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MCS-041

**MASTER OF COMPUTER
APPLICATIONS (MCA)**

Term-End Examination

December, 2023

MCS-041 : OPERATING SYSTEMS

Time : 3 Hours

Maximum Marks : 100

Weightage : 75%

Note : (i) *Question No. 1 is compulsory.*

(ii) *Attempt any **three** questions from the rest.*

1. (a)

Process	Burst time	Arrival Time	Priority
P ₁	12	0	2
P ₂	17	10	1 (Highest priority)
P ₃	10	15	3
P ₄	15	16	4

P. T. O.

- (i) Draw the Gantt chart for priority-based scheduling (non-preemptive), SJF (non-preemptive), FCFS and Round Robin scheduling (Quantum = 5). 8
- (ii) Calculate average waiting time for each scheduling algorithm. 4
- (iii) Calculate average turnaround time for each scheduling algorithm. 4
- (b) A disk queue requests for I/O are 98, 183, 37, 122, 14, 124, 65, 67. Determine the total number of head movements using FCFS, SSTF, SCAN and C-SCAN. Consider the disk head is initially at cylinder 53 and the disk arm is moving towards 0th cylinder. 10
- (c) List the limitations of multilevel queue scheduling. 4
- (d) What is the need of Direct Memory Access (DMA) ? Describe the working of DMA. 5

- (e) What do you mean by Security Policy ?
Why does operating system require security policy ? 5
2. (a) What is a semaphore ? Explain, how semaphore is used for process synchronisation. 7
- (b) Discuss the following : 6
- (i) Batch processing O/S
- (ii) Time sharing O/S
- (c) Explain the Bakery algorithm for process synchronisation. List the limitations of Bakery algorithm. 7
3. (a) What do you mean by Process ? How is it different from thread ? Explain different states of a process with the help of a diagram. 2+3+5
- (b) What are System Calls ? Explain the following system calls : 10
- (i) Delete
- (ii) Abort
- (iii) Fork/Join
- (iv) Delay

4. (a) What is directory structure ? Describe the following schemes of defining the logical structure of a directory : $2.5 \times 4 = 10$
- (i) Single level directory
 - (ii) Two level directory
 - (iii) Tree structured directory
 - (iv) Acyclic graph directory
- (b) List the activities of an operating system related to file management function. 4
- (c) Explain different file related system services. 6
5. Write short notes on the following : $5 \times 4 = 20$
- (i) Asynchronous I/O
 - (ii) Demand Paging
 - (iii) Network operating system
 - (iv) Mutual Exclusion in distributed O/S
 - (v) Hypercube System