

[This question paper contains 4 printed pages]

Your Roll No.....

Sr. No. of Question Paper :	10107A
Unique paper Code :	2342572401
Name of Paper :	Operating Systems
Name of Course :	B.A. Prog
Semester :	IV

Duration: 3 Hours

Maximum Marks: 90

Instructions for candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **Question No. 1 (Section A)** is compulsory.
3. Attempt any 4 (**four**) questions from **Section B**.
4. Parts of a question should be attempted together.

		Section A	
Q1	(i).	Write three advantages of multi-threaded systems.	(3)
	(ii).	Can deadlock occur with only one process? Explain logically.	(3)
	(iii).	What is the drawback of priority scheduling algorithm? How it can be resolved?	(3)
	(iv).	Explain the purpose of system programs.	(3)
	(v).	Consider a logical address space of 64 pages of 1024 words each, mapped onto a physical memory of 32 frames.	(3)

		(a) How many bits are there in the logical address? (b) How many bits are required to address each word in a frame?																
	(vi).	Write the steps involved in handling a page fault in an operating system.	(3)															
	(vii).	Explain the concept of Dual-Mode operation in an operating system and its importance.	(3)															
	(viii).	Explain the long-term, medium-term, and short-term schedulers.	(3)															
	(ix).	How does multiprogramming improve system performance?	(3)															
	(x).	What is fragmentation and its types?	(3)															
		Section B																
Q2	(i).	Explain the structure of a disk with the help of a diagram.	(6)															
	(ii).	Consider the following set of processes with their arrival times and CPU burst times (in milliseconds): <table border="1"><thead><tr><th>Process ID</th><th>Arrival Time</th><th>Burst Time</th></tr></thead><tbody><tr><td>P1</td><td>0</td><td>7</td></tr><tr><td>P2</td><td>2</td><td>4</td></tr><tr><td>P3</td><td>4</td><td>1</td></tr><tr><td>P4</td><td>5</td><td>4</td></tr></tbody></table> Using the shortest job first non-preemptive and preemptive scheduling algorithm: (a) Draw the Gantt chart showing the execution order of processes. (b) Calculate the turnaround time and waiting time for each process. (c) Calculate the average turnaround time and average waiting time.	Process ID	Arrival Time	Burst Time	P1	0	7	P2	2	4	P3	4	1	P4	5	4	(9)
Process ID	Arrival Time	Burst Time																
P1	0	7																
P2	2	4																
P3	4	1																
P4	5	4																

Q3	(i).	Explain single-level, two-level, and tree-structured directories.	(6)
	(ii).	Explain the concept of demand paging in an operating system. What are the advantages of using demand paging? Consider the following page reference string: [7, 2, 3, 1, 2, 5, 3, 4, 6, 7]. Assuming demand paging with three frames, how many page faults would occur if optimal page replacement algorithm is used?	(9)
Q4	(i).	Draw the process state diagram and explain its various states.	(5)
	(ii).	A disk scheduling system has the following queue of pending requests (in order of arrival) [98, 183, 37, 122, 14, 124, 65, 67]. The disk head starts at position 51. The disk tracks range from 0 to 199. Compute the total head movement using the SCAN scheduling algorithm (head moving towards higher numbered first).	(5)
	(iii).	Explain the various operations performed on a process in an operating system. Also explain the fork() system call and the cascading termination phenomenon with suitable example.	(5)
Q5	(i).	Explain the microkernel approach to operating system design using diagram. Write its advantages and disadvantages.	(6)
	(ii).	Give four memory partitions of 100KB, 500KB, 200KB, and 600KB (in order), how would each of the first fit, best fit, and worst fit algorithms place processes of 212 KB, 410 KB, 112KB and 420KB (in order)? Calculate remaining memory after allocation using each strategy.	(9)

Q6	(i).	Define a system call. Discuss the different types of system calls in an operating system with examples for each type.	(5)
	(ii).	Write a short note on the following: (a) Swapping (b) Compaction (c) Context Switch (d) Virtual Memory (e) Convoy Effect	(10)
Q7		Differentiate between the following:	(15)
	(i).	Logical and Physical Address Space	
	(ii).	Multi-Tasking and Multi-User System	
	(iii).	Segmentation and Paging	
	(iv).	Threads and Process	
	(v).	Seek Time and Rotational Latency	