Total No. of printed pages = 6

63/2 (SEM-1) MCA 1.4

2021

(held in 2022)

MCA

(Theory Paper)

Paper Code : MCA-1.4

(Operating Systems)

Full Marks – 75

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer *all* questions.

1. When does a page fault occur ? 1

   (a) Page is present in frame

   (b) When dead lock occurs

   (c) Page is not present in frame

   (d) Context switch

[Turn over

2. Which of the following is not a CPU scheduling algorithm ? 1

(a) Round Robin (b) Priority

(c) SJF (d) SCAN

3. After completion of I/O operation the process switches to ——— state. 1

(a) New (b) Ready

(c) Running (d) Waiting

4. The deadlock avoidance algorithm dynamically examines the ——— to ensure that circular wait never occurs. 1

(a) Operating system

(b) Resources

(c) Process

(d) Resource Allocation State

5. What is meant by booking ? 1

(a) Install a program

(b) To scan

(c) To shut down

(d) Starting the computer.

Answer *all* questions :

6. Define multitasking. 2

7. What is dispatch latency ? 2

8. Define context switch. 2

9. What does CPU scheduler do ?2

10. What is process scheduling ? 2

Answer any *four* questions :

11. Define process. Consider the following set of processes with their arrival time and length of the CPU burst in milliseconds. 1+2+2+2=7

Process	Arrival Time	Burst Time
p_1	0	6
p_2	1	4
p_3	2	2
p_4	3	1
p_5	4	8

(i) Draw two Gantt charts to illustrate the execution of these processes using FCFS and SJF (preemptive) scheduling algorithms.

(ii) Find the waiting time of each process for each of the algorithms in question (i).

(iii) Find the turnarround time of each process for each of the scheduling algorithms.

12. What is a page fault ? Apply first In First Out, Optimal and Least Recently Used page replacement algorithms to the following reference string and find out the number of page faults occured in each of the algorithms using 3 page frames :

1 2 3 4 5 3 4 1 6 7 8 7 8 9 5 4 2. 1+6=7

13. What is seek time in disk scheduling ? A disk drive has 400 cylinders, numbered from 0 to 399 the drive head is currently serving request at 14. The list of pending requests are : 86, 40, 75, 90, 200, 340, 230 starting from the current head possition, draw the graph and find out the total cylinders that the disk arm moves to satisfy all pending requests by using :

(i) FCFS disk scheduling

(ii) SSTF disk scheduling

(iii) SCAN disk scheduling.

14. What is turnaround time ? Explain critical section problem and the requirements for its solution. 1+6=7

15. Explain the safety algorithm and resource request algorithm steps in Bankers algorithm. 4+3=7

16. Define file attributes and the basic operations that can be applied to a file. 7

Answer any *two* questions :

17. Explain wait for graph. Consider the following snapshot of a system :

Processes	Allocation	Max	Available
	A B C D	A B C D	A B C D
P_1	0 0 1 2	0 0 1 2	1 5 2 0
P_2	1 0 0 0	1 7 5 0	
P_3	1 3 5 4	2 3 5 6	
P_4	0 6 3 2	0 6 5 2	
P_5	0 0 1 4	0 6 5 6	

Where A, B, C, D are different resource types -

Answer the following questions using Banker's algorithm : 3+1+4+2=10

(i) What is the content of the matrix need ?

(ii) Find the safe sequence if the system is safe.

(iii) If a request from P_2 arrives for (0, 4, 2, 0) can the request be granted immediately.

18. Explain how deadlock can be recovered. 10

19. Discuss safe state. How a deadlock can be avoided using resource allocation graph ? 10

Answer any *one* question :

20. Describe demand paging and its basic concepts. 12

21. Describe how deadlock can arise and how it can be prevented. 12