8457

B.Tech. CSE (AI) VIth Semester Examination, 2024

OPERATING SYSTEM

Paper : AI–602

Time : 3 Hours] [*M.M. : 70*

Note :– Answer any *five* questions. All questions carry equal marks.

1. Operating system is a resource allocator. Justify. Also, discuss types of operating system in detail. [14]
2. Differentiate between : [14]
   (i) System program and application program
   (ii) Microkernel and module structure of an operating system
   (iii) Monolithic kernel and layered structure of an operating system
   (iv) Functionality and services of an operating system

3. Explain process control block. Discuss its utility ? Explain various criteria for CPU Scheduling ? Consider the following processes : [14]

Process	Burst Time	Arrival Time
P_0	8	0
P_1	4	1
P_2	9	2
P_3	5	3

Draw the Gantt chart and calculate the average waiting time and average turnaround time by using :

(i) FCFS CPU scheduling algorithm

(ii) Non-preeemptive SJF CPU scheduling algorithm

4. Write short notes on the following : [14]

(i) Multilevel Feedback Queue

(ii) Processor Affinity and Load Balancing

(iii) Thread versus Process

(iv) Scheduler and Dispatcher

5. Explain Inter-process Communication models. Differentiate between parallelism and concurrency. Is it possible to have concurrency without parallelism ? Justify. State the Producer-consumer problem. Give a solution to this problem using semaphores. [14]

6. What is a deadlock ? Discuss the necessary conditions for deadlock with examples. Consider the following snapshot of a system : [14]

	Allocation			Max			Available		
	X	Y	Z	X	Y	Z	X	Y	Z
P0	2	1	0	8	6	3	4	3	2
P1	1	2	2	9	4	3			
P2	0	2	0	5	3	3			
P3	3	0	1	4	2	3			

Answer the following questions using Banker's algorithm :

(i) What is the content of the need matrix ?

(ii) Is the system in a safe state ? If yes, then give the safe sequence.

7. Explain Paging with example. Differentiate between Paging and Segmentation. Consider the following page reference string :

3,7,2,3,1,2,5,3,4,6,7,7,1,0,5,4,6,2,3,0,1

How many page faults would occur for FIFO, LRU and Optimal page replacement algorithms, assuming four frames (initially empty) ? [14]

8. Write short notes on the following : [14]

(i) Swapping

(ii) Thrashing

(iii) Belady's anomaly

(iv) Logical versus physical address space

9. What are files and explain the access methods for files.

A hard disk having 2000 cylinders numbered from 0 to 1999. The drive is currently serving the request at cylinder 143, and the previous request as at cylinder 125. The status of the queue is as follows :

87, 1471, 914, 1775, 949, 1510, 1023, 1751, 131

What is the total head movement for the FCFS and SSTF disk-scheduling algorithm ? [14]

10. Write short notes on the following :

(i) General Graph Directory

(ii) Disk Structure

(iii) RAID

(iv) File system protection and security