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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (R,S) / S2 (PT) (R,S) Examination June 2023 (2019 Scheme)

Course Code: CST 206

Course Name: OPERATING SYSTEMS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks. Marks

1	What are the major activities of an operating system with regard to file management?	(3)
2	Write the operations taking place during the booting of a system.	(3)
3	Explain the different buffering mechanisms used in message passing systems?	(3)
4	Define the parameters for multilevel feedback queue scheduling? How it is better compared to multilevel queue scheduling?	(3)
5	What are the three conditions to be satisfied by a solution to critical section problem?	(3)
6	Explain with an example the improper usage of semaphore causing deadlocks?	(3)
7	Differentiate Logical address Space and Physical Address Space	(3)
8	Explain the terms (i) Dynamic Loading (ii) Dynamic Linking	(3)
9	Discuss the steps in handling a page fault?	(3)
10	How is disk formatting done?	(3)

PART B

Answer any one question from each module

Module 1

11	(a)	What is an Operating System? Explain any 3 types of Operating System.	(7)
	(b)	What is a system call? What are the different ways to pass parameters to system call? List basic types of system call with examples.	(7)

OR

12	(a)	Write notes on the following operating system structures. (i) Microkernel structure (ii) Simple Structure (iii) Layered Structure	(8)
	(b)	Describe the differences between symmetric and asymmetric multiprocessing. What are the advantages and disadvantages of multiprocessor systems?	(6)

Module 2

13 (a) Define process. With the help of a neat diagram explain different states of process. (7)

(b) With an example, illustrate the interprocess communication using Shared memory (7)

OR

14 (a) Assume you have the following jobs in a system that to be executed with a single processor. Now, (8)

Process ID	Arrival Time	Burst Time (ms)
P0	0	75
P1	10	40
P2	10	25
P3	55	30
P4	95	45

i) Create a Gantt chart illustrating the execution

ii) Find the average waiting time

Iii) Find the average turnaround time

For the above processes, when the system uses

a) Preemptive Scheduling b) RR Scheduling (Time Quantum = 15 ms)

(b) What are threads? What are the benefits of multithreaded programming? List the ways of establishing relationship between user threads and kernel thread. (6)

Module 3

15 (a) Explain Dining Philosophers Problem. Give a solution for the problem using monitors. (6)

(b) What do you mean by deadlock? What are the four necessary conditions for a deadlock to occur? Describe various deadlock prevention mechanisms. (8)

OR

16 (a) What is a semaphore? Describe how semaphores can be used as a process synchronisation mechanism? (7)

(b) Consider the following snapshot of the system with five processes P1. P2, P3,P4,P5 and four resources A, B, C, D. Using Bankers Algorithm, check whether the system is in safe state or not. (7)

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

Module 4

17 (a) With the help of a diagram explain how logical address is translated to physical address in case of segmentation scheme. (5)

Consider the following segment table of a process.

Segment	Base	Limit
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

Compute the resultant physical addresses for the following logical addresses.

(i) 0, 430 (ii) 1, 10 (iii) 2,500 (iv) 3, 400 (v) 4, 112

(b) Consider the following page reference stream, R=3, 2, 4, 3, 4, 2, 2, 3, 4, 5, 6, 7, 7, 6, 5, 4, 5, 6, 7, 2, 1. Assuming demand paging with three frames, how many page faults would occur for the following page replacement algorithms. (9)

i) LRU replacement ii) FIFO replacement iii) Optimal replacement

OR

18 (a) Define Demand Paging. Explain Swapping with a neat diagram. (6)

(b) Consider a fixed partitioned memory management scheme with fixed partitions are 150K, 300K, 550K, 400K, 250K and 200K (in order). Five processes are ready for execution each with memory requirement as P1(240K), P2(120K), P3(380K), P4(300K) and P5(350K). Write the allocation in each of the following cases and calculate the internal fragmentation and external fragmentation (if any) in each case. (8)

(i) First Fit (ii) Best Fit (iii) Worst Fit

Module 5

19	(a)	List out the logical structures of a directory with figures.	(5)
	(b)	With neat sketches illustrate the following disk space allocation algorithms (i) Contiguous allocation (ii) Linked allocation (iii) Indexed allocation?	(9)

OR

20	(a)	Discuss Protection. Write notes about the protection strategies provided for files.	(6)
	(b)	Consider a disk queue with requests for I/O to blocks on cylinders 98, 183, 41,122, 14, 124, 65, 67. The head is initially at cylinder number 53. The cylinders are numbered from 0 to 199. Find out the total head movement incurred while servicing these requests, if following scheduling algorithms are used-(i) FCFS (ii) SSTF (iii) C-SCAN (iv) LOOK	(8)

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