



Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (FT/WP/S2PT) (S,FE) Examinations May 2026 (2019 Scheme)

Course Code: CST206

Course Name: OPERATING SYSTEMS

Max. Marks: 100

Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks)

Marks

- | | | |
|----|--|---|
| 1 | Explain the role of interrupts and distinguish between interrupts and traps. | 3 |
| 2 | Mention the benefits of utilizing loadable kernel modules. | 3 |
| 3 | Enumerate the advantages of allowing processes to work together in a cooperative manner. | 3 |
| 4 | Identify the challenges associated with multilevel queue scheduling. How it is resolved through the use of multilevel feedback queue scheduling? | 3 |
| 5 | Give an example of the use of semaphores as a synchronisation method. | 3 |
| 6 | Compare a resource allocation graph with a wait-for graph, highlighting their key differences. | 3 |
| 7 | Define demand paging and discuss its key advantages. | 3 |
| 8 | Explain how the page table is structured and its role in memory management. | 3 |
| 9 | How do sequential access and direct access methods differ in storage devices | 3 |
| 10 | How do physical formatting and logical formatting differ in the context of magnetic disks? | 3 |

PART B

(Answer one full question from each module, each question carries 14 marks)

Module – 1

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|----|---|---|
| 11 | a) In what way does the separation between kernel mode and user mode serve as a fundamental type of protection mechanism. | 6 |
| | b) Highlight the key differences between monolithic and microkernel operating system structures. | 8 |
| 12 | a) Outline the main traits of single processor, multiprocessor and multicore systems. | 9 |
| | b) Describe the steps involved in the System Boot Process. | 5 |

Module – 2

- | | | |
|----|---|---|
| 13 | a) Provide an example to illustrate the read and write operations using named pipe. | 5 |
|----|---|---|

- b) Draw the Gantt chart and calculate the Average waiting time and Average Turnaround time for the following algorithms using the data given in the table: 9

(i) FCFS (ii) SJF (iii) SRTF

Process	Arrival Time (ms)	CPU Burst Time (ms)
P1	1	4
P2	0	3
P3	2	2
P4	3	5
P5	4	1

- 14 a) Depict the sequence of actions involved in a context switch executed by the kernel, along with a diagram. 7
- b) In a message passing system how are the send() / receive() operations along with communication link realized for both direct versus indirect communication? 7

Module – 3

- 15 a) Write an algorithm that ensures all the critical-section requirements are fulfilled for multiple (n) process. 6
- b) Consider the following snapshot of a system with five processes P1, P2, P3, P4, P5 and four resources A, B, C, D. Using Banker's Algorithm find the following 8
- (i) Calculate the Need Matrix
- (ii) Is system in safe state? If yes find the safe sequence?
- (iii) If request from P2 arrives for (0, 3, 2, 0) can the request be immediately granted?

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P1	0	0	1	2	0	0	1	2	1	5	2	0
P2	1	0	0	0	1	7	5	0				
P3	1	3	5	4	2	3	5	6				
P4	0	6	3	2	0	6	5	2				
P5	0	0	1	4	0	6	5	6				

- 16 a) List and briefly describe three well-known classic synchronization problems. 9
- b) Assume a system is in an unsafe state. Demonstrate that the processes may still complete their execution without leading to a deadlock. 5

Module – 4

- 17 a) Consider a logical address space of 64 pages with 1024 words each, mapped onto a physical memory of 64 frames. 5

Find

- (i) Bits required for logical address
 (ii) Bits required for physical address
 b) Apply First Fit, Best Fit, and Worst Fit memory allocation strategies to assign processes of 212, 417, 112, and 426 KB to partitions of 150, 300, 600, 350, and 500 KB. Indicate which approach is most memory-efficient. 9
- 18 a) With the help of a diagram, explain logical address to physical address translation in paging. Support the explanation with an example. 7
- b) Outline the major aspects of how contiguous memory is allocated and managed in operating systems. 7

Module – 5

- 19 a) Describe the strategies used for protecting Files. 5
- b) Suppose that a disk drive has 5,000 cylinders, numbered 0 to 4,999. The drive is currently serving a request at cylinder 2,150 and the previous request was at cylinder 1,805. The queue of pending requests, in FIFO order is 2,069, 1,212, 2,296, 2,800, 544, 1,618, 356, 1,523, 4,965, 3,681. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the scheduling algorithms?
 i) FCFS ii) SSTF iii) SCAN 9
- 20 a) Describe the different operations that can be performed on files. 10
- b) How is the management of bad blocks on disks conducted? 4