

(3 Hours)



Total Marks: 80

- N.B. 1) Question **no.1** is compulsory
- 2) Solve any **Three** questions from remaining five.
- 3) Assume suitable data wherever required.

Q 1 ) Answer any four (20)

- Describe various types of system calls for performing different tasks.
- What are the four necessary conditions of deadlock prevention?
- Differentiate between multiprogramming and multiprocessing.
- Explain pre-emptive and non-pre-emptive scheduling.
- What is a semaphore? Explain busy waiting semaphores.

Q 2) a) Consider the following page reference string:

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.

How many page faults would occur for the following replacement algorithms, assuming one, two, three, four, five, six, or seven frames? Remember all frames are initially empty, so your first unique pages will all cost one fault each.

- LRU , FIFO and Optimal replacement. (10)
- b) What do you mean by a critical section? Using semaphores , write a solution to readers and writers problem that gives priority to readers. (10)

Q 3) a) Consider the following system snapshot using data structures in the Banker's algorithm, with resources A, B, C, and D, and process P0 to P4.

	MAX				Allocate				NEED				Available			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
P0	6	0	1	2	4	0	0	1								
P1	1	7	5	0	1	1	0	0								
P2	2	3	5	6	1	2	5	4								
P3	1	6	5	3	0	6	3	3								
P4	1	6	5	6	0	2	1	2								
													3	2	1	1

Using Banker's algorithm, answer the following questions.

- How many resources of type A, B, C, and D are there?
- What are the contents of the Need matrix?
- Is the system in a safe state? Why

(iv) If a request from process P4 arrives for additional resources of (1,2,0,0,), can the Banker's algorithm grant the request immediately? Show the new system state and other criteria. (10)

b) Explain the process states by using processes state transition diagram. (10)

Q 4) a) Explain any 3 allocation schemes that exist for allocating secondary storage to files. (10)

b) What is directory? What are the different ways to implement a directory? (10)

Q 5) a) What are the methods for selecting a disk scheduling algorithm?  
Explain the disk scheduling algorithms? (10)

b) Suppose the head of moving-head disk with 200 tracks, numbered 0 to 199 is currently serving a request at track 143 and has just finished a request at track 125. if the queue of requests is kept in the FIFO order 86, 147, 91, 177, 94, 150, 100, 175, 130 What is total head movement to satisfy these request for the following disk scheduling algorithms?

i) FCFS ii) SSTF iii) C-SCAN (10)

Q 6) a) Compare the following main memory organization schemes : contiguous memory allocation, pure segmentation, and pure paging with respect to the following issues:

i) External fragmentation ii) Internal fragmentation iii) Ability to share code across processes. (10)

b) Write an algorithm to implement a semaphore using:-

i) The Swap instruction ii) The Test and set instruction. (10)