(Time: 3 hours)   **Total marks: 80**

Note:

1. Q1 is compulsory
2. Attempt any three from remaining questions
3. Answers to sub questions should be answered together
4. Illustrate answers with diagram wherever necessary

1 a) Given a reference string to the following pages by a program   10
1,0,2,2,1,7,6,7,0,1,2,0,3,0,4,5,1,5,2,4,5,6,7,6,7,2,4,2,7,3,3,2,3
How many page faults will occur for the following page replacement
algorithm assuming four frames
i) FIFO
ii)Optimal Replacement
iii) LRU

   b) What is Multithreading? List the Benefits of Multithreading.Describe the   10
models of Multithreading.

2 a) Consider following snapshot of the system:-   10

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	2	0	2	1	9	5	5	5	6	3	5	4
P1	0	1	1	1	2	2	3	3				
P2	4	1	0	2	7	5	4	4				
P3	1	0	0	1	3	3	3	2				
P4	1	1	0	0	5	2	2	1				
P5	1	0	1	1	4	4	4	4				

Using Bankers algorithm answer the following:-
i) What are the contents of need matrix?
ii) Find if the system is in safe state? If it is, find the safe sequence.
iii)If the request from process P5 arrives for (3,2,3,3),can the request be
granted immediately

   b) What is Process Synchronization? Describe Monitor. How monitor can be   10
used to solve Dining Philosopher problem.

3 a) On a paging system consider a logical address space of 256 pages with a 4-   10
KB page size,mapped onto a physical memory of 64 frames
a) How many bits are required in the logical address?
b) How many bits are required in the physical address?
Describe the techniques of structuring page table.

	b)	What is File Control Block?.Describe various file allocation techniques.	10
4	a)	What is a Deadlock?List the necessary conditions for deadlock to occur.Briefly describe the Methods for handling Deadlocks.	10
	b)	For the process listed in table , draw a Gantt chart and find their average waiting time and average turnaround time using	10

    i. FCFS
    ii. Round Robin (quantum=2)
    iii. SJF(both preemptive and non-preemptive)

Process	Arrival Time	Processing Time
P1	2	3
P2	4	2
P3	5	1
P4	7	4
P5	9	2
P6	15	6
P7	16	8

5	a)	Suppose a disk drive has 5000 cylinders, numbered 0 to 4999. The disk head has just finished a request at track 143 and is currently at track 125.The queue of pending request in FIFO order is:- 86,1470,913,1774,948,1509,1022,1750,130 .Starting from the current head position, what is the total distance in cylinders that the disk arm moves to satisfy all pending request for each of the following disk scheduling algorithm ? 1)SSTF 2)SCAN 3)FCFS 4)C-LOOK	10
	b)	Write Short Notes on i)Access Matrix ii)Security threats	10

6		Write notes on any four	20
	a)	Segmentation	
	b)	Inter Process Communication	
	c)	Translation Look Aside Buffer(TLB)	
	d)	Earliest Deadline First(EDF) Algorithm	
	e)	Linker and Loader	

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