Duration: 3hrs   **[Max Marks: 80]**

N.B.: (1) Question No 1 is Compulsory.
       (2) Attempt any three questions out of the remaining five.
       (3) All questions carry equal marks.
       (4) Assume suitable data, if required and state it clearly.

1	Attempt any FOUR	**[20]**
a	What is an Operating System? Explain its basic functions	
b	Explain in brief the types of CPU schedulers with a diagram.	
c	Define Thread. Mention benefits of Multithreading	
d	What is a Deadlock? Explain the necessary conditions for a deadlock to take place.	
e	Explain MFT with an example.	

2	a	Discuss various CPU scheduling criteria	**[10]**
	b	Explain concept of Paging with an example.	**[10]**

3	a	Explain File Allocation methods in detail.	**[10]**
	b	Explain the Five-State Process State Transition Diagram	**[10]**

4   a   What is Deadlock Avoidance? Explain the algorithm with an example   **[10]**

     b   Suppose the following disk request sequence (track numbers) for a disk with 100   **[10]**
tracks is given as :45, 20, 90, 10, 50, 60, 80, 25, 70.
Assume that initial head position of the R/W head is on track 50. Count the additional distance that will be traversed by the head when SSTF algorithm is used as compared to the SCAN algorithm (assuming SCAN moves towards 100 when it starts execution).

5	a	Explain Round Robin Algorithm with a suitable example	**[10]**
	b	Explain difference between External fragmentation and Internal Fragmentation. How to solve the fragmentation problem using Paging?	**[10]**

6   a   Explain the Critical Section Problem. Explain the Hardware solution proposed to achieve the same   **[10]**

     b   Consider the following snapshot of the system.   **[10]**

Process	Max				Allocation				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	6	0	1	2	4	0	0	1	3	2	1	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				

       i.   Determine the total number of instances of each type A, B, C, D   **(2M)**
       ii.   Find the content of the Need Matrix   **(2M)**
      iii.   Determine if the system is in Safe State. If so, find the Safe Sequence   **(6M)**

****

5467219F1080B95368193950FB2B1A0F