

### B3.4-R4 : 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.

**Total Time : 3 Hours**

**Total Marks : 100**

1. (a) What is the purpose of the command interpreter ? Why is it usually separated from the kernel ?  
(b) What are two differences between user-level threads and kernel-level threads ? Under what circumstances is one type better than the other ?  
(c) Under what circumstances do page faults occur ? What are the actions to be taken by the operating system when a page fault occurs.  
(d) Why might a system use interrupt-driven I/O to manage a single serial port and polling I/O to manage a front-end processor, such as a terminal concentrator ?  
(e) Which are the two basic approaches for distributed mutual exclusion ? Explain any one approach in detail.  
(f) How do you change File Access Permissions ? Explain with an example.  
(g) What is a Stateless Linux Server ? What features does it offer ?

**(7x4)**

2. (a) Given the following track requests in the disk queue, Compute for the Total Head Movement (THM) of the read/write head :

(82, 170, 43, 140, 24, 16, 190)

Consider that read/write head is positioned at location 50 for a 200 track disk (0-199).

Apply the following three algorithms to find out THM :

- (i) FCFS algorithm
  - (ii) Shortest seek time first algorithm
  - (iii) SCAN
- (b) What is critical section ? What are the three conditions to be satisfied in order to solve the critical section problem ? Explain each in detail.
  - (c) What is a thread ? What are the benefits of multithreaded programming ?

**(9+6+3)**

3. (a) Compare I/O based on polling with interrupt-driven I/O. In what situation is one technique preferable to the other ?  
 (b) Explain the protection domain in UNIX.  
 (c) Explain the application level filtering features of Windows firewall. (6+6+6)

4. (a) What is paging ? Consider the given page frame sequences 2, 3, 4, 2, 1, 3, 7, 5, 4, 3, 2, 3, 1. Page frame size is 4. Calculate page hit and page miss using LRU, FIFO and optimal page replacement. Explain your answer.  
 (b) Suppose that two processes detect the demise of the coordinator simultaneously and both decide to hold an election using the bully algorithm. What will happen ? Give a proper example.  
 (c) What is the difference between system call and system program ? (10+6+2)

5. (a) Draw and explain 5-state process transition diagram.  
 (b) List and explain basic Operating-System Services.  
 (c) What is the Tertiary-Storage device ? Explain WORM disks and Tapes in detail. (6+6+6)

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

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
<b>P0</b>	0	0	1	2	0	0	1	2	1	5	2	0
<b>P1</b>	1	0	0	0	1	7	5	0				
<b>P2</b>	1	3	5	4	2	3	5	6				
<b>P3</b>	0	6	3	2	0	6	5	2				
<b>P4</b>	0	0	1	4	0	6	5	6				

Using Banker's algorithm,

- (1) Determine whether the system is in a safe state or not.  
 (2) Decide whether a request from process P1 for resources A B C D (0, 4, 2, 0) should be granted immediately or not.  
 (b) Draw and explain moving-head disk mechanism.  
 (c) The file system buffer cache does both buffering and caching. Describe why buffering is needed ? (9+5+4)

7. (a) Consider the following set of process in order P1, P2, P3, P4, P5 and P6 with the length of the CPU burst time given in milliseconds. Draw Gantt Chart and calculate turn round time using following scheduling algorithms.

(1) SRTF (Shortest Remaining Time First)

(2) Round Robin (time quantum = 2ms)

Process	Arrival Time	Burst Time
P1	0	4
P2	1	5
P3	2	2
P4	3	1
P5	4	6
P6	6	3

(b) What is a Remote Procedure Call (RPC) ? Explain call message and reply message format of RPC.

(c) When is a set of processes said to be deadlocked ? What are the four conditions that must hold for deadlock to occur ?

(6+6+6)

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