C3-R3: OPERATING SYSTEMS

NOTE:

1. **Answer question 1 and any FOUR questions from 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) Distinguish between multiprocessing and multiprogramming.
b) How is the pathname /usr/doe/cand.c looked up in UNIX?
c) Does a process incur more execution overhead compared to a thread? Justify your answer.
d) What do you understand by I/O scheduling? What is meant by spooling?
e) State the practical limitations of implementing non-preemptive SJF algorithm.
f) What is the disadvantage of user level threads?
g) Distinguish between logical and physical address space.

(7x4)

2.

a) Define Turnaround Time, Response Time and Waiting Time.
b) Consider the following set of processes:

Process	Arrival Time	Processing time
A	0	3
B	2	6
C	4	4
D	6	5
E	8	2

Compute the average turnaround time using each of the following scheduling policies:
i) First Come First Served (FCFS)
ii) Round Robin with time quantum = 4 units
iii) Shortest Process/Job Next (SPN or SJN) and
iv) Shortest Remaining Time First (SRTF).
Which of the scheduling policies gives the best result? Comment on the implementation aspects of policy.

(6+12)

3.

a) What is TLB? Find out the effective memory-access time with an 87% hit ratio and the following access times:
TLB access time: 12ns; MM access time: 90ns
b) Show and explain an implementation of printer-computer (computer produces an item, keeps in a buffer from where the printer (consumer) is picking it up) problem using semaphore.

(8+10)

4.

a) Disk requests come in to the disk drive for tracks in the order of 55, 58, 39, 18, 90, 160, 150, 38 184. The disk arm is initially at track 100. A seek takes 5 msec per track move. Compare the average seek lengths and seek times achieved with: Shortest Service/Seek Time First (SSTF), SCAN and Circular-SCAN (C-SCAN) strategies.

b) What is context switch? Why is it considered to be an overhead?

c) What is the difference between a long-term scheduler and a short-term scheduler?

(12+3+3)

5.

a) Consider the following page reference during a given time interval for a memory consisting of 3 frames : v,w,u,u,w,x,v,y,z,u,v,x,u,z,u. Using the i) First In First Out (FIFO) replacement strategy and the ii) the Least Recently Used (LRU) replacement strategy compare the results. Does page hit increase if the number of frames is increased? Give reasons for your answer.

b) What is dynamic loading? Mention its advantage. How dynamic linking is performed? Mention any disadvantage that you can think of for both the schemes.

(10+8)

6.

a) Differentiate between synchronous and asynchronous message passing. What is a mailbox?

b) Describe Banker's algorithms to detect deadlock in a system. What are the possible recovery strategies once deadlock is detected?

c) Distinguish between paging and segmentation schemes of memory management.

(4+10+4)

7.

a) Describe the public-key encryption scheme and mention how is it advantageous to the data-encryption standard.

b) What is protection domain? What are the various methods of storing a protection matrix?

c) Where and how "bit vector/table" is used in free space management of disks? What are the advantages and disadvantages of the technique?

(10+3+5)