Roll No. ..... Total Pages : 04

BT-4/M-24 44222

OPERATING SYSTEM
PC-CS-AIDS-212A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. What is an operating system ? Discuss essential properties of the following type of operating systems :
   (a) Multi-programmed operating systems.
   (b) Time sharing operating systems.
   (c) Distributed operating systems.

2. Explain the following :
   (a) System calls.
   (b) Different types of protection.
   (c) Virtual machine.

Unit II

3. Consider the following set of processes, with arrival time, length of the CPU burst time, and priority (lower number

means higher priority). Draw the Gantt chart and then calculate the average waiting time for Shortest Job First, Shortest remaining time next, and priority (preemptive case only).

Process	Arrival Time (msec)	Burst Time (msec)	Priority
P1	0	10	5
P2	0	5	2
P3	2	3	1
P4	5	20	4
P5	10	3	3

4. (a) What do you mean by communication primitives ? Explain in detail inter process communication along with its various design issues.

   (b) What do you mean by critical section problem ? Give the criteria to measure the performance of critical section problem.

Unit III

5. What is Deadlock ? Consider the following snapshot of a system :

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

Answer the following questions using the Banker's algorithm :

(a) What is the content of the matrix Need ?

(b) Is the system in a safe state, justify ?

(c) Can a request (0,1,0,0) from process P3 be safely granted immediately ? Justify your answer.

6. (a) What do you mean by page replacement ? Explain various page replacement algorithms along with their advantages and disadvantages.

(b) Using LRU and optimal page replacement algorithm, determine the number of page faults when reference to pages occur in the following order :
1, 2, 4, 5, 2, 1, 2, 4.

Assume that the main memory can accommodate 3 pages and the main memory already has the pages 1 and 2, with page 1 having been brought earlier than page 2.

Unit IV

7. What is disk scheduling ? Suppose that a disk has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 98. The queue of pending requests, in FIFO order, is 98, 183, 37, 122, 14, 124, 65, 67. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk scheduling algorithms ?

(a) FCFS.

(b) SSTF.

(c) C-SCAN.

8. Write short notes on the following :

(a) File allocation methods.

(b) General graph directory.

(c) Domain of protection.