Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech Degree Supplementary Examination June 2023 (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	What are the operations taking place when a system call is executed?	3
2	What are multiprocessor systems? What are the advantages of multiprocessor systems?	3
3	Write the difference between process and thread.	3
4	Differentiate between the two common models of interprocess communication.	3
5	Write the three requirements that a solution to critical–section problem must satisfy.	3
6	Explain the priority inheritance protocol for solving the priority inversion problem.	3
7	What do you understand by external and internal fragmentation in case of memory management schemes.	3
8	Explain the concept of demand paging?	3
9	Explain the linked allocation of file allocation with merits and demerits.	3
10	Point out the differences between C-SCAN and C-LOOK scheduling algorithms.	3

PART B

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

Module – 1

11 a) Explain the essential properties of the following types of Operating systems: 10

    i) Batch operating system

    ii) Time sharing operating system

    iii) Real time operating system

    iv) Distributed operating system

  b) Explain the layered approach of the operating system structure.   4

12 a) Explain any four Kernel data structures with suitable examples. 8

    b) Justify the statement "Operating System can be viewed as a government, resource allocator and a control program". 6

Module – 2

13 a) With the help of a diagram, explain the operations taking place when the CPU switches from one process to another. 7

    b) Explain how the logical communication link is established and the messages are passed in case of direct and indirect communication, in a message passing system. 7

14 a) For the following set of processes draw the Gantt chart and find the average waiting time for : 9

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

Process	Arrival time (in sec)	Burst Time(in sec)
P1	0	4
P2	1	2
P3	2	5
P4	3	4

    b) Explain the working of multi-level feedback queue scheduling. 5

Module -3

15 a) Consider a system with four processes P1, P2, P3, P4 and four types of resources R1, R2, R3, R4. The maximum number of instances of resources of each type are 5, 7, 7 and 7 respectively. What will be the order of processing of jobs if the allocated matrix and the maximum demand matrix are as given below. 8

	Allocated Matrix				Maximum Claim			
	R1	R2	R3	R4	R1	R2	R3	R4
P1	2	1	3	2	3	5	6	4
P2	0	0	1	2	1	3	4	6
P3	1	2	1	1	1	4	3	2
P4	1	1	0	2	2	3	1	2

	b)	Explain how semaphores can be used to solve Readers-Writers problem.	6
16	a)	State dining philosopher's problem and give a solution using semaphores. Write structure of philosopher.	8
	b)	Explain the methods for deadlock prevention.	6

Module -4

17	a)	Consider the following page reference string 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6 Find the number of page faults if there are 4-page frames, using the following page replacement algorithms (i) LRU (ii) FIFO (iii) Optimal.	9
	b)	With the help of an example explain the concept of shared pages in a paging system.	5
18	a)	Memory is divided into fixed partitions of sizes 100KB, 500KB, 200KB, 300KB, 600KB in the order and all these partitions are available. Suppose processes of size requirements 212KB, 417KB, 112KB, 426KB are arrived in the system in that order. Show how the first fit, best fit and worst fit algorithms works to place processes into partitions. Which is the best algorithm?	8
	b)	Explain the concept of a hashed page table with a diagram.	6

Module -5

19	a)	Explain FCFS, SSTF and SCAN disk scheduling algorithms, using the given disk queue of requests: 20, 89, 130, 45 and 180. Assume that, the disk has 200 platters ranging from 0 to 199 and the current position of head is at cylinder 100.	9
	b)	Explain the different methods used for keeping track of free disk space.	5
20	a)	There are 4 domains (D1, D2, D3, D4) and 4 objects (files – F1, F2, F3, F4). A process executing in D1 can read and write files F1, F3 and F4. A process in D4 can read F1, read & write F3 and execute F2. A process in D2/D3 can read F2 and execute F4. A process in D1 can switch to D2 or D4. A process in D4 can switch to D3. Draw the access matrix showing all these details.	7
	b)	How can we make a new magnetic disk ready for use (to store files)?	7

***