No. of Printed Pages : 4

MCS–041

MASTER OF COMPUTER APPLICATIONS (MCA) (REVISED)

Term-End Examination

June, 2025

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) What are the goals and functions of an operating system ? Explain in detail. 6

   (b) Define a process. List and explain various process states. Explain the transition of the process states with the help of a diagram. 6

   (c) List and explain various Multiprocessor Interconnection Networks. 8

(d)

Process	Arrival Time	Burst Time
P_1	0	3
P_2	3	3
P_3	6	5
P_4	7	2
P_5	10	8

Consider the above table and answer the following questions using Round Robin (RR) and Shortest Remaining Time Next (SRTN) Scheduling Algorithms :

(RR Quantum = 3)

(i) Average turnaround time for each algorithm. 5

(ii) Calculate average waiting time for each algorithm. 5

(iii) Calculate throughput and processor utilization for each algorithm. 5

(iv) Draw Gantt chart for each algorithm. 5

2. (a) What do you mean by concurrency control problems ? Explain Sleeping Barber Problem and its sample solution using Semaphores. 10

   (b) Discuss Resource Allocation Graph (RAG) with suitable diagram for single and multiple instances of a resource. Also, show how to determine whether a deadlock has occurred or not using RAG. 10

3. (a) Explain the following with respect to contiguous memory allocation : 5×2=10

   (i) Single Partition System

   (ii) Multiple Partition System

   (b) Describe Demand Paging in brief. 4

   (c) Calculate how many page faults would occur for FIFO, LRU and optimal techniques for the following page reference string. The size of the frame is 3 : 6

   1, 2, 3, 1, 2, 3, 4, 2, 1, 3, 4, 5, 6

   Note : Assume that all the frames initially are empty.

4. (a) A disk queue requests for I/O are 60, 84, 124, 12, 111, 63, 69. Determine the total number of head movement using LOOK, C-LOOK, SCAN, C-SCAN disk scheduling algorithms. Consider the disk head is initially at cylinder 48 and the disk arm is moving towards 0th cylinder. 10

   (b) What are the system security threats ? Classify direct and indirect attacks and explain. 5

   (c) What is Authentication Process in the context of Operating System ? How does it work ? Explain your answer. 5

5. Write short notes on the following : 4×5=20

   (i) Network Operating System

   (ii) Lamport's Bakery Algorithm

   (iii) Remote Procedure Call (RPC)

   (iv) Booting Windows 2000

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