C0-R4.B2: OPERATING SYSTEMS

NOTE:

1.	**Answer question 1 and any FOUR from questions 2 to 7.**
2.	**Parts of the same question should be answered together and in the same sequence.**

Time: 3 Hours **Total Marks: 100**

1.
a) Differentiate between foreground process and background process.
b) What is the difference between segmentation and paging?
c) What are the services provided by operating systems?
d) Is it possible to have a deadlock involving only one single process? Explain your answer.
e) What are the advantages of distributed operating system over network operating systems?
f) What is an access control list?
g) What is the difference between NTFS and FAT32?

(7x4)

2.
a) Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, 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 the pending requests, for each of the following disk- scheduling algorithms?
  i) LOOK
  ii) C-SCAN
  iii) C-LOOK
b) What is a race condition? Explain how a critical section avoids this condition. What are the properties which a data item should possess to implement a critical section?
c) What are the advantages of threads over multiple processes?

(9+6+3)

3.
a) What is the difference between internal and external memory fragmentation? Explain with help of an example.
b) What is Direct Memory Access? What is cycle stealing in DMA?
c) Differentiate between protection and security. Explain the techniques used for protection of user files.

(6+6+6)

4.
a) Explain FIFO, LRU and optimal page replacement policies.
b) Discuss the design issues in terms of how distributed systems will have to adapt when scale, similarity, network, and membership change in "modern" systems.
c) Give the difference between multiprogramming and multiprocessing.

(9+6+3)

5.
a) What are semaphores? Explain two operations performed on semaphores.
b) Why are Translation Look-aside Buffers (TLBs) important? In a simple paging system, what information is stored in a typical TLB table entry?
c) Differentiate between Worms and Viruses.

(6+6+6)

6.

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				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				

    Using Banker's algorithm, answer the following questions.
    i)   How many resources of type A, B, C, and D are there?
    ii)   What are the contents of the Need matrix?
    iii)   Is the system in a safe state? If yes, show the safe sequence.

b) Explain two methods of space allocation on secondary storage, with neat diagrams. What are there relative advantages and disadvantages?

(9+9)

7.

a) Consider the following set of processes, with the length of the CPU-burst time given in milliseconds.

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

    The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0. Calculate average waiting time and turn-around time using following scheduling algorithm.
    i)   FCFS
    ii)   SJF
    iii)   Non-preemptive priority
    iv)   Round Robin (quantum = 1)

b) What is a process control block? List and explain five fields of PCB.

c) What are vectored interrupts? How are they serviced by the Operating System?

(8+5+5)