Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (S,FE) (FT/WP) (S2 PT) Examination December 2025/January 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	Distinguish between a system call and a standard C library.	3
2	After the machine power-on, how does the hardware locate the Operating System kernel?	3
3	What purpose does the pipe system call fulfil?	3
4	What does the operating system concept of "starvation" signify? In what ways can priority scheduling help mitigate starvation?	3
5	Illustrate with an example how incorrect semaphore usage can lead to deadlocks.	3
6	Elucidate the concept of a resource allocation graph with an example.	3
7	Define thrashing. How is it caused?	3
8	Highlight the distinctions between segmentation and paging.	3
9	Explore the idea of a Virtual File System.	3
10	The disk-scheduling algorithm should be implemented as a standalone component of the operating system. What is the reason for this?	3

PART B

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

Module – 1

			Marks
11	a)	Describe the key characteristics of the following types of operating system: (i) Batch operating system (ii) Time sharing operating system (iii) Real time operating system (iv) Distributed operating system	8
	b)	Comprehend on the layered arrangement of an Operating System. Identify its benefits and drawbacks.	6
12	a)	Define a system call. What are the various methods for passing parameters to a system call? Mention the basic types of system calls with examples.	8
	b)	With a diagram, describe the microkernel architecture?	6

Module – 2

13 a) Describe the process creation in Unix using an appropriate example. 6

b) Determine the average waiting time and average turnaround time for the processes given in the table below using: - 8

i) SRT scheduling algorithm ii) Priority scheduling algorithm

Process	Arrival Time (ms)	CPU Burst Time (ms)	Priority
P1	0	6	2
P2	1	8	1
P3	2	7	3
P4	3	3	2

(Lower number = higher priority)

14 a) How is Bounded buffer used to implement IPC with shared memory? 8

b) What does the term "Process Control Block" refer to? Elaborate on its importance. 6

Module – 3

15 a) Provide a solution to the Dining Philosopher's problem utilizing monitor. 5

b) Consider the following snapshot of a system with five processes P0, P1, P2, P3, P4 and four resources A, B, C and D 9

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

Using Banker's algorithm, answer the following questions:-

i) How many instances of resources A, B, C, D are there?

ii) What is the content of Need matrix?

iii) Is the system in a safe state? If it is, find the safe sequence.

16 a) Demonstrate that if the wait and signal operations are not performed atomically, there is a possibility of violating mutual exclusion. 7

b) What approaches can be employed to resolve a deadlock situation? 7

Module – 4

17 a) Consider the following segment table: 5

Segment	Base	Length
0	300	500
1	1200	200
2	50	150
3	1800	400
4	2200	100

What are the physical addresses for the following logical addresses?

i) 0,320 ii) 1,110 iii) 2,550 iv) 3,240 v) 4,131

b) With six memory partitions of 120 KB, 480 KB, 190 KB, 320 KB, 630 KB (in order), how would the first fit, best fit and worst fit algorithms place processes of 225 KB, 405 KB, 128 KB, 440 KB (in order). Rank the algorithms by memory usage efficiency. 9

18 a) Describe the process of swapping. Illustrate with the help of a diagram. 6

b) Discuss the strategies that serves as a common solution to dynamic storage-allocation problem with respect to contiguous memory allocation. 8

Module – 5

19 a) Describe the strategies used for protecting Files. 6

b) Suppose that a disk drive has 200 cylinders numbered from 0 to 199. The disk is currently servicing at cylinder 65. The queue of pending requests in FIFO order is 120, 38, 175, 27, 150, 45, 82 and 100. 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? 8

(i) FCFS (ii) SSTF (iii) SCAN

20 a) Explain the methods employed to manage free space on a disk. 6

b) Provide an explanation of disk formatting. 8

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