Code No: R194102G **R19** **Set No. 1**

IV B.Tech I Semester Supplementary Examinations, March – 2023

OPERATING SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks
*****

UNIT I

1 a) Define process? Explain the various states of a process and the transitions between them. [7]

b) Explain the concept of pre-emptive and non-pre-emptive scheduling. Compare and contrast the two approaches and discuss their advantages and disadvantages. [8]

(OR)

2 a) What is an operating system? Explain the different types of operating systems and their advantages and disadvantages. [7]

b) Let's consider the following set of processes arriving at a CPU for scheduling:

Process	Arrival Time	Burst Time
P1	0	5
P2	1	3
P3	2	6
P4	3	2
P5	4	4

Using the SJF (Shortest Job First) scheduling algorithm, determine the order in which the processes will be executed, and the average waiting time for the processes. [8]

UNIT II

3 a) Discuss the concept of paging in computer memory management, and explain how it differs from segmentation. [7]

b) Let's consider memory with 4 frames and a process requests the following pages : 1, 2, 3, 4, 5, 2, 1, 6, 7, 8, 7, 8, 9, 3, 4, 5, 6.
Initially, All the frames are empty. Use OPT page replacement Algorithm and find the total number of page faults. [8]

(OR)

4 a) Explain the concept of virtual memory, and discuss how it is used to manage memory in modern computer systems. [7]

b) Discuss the advantages and disadvantages of using a single-level or multi-level page table in a paging system. [8]

UNIT III

5 a) Explain the producer-consumer problem and how it can be solved using semaphores. [7]

b) Consider a system with five processes and four resource types: A, B, C, and D. Assume that the system has 8 units of A, 7 units of B, 8 units of C, and 4 units of D available.

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

Use the banker's algorithm to determine whether the system is in a safe state or not, and show the safe sequence if it is safe [8]

(OR)

6 a) Explain the concept of process synchronization and why it is necessary in operating systems. [7]

b) Explain the concept of deadlock prevention through graph-based approaches such as the wait-for graph, and provide an example of its use in a multi-process system [8]

UNIT IV

7 a) Explain the concept of a file in an operating system, and discuss the different types of files that are typically used in a computer system. How are files organized on disk, and what metadata is associated with each file? [7]

b) Compare and contrast at least three disk scheduling algorithms, such as FCFS, SSTF, SCAN, C-SCAN, LOOK, and C-LOOK. What are the strengths and weaknesses of each algorithm [8]

(OR)

8 a) Discuss the file system mounting process in an operating system, and explain how file systems are linked to specific disk partitions or devices [7]

b) Suppose you have a disk with 2000 tracks, and the disk head is currently positioned at track 100. The disk is serving the following I/O requests in the order they arrive: Request 1: Track 143 Request 2: Track 125 Request 3: Track 179 Request 4: Track 80 Request 5: Track 199. Assuming you are using the SSTF (Shortest Seek Time First) disk scheduling algorithm, what is the order in which the requests will be serviced? What is the total distance travelled by the disk head to service all requests, and what is the average seek time per request? [8]

UNIT V

9 a) Explain how inter-process communication in LINUX achieved using pipes? [7]

b) What is the basic structure of an Android application, and what components are included in an APK file? [8]

(OR)

10 a) Discuss the concept of a system call in LINUX, and explain how it is used to enable user-level programs to interact with the kernel. What are some common system calls in LINUX, [7]

b) What is the difference between an Activity and a Service in Android [8]