

**Operating System**

Paper - I

Time: Three Hours



SPM/KW/22/2531

Max. Marks: 70

- Notes:
- All questions carry marks as indicated
  - Solve Question 1 OR Questions No. 2
  - Solve Question 3 OR Questions No. 4
  - Solve Question 5 OR Questions No. 6
  - Solve Question 7 OR Questions No. 8
  - Solve Question 9 OR Questions No. 10
  - Due credit will be given to neatness and adequate dimensions
  - Assume suitable data whenever necessary
  - Illustrate your answers whenever necessary with the help of neat sketches

- Explain the types of operating system.
  - What is system call? Discuss various types of system calls.

**OR**

- Explain following Disk Space allocation methods.
  - Suppose a disk drive has 200 cylinders, numbered from 0 to 199. The drive is currently serving a request at cylinder 50, and the previous request was at cylinder 10. The queue of pending request in FIFO order is 82, 170, 43, 140, 24, 16, 190. Starting from the current head position, what is the total distance that the disk arm moves to satisfy all the pending requests for the following algorithm:
    - SSTF
    - SCAN
    - LOOK
    - C-LOOK

- Explain the concept of process control block, with neat diagram.
  - Consider the following set of process with length of CPU burst time gives in millisecond

Process	Arrival Time	Burst Time	Priority
1	0	15	2
2	2	3	1
3	5	5	5
4	6	8	4
5	7	12	3

Give Gantt chart and calculate the average waiting time for

- FCFS
- SJF
- Round Robin (Slice = 4 ms)
- Priority scheduling algorithm

**OR**

- Explain the long-term, short-term and medium term schedulers.
  - Draw the state transition diagram of process and explain each state in detail.

- Explain segmentation as a non contiguous memory allocation scheme.
  - Explain paging. How it is implemented? What hardware is required?

**OR**

- Calculate how many page faults will occur for the following algorithms applied on given reference string with three page frames: 1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9.
    - FIFO
    - Optimal
    - LRU page replacement
  - What is memory fragmentation? Explain internal and external fragmentation.
- Explain any two classical problem of synchronizations.
  - What is the critical section problem? Explain the three conditions that a solution to a critical section problem must satisfy.

**OR**

- Define the following any two.
    - Race condition
    - Mutual Exclusion
    - Semaphore
    - Busy waiting
  - What is mutual exclusion? How the semaphore used to solve the critical section problem?
- Explain various directory structures in detail.
  - Discuss the various file Access methods.

**OR**

- Solve the following using Banker's Algorithm and find out whether resultant system state is safe or not.

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P <sub>0</sub>	0	1	0	7	5	3	3	3	2
P <sub>1</sub>	2	0	0	3	2	2			
P <sub>2</sub>	3	0	2	9	0	2			
P <sub>3</sub>	2	1	1	2	2	2			
P <sub>4</sub>	0	0	2	4	3	3			

- Find out if system state is safe, if safe find out safe sequence.
- If P<sub>1</sub> makes a request – P<sub>1</sub> (1, 0, 2) is the resulting state safe?
- If P<sub>4</sub> makes a request – P<sub>4</sub> (3, 3, 0), can it be granted? Solve.

\*\*\*\*\*