TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

School of Computer Science and Engineering

Department of Computer Engineering and Technology

TY BTech (CSE & AIDS) (Academic Year 2025-26)

Mid Term Exam - Semester V

Course Name:- Operating Systems

Course Code:-CSE3PM01A/AID3PM09A

Maximum Marks: 30

Time: 1 Hrs

Date: 29/09/2025

Instructions:-

1. Attempt any 2 questions from Q. 1 to Q. 3 AND Attempt any 3 questions from Q. 4 to Q. 7 AND Attempt any 1 questions from Q. 8 to Q. 9
2. Figure to the right indicates full marks.
3. Use of cell phone is prohibited in the examination hall.
4. Neat diagrams must be drawn wherever necessary.
5. Assume suitable data, if necessary and clearly state.
6. Use of scientific calculator is allowed

Attempt any 2 questions from Q. 1 to Q. 3			
Q.1	CO 1 Analyzing	Discuss the advantages of time-sharing operating systems over batch processing systems.	[5 Marks]
Q.2	CO1 Applying	Using examples explain the significance of shell scripting for system administration.	[5 Marks]
Q.3	CO1 Understanding	What is Protection and Security? Compare between protection and security.	[5 Marks]
Attempt any 3 questions from Q. 4 to Q. 7			
Q.4	CO 2 Applying	Consider the following C code snippet (assume necessary headers are included): <pre>int main() { int i; for (i = 0; i < 3; i++) { fork(); } printf("Process %d: i=%d ", getpid(), i); return 0; }</pre>	[5 Marks]

Roll No.

		How many processes exist when the program reaches the end of main? What is the expected set of outputs (order may vary) from the printf in all processes?	
Q.5	CO 2 Analyzing	Compare and contrast pre-emptive and non-preemptive scheduling algorithms. Provide one example for each.	[5 Marks]
Q.6	CO 2 Applying	Given five processes with (arrival time, burst time): P1(0,8), P2(1,4), P3(2,9), P4(3,5), P5(4,2). Draw the Gantt chart and compute average waiting time and average turnaround time for non-preemptive SJF scheduling algorithm.	[5 Marks]
Q.7	CO2 Understanding	Draw and explain the 5 state process model.	[5 Marks]
Attempt any 1 questions from Q. 8 to Q. 9			
Q.8	CO3 Applying	A shared variable x, initialized to zero, is operated on by four concurrent processes W, X, Y, Z as follows. Each of the processes W and X reads x from memory, increments by one, stores it to memory and then terminates. Each of the processes Y and Z reads x from memory, decrements by two, stores it to memory, and then terminates. Each process before reading x invokes the P operation (i.e. wait) on a counting semaphore S and invokes the V operation (i.e. signal) on the semaphore S after storing x to memory. Semaphore S is initialized to two. What is the maximum possible value of x after all processes complete execution? Justify answer with explanation.	[5 Marks]

Roll No.

		Process W	Process X	Process Y	Process Z	
		Wait (S)	Wait (S)	Wait (S)	Wait (S)	
		Read (x)	Read (x)	Read (x)	Read (x)	
		$x = x + 1;$	$x = x + 1;$	$x = x - 2;$	$x = x - 2;$	
		Write (x)	Write (x)	Write (x)	Write (x)	
		Signal (S)	Signal (S)	Signal (S)	Signal (S)	
Q.9	CO3 Applying	Devise a solution for readers-writers problem using semaphore.				[5 Marks]



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UNIVERSITY** PUNE
TECHNOLOGY RESEARCH SOCIAL INNOVATION ENTREPRENEURSHIP



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CSE3PM01A/AID3PM09A - Operating Systems

Question Paper ID: 065719

Faculty/School	School of Computer Science and Engineering	Term	Semester V
Program	TY B.Tech CSE / AIDS	Duration	1 hour 30 minutes
Specialization	-	Max. Marks	40

Section - 1 (8 X 5 Marks)

Answer any 8 questions

1	Draw and explain Monolithic and Microkernel architectures of OS.	5 marks	CO1	Remembering												
2	Consider the 3 processes p0,p1,p2 shown in the table. Explain the completion order of these processes in Round Robin scheduling with quantum of 2 time units. Calculate Average turnaround time and Average waiting time. <table><tr><td>Process</td><td>Arrival-Time</td><td>Burst-Time</td></tr><tr><td>P0</td><td>0</td><td>5</td></tr><tr><td>P1</td><td>1</td><td>7</td></tr><tr><td>P2</td><td>3</td><td>4</td></tr></table>	Process	Arrival-Time	Burst-Time	P0	0	5	P1	1	7	P2	3	4	5 marks	CO2	Evaluating
Process	Arrival-Time	Burst-Time														
P0	0	5														
P1	1	7														
P2	3	4														
3	Illustrate potential issues in concurrent execution of processes.	5 marks	CO3	Understanding												
4	Define deadlock in a system. Describe how to prevent a deadlock.	5 marks	CO3	Understanding												
5	Describe the processes indirectly aware of each other (Cooperation by sharing) and explain the problems occurring in them.	5 marks	CO3	Understanding												
6	Illustrate the steps in Direct Memory Access (DMA) data transfer with the help of the diagram	5 marks	CO4	Applying												
7	Describe briefly the types of Memory partitioning? Given a memory of 1 GB divided into fixed partitions of 128 MB each, analyze how internal fragmentation occurs for process sizes: 50 MB, 120 MB, 250 MB, and 400 MB. Show memory allocation and wastage.	5 marks	CO4	Analysing												

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8	A system uses FIFO policy for page replacement. It has 4 page frames with no pages loaded to begin with. The system first accesses 100 distinct pages in some order and then accesses the same 100 pages but now in the reverse order. How many page faults will occur?	5 marks	CO4	Analysing
9	Explain the following terms with respect to Disk Scheduling: i) Seek Time ii) Rotational Latency iii) Transfer Time iv) Disk Access Time v) Disk Response Time	5 marks	CO5	Remembering
10	Describe Boot block and Bad block of the disk.	5 marks	CO5	Understanding

END OF QUESTION PAPER