Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (S, FE) / S2 (PT) (S, FE) / S4 (WP) (S) Examination December 2024 (2019 Scheme)

Course Code: CST 206

Course Name: OPERATING SYSTEMS

Max. Marks: 100   Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks)   Marks

1	Differentiate single processor and multiprocessor systems.	3
2	Explain the steps taking place in booting.	3
3	Explain the difference types of scheduling queues.	3
4	How many times "hello" will be printed after executing the following code. Justify your answer.	3

```
void main()
    {
        fork();
        fork();
        fork();
        printf("hello\n");
    }
```

5	Explain the necessary conditions for a deadlock	3
6	What is a monitor?	3
7	Explain Belady's anomaly with an example?	3
8	Does segmentation suffer from fragmentation? Justify your answer.	3
9	Explain two level directory structure with an example.	3
10	Define the terms seek time, rotational latency and transfer time.	3

PART B

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

Module -1

11	a)	What is a system call? Explain any three different types of system call.	9
	b)	Explain the dual mode operations of operating system.	5

12 a) Explain the following operating system structures with suitable diagrams   9
        (i) Simple (ii) Layered (iii) Microkernel.

    b) What are the major functions of operating system related to process management.   5

Module -2

13 a) Calculate the average waiting time and turnaround time for the processes given in   9
        the following table after displaying the Gantt charts for the following scheduling
        algorithms

        a) Non-pre-emptive SJF   b) Pre-emptive SJF c) RR scheduling (time slice= 4 ms)

Process	Arrival time (ms)	CPU burst time (ms)
P1	0	10
P2	2	6
P3	3	4
P4	6	2
P5	10	8

    b) Explain the different process states with a suitable diagram.   5

14 a) Differentiate between the following   8

        (i) Short term scheduler and medium-term scheduler
        (ii) Pre-emptive and non-pre-emptive scheduler.

    b) Explain shared memory model IPC mechanism with a suitable example   6

Module -3

15 a) Consider the following snapshot of a system in which four resources A, B and C   10
        are available.

	Allocation			Max			Need			Available		
	A	B	C	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3				3	3	2
P1	2	0	0	3	2	2						
P2	3	0	2	9	0	2						
P3	2	1	1	2	2	2						
P4	0	0	2	4	3	3						

Do the following problems using banker's algorithm.
a) Compute what each process must still request and fill this under the column
Need.
b) Is the system in a safe state? Why or why not?
c) If a request from P1 arrives for (1,0,2), can the request be granted immediately?

b) Describe how test and set instruction can be used to provide a solution to critical section problem.   4

16 a) Explain dining philosophers' problem. How it can be solved using semaphores?   8

b) Explain with an example how wait for graph can be used to detect a deadlock.   6

Module -4

17 a) Consider the page reference string 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1. For a system with 3 frames compute the number of page faults for the following page replacement algorithms (i) FIFO (ii) Optimal (iii) LRU   9

b) Differentiate internal and external fragmentation with suitable examples.   5

18 a) Consider six memory partitions of size 200 KB, 400 KB, 600 KB, 500 KB, 300 KB and 250 KB. These partitions need to be allocated in order to four processes of size 357 KB, 210 KB, 468 KB, 491 KB. Perform (i) First fit (ii) Best fit (iii) Worst fit.   9

b) Explain the concept of paging with TLB using suitable diagrams.   5

Module -5

19 a) Explain linked and indexed file allocation strategies mentioning each method's advantages and disadvantages.   10

b) Explain access matrix with an example.   4

20 a) Suppose that a disk drive has 200 cylinders numbered from 0 to 199 and the current position of the head is at cylinder 100. For the given queue of requests: - 20, 89, 130, 45, 120 and 180, draw the head movement in FCFS, SSTF and C-SCAN disk scheduling algorithms and compute the total head movements (in cylinders) in each.   9

b) Explain different file access methods.   5

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