H Roll No. .....

TMC–103

M. C. A. (FIRST SEMESTER)
END SEMESTER
EXAMINATION, Jan., 2023

OPERATING SYSTEM

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Explain the layered architecture of an operating system. (CO1)

   (b) What is multiprocessor operating system ? Explain. (CO1)

   (c) Explain various components of an operating system. (CO1)

P. T. O.

2. (a) Explain Shortest Remaining Time First (SRTF) CPU Scheduling algorithm. Consider the processes, CPU Burst time and Arrival time given below : (CO2)

Processes	CPU Burst Time	Arrival Time
P_1	8	2
P_2	1	7
P_3	2	6
P_4	6	3
P_5	4	5
P_6	2	3

Draw the Gantt chart and calculate the following by using SRTF CPU scheduling algorithm :

(i) Average waiting time

(ii) Average turnaround time

(iii) CPU utilization

(b) What are schedulers and its various categories ? (CO2)

(c) Explain process state diagram with the help of a suitable diagram. (CO2)

3. (a) Write and explain the two Process Solution for Critical Section Proble. (CO3)

(b) Consider the following snapshot of a system : (CO3)

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	2	0	0	1	4	2	1	2	3	3	2	1
P_1	3	1	2	1	5	2	5	2				
P_2	2	1	0	3	2	3	1	6				
P_3	1	3	1	2	1	4	2	4				
P_4	1	4	3	2	3	6	6	5				

Answer the following questions using the Banker's algorithm :

(i) Illustrate that the system is in a safe state by demonstrating an order in which the processes may complete.

(ii) If a request from process P_1 arrives for (1, 1, 0, 0), can the request be granted immediately ?

If a request from process P_4 arrives for (0, 0, 2, 0), can the request be granted immediately ?

(c) What is Resource Allocation Graph ? How can deadlock be detected with the help of resource allocation graph ? Explain with an example. (CO3)

4. (a) Differentiate internal and external fragmentation. What are the various techniques to overcome the problem of external fragmentation ? (CO4)

(b) What is Page Replacement ? How many page faults would occur for the following reference string for four-page frames using LRU and OPR algorithms ? (CO4)

4 2 6 4 7 1 3 2 6 3 5 1 2 3

(c) A disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 53. 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 ? (CO4)

(i) FCFS

(ii) SSTF

(iii) SCAN

(iv) C-LOOK

5. (a) How is protection and security provided in any operating system ? (CO5, CO6)

(b) What is Access Matrix ? How can it be implemented in any operating system ? (CO5, CO6)

(c) Describe various LINUX distributions along with their properties. (CO5, CO6)