

Time: 3 Hrs.

Marks: 80

**Note: 1. Question No. 1 is compulsory****2. Attempt any Three Questions Out of remaining five questions.****Q.1 Attempt any FOUR**

- a. What is an Operating system? Explain any four functions of an operating System. 5 Marks
- b. Discuss various scheduling criteria. 5 Marks
- c. What is semaphore? Explain types of semaphore. 5 Marks
- d. Explain inter-process communication. 5 Marks
- e. Explain programmed I/O and Interrupt drive I/O. 5 Marks

- Q.2 a. What is System call? Explain any five system calls in detail. 10 Marks
- b. Explain hardware support for paging. 10 Marks

- Q.3 a. Consider the following set of processes, assuming all are arrived at time 0. 10 Marks

Process	Burst Time	Priority
P1	10	5
P2	6	2
P3	7	4
P4	4	1
P5	5	3

Calculate average waiting time and average turn-around time for FCFS, SJF (Non- pre-emptive), Priority and Round Robin Algorithm (Quantum= 3 ms)

- b. Define Deadlock. Explain the necessary and sufficient condition for deadlock.  
Explain any one Deadlock avoidance technique. 10 Marks

- Q.4 a. Calculate number of Page Hit and Miss for the following string using FIFO, LRU and Optimal page replacement policies considering Frame Size = 4.  
1,2,3,4,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2 10 Marks
- b. State and explain reader writer problem using semaphore. 10 Marks

- Q.5 a. Explain various disk scheduling algorithms. 10 Marks
- b. What are the various allocation methods with reference to file system? 10 Marks

- Q.6 Write a short note on: (Any Two) 20 Marks
- a. Process Control Block
- b. Banker's Algorithm
- c. Memory Partitioning
- d. I/O Buffering Techniques

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