

**B1.4-R5 : OPERATING SYSTEMS****NOTE :**

1. Answer question 1 and any FOUR questions from 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

**Time : 3 Hours****Total Marks : 100**

1. (a) What is kernel ? Explain the types of kernel.  
 (b) Describe indexed file and indexed sequential file organization.  
 (c) Explain FCFS (First Come First Serve) scheduling algorithm with an example.  
 (d) What is the role of lock variable and TSL (Test and Set Lock) instruction in busy waiting ? Explain in brief.  
 (e) What is Mutual exclusion ? Explain Peterson's solution for mutual exclusion problem.  
 (f) What is paging ? Explain the paging hardware.  
 (g) Which are the different disk scheduling algorithms, explain any one with the help of a suitable example. (7x4)

2. (a) List and Explain Components of an Operating System.  
 (b) Explain different free space management techniques in detail.  
 (c) Explain about different multithreading models. (6+6+6)

3. (a) Consider the following snapshot of a system :

	Allocation	Max	Available
	A B C D	A B C D	A B C D
P <sub>0</sub>	2 0 0 1	4 2 1 2	3 3 2 1
P <sub>1</sub>	3 1 2 1	5 2 5 2	
P <sub>2</sub>	2 1 0 3	2 3 1 6	
P <sub>3</sub>	1 3 1 2	1 4 2 4	
P <sub>4</sub>	1 4 3 2	3 6 6 5	

Answer the following questions using banker's algorithm :

- (i) Test the system whether it is in safe state or not ? If yes, find the safe sequence.
- (ii) If a request from P<sub>1</sub> arrives for (1, 1, 0, 0), can the request be granted immediately ?
- (iii) If a request from process P<sub>4</sub> arrives for (0, 0, 2, 0), can the request be granted immediately ?

- (b) What will be the average turn around time and average waiting time for four processes P1, P2, P3 and P4 using round robin algorithm ? Consider Time Quantum = 2.

Process ID	Arrival time (ms)	Burst time (ms)
P1	0	5
P2	1	4
P3	2	2
P4	3	1

(10+8)

4. (a) Consider the reference stream 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur using LRU (Least Recently Used) and Optimal Page Replacement algorithm with 3 frames ?
- (b) What is RAID ? What are the objectives of RAID ? Explain the level of RAID in brief.
- (c) Write a short note on design principle of security. (6+6+6)
5. (a) What is Semaphore ? Explain its properties along with drawbacks. Explain how Semaphore can be used to solve the classical problem of Readers & Writers.
- (b) Memory partitions of 100 kb, 500 kb, 200 kb, 300 kb, 600 kb are available. How would best, worst, first fit algorithms will place processes 212, 417, 112, 426 in order. Which is the best algorithm ? Justify your answer. (10+8)
6. (a) Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive currently services a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending request in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 Starting from the current position, what is the total distance (in cylinders) that the disk arm moves to satisfy all pending requests, for each of the following algorithms (i) FCFS (ii) SSFT (iii) SCAN (iv) LOOK (v) C-SCAN (vi) C-LOOK
- (b) Write a note on Real Time System. Also explain the advantages and disadvantages. (12+6)
7. (a) Write design principle of Window Operating System.
- (b) Define distributed operating system. And also explain the key component of distributed operating system. (9+9)

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