

MCA 3rd semester-2020**Operating System (CS 3.2)**

Full Marks–70, Time: 3 Hours
The questions are of equal value.
Answer ALL questions.

1. Operating system is interrupt-driven. Justify and explain with flow diagram.

OR

(a) Explain how I/O protection is provided by OS.

(b) Differentiate between buffering versus spooling.

2. (a) On a system using non-preemptive scheduling, processes with expected run time of 5, 18, 9 and 12 are in the ready queue. In what order should they be run to minimize wait time? Explain.

(b) Explain the Round-Robin CPU scheduling algorithm with an example. Write its advantages.

OR

(a) What is a race condition? Explain with the example of shared-memory solution to the bounded-buffer problem.

(b) Write and explain the two-process solution to critical section problem.

3. (a) Write the algorithm for deadlock detection. Check if deadlock exists in the following state:

Process	Allocation			Request			Available		
	A	B	C	A	B	C	A	B	C
P ₁	0	1	0	0	0	0	0	0	0
P ₂	2	0	0	2	0	2			
P ₃	3	0	3	0	0	1			
P ₄	2	1	1	1	0	0			
P ₅	0	0	2	0	0	2			

(b) Explain the options that can be used to recover from a deadlock.

OR

(a) What is system deadlock? How can it be prevented?

(b) Write the safety algorithm. Find the minimum number of resources needed to be available for the following state to be safe:

Process	Maximum allocation	Current allocation
P ₁	3	1
P ₂	2	1
P ₃	9	3
P ₄	7	2

4. (a) Differentiate between MFT and MVT.

(b) What is segmentation? Given the segment table as:

Segment	Base	Length
0	330	124
1	876	211
2	111	99
3	498	302

Compute the physical addresses for each of the logical addresses (0, 99), (2, 78), (1, 265), (3, 222) and (0, 111).

OR

(a) What is page fault? Explain how it is handled by OS, with the diagram.

(b) Given the page reference string as:

0, 9, 0, 1, 8, 1, 8, 7, 8, 7, 1, 2, 8, 2, 7, 8, 2, 3, 8, 3

how many page faults will occur if the program has 3 frames and uses FIFO replacement, LRU replacement, and optimal replacement.

5. (a) Explain the indexed file allocation method with an example. Write its advantages.

(b) Explain how file protection is provided in a multi-user system like UNIX.

OR

On a disk with 1000 tracks, numbered on to 999, compute the number of tracks the disk head must move to satisfy all the requests in the disk queue. Assume the last request serviced was at track 345 and the head is moving towards track 0. The queue in FIFO order contains requests for the tracks 123, 874, 692, 475, 105, 376. Perform the computation for FIFO, SSTF, SCAN, LOOK, C-SCAN, and C-LOOK algorithms.