

**B033414(033)**

**B. Tech. (Fourth Semester) Examination,**

Nov.-Dec. 2021

(AICTE Scheme)

(IT Engg. Branch)

**OPERATING SYSTEM**

**INFORMATION & TECHNOLOGY**

***Paper : (BT3033)***

***Time Allowed : Three hours***

***Maximum Marks : 100***

***Minimum Marks : 35***

***Note : Attempt all questions. Part (a) carries 4 marks and is compulsory. Attempt any two parts from (b), (c) and (d) carrying 8 marks each.***

1. (a) Describe various functions of Operating System. 4
- (b) Explain Dual mode protection and memory protection with the help of diagram. 8

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- (c) Explain concept of Multiprogramming and real time operating system. 8
- (d) Draw and explain system structures. 8
2. (a) What is pre-emptive and non-pre-emptive scheduling. Also give their advantages and disadvantages. 4
- (b) Consider the set of processes with the length of CPU burst time given in milliseconds.

Process	Arrival time	CPU Burst time
P1	0.000	4
P2	2.002	7
P3	6.002	2
P4	8.004	5

Give the Gantt chart and calculate average turn around time and average waiting time for FCFs and SFTF Scheduling algorithm. 8

- (c) Explain various types of Scheduler and also define Dispatcher. (with diagram). 8
- (d) What is producer consumer problem? Give semaphore solution for this problem. 8

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3. (a) Define deadlock. A computer system has 6 tape drives with  $n$  processes competing for them. Each process needs 3 tape drives. The maximum value of  $n$  for which the system is guaranteed to be deadlock free. 4
- (b) Assume that there are 5 processes, P0 through, P4 and 4 types of resources. At T0 we have the following system state : 8

	Allocation	Max.	Available
	A B C D	A B C D	A B C D
P <sub>0</sub>	0 1 1 0	0 2 1 0	1 5 2 0
P <sub>1</sub>	1 2 3 1	1 6 5 2	
P <sub>2</sub>	1 3 6 5	2 3 6 6	
P <sub>3</sub>	0 6 3 2	0 6 5 2	
P <sub>4</sub>	0 0 1 4	0 6 5 6	

Answer the following questions using Banker's algorithm :

- (i) What is the content of matrix need?
- (ii) Is the system in a safe state?
- (iii) If a request from process P1 arrives (0, 2, 1, 0) can be safely granted immediately.

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- (c) Explain Deadlock prevention schemes. 8
- (d) What are the four conditions of deadlock? Explain in detail. 8
4. (a) What is internal and external fragmentation? Explain. 4
- (b) Explain paging with TLB.  
Consider a single level paging scheme with a TLB. Assume no page fault occurs. It takes 20 ns to search the TLB and 100 ns to access the physical memory. If TLB hit ratio is 80%, what will be the effective access time? 8
- (c) How many page fault would occur for FIFO, LRU and optimal page replacement algorithm with 3 frames for the following reference string? 8
- 7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 1 0 1
- (d) Explain partition allocation algorithms.

Given five memory partitions of 100 Kb, 500 Kb, 200 Kb, 300 Kb, 600 Kb (in order), how would the first-fit, best-fit and worst-fit algorithms place processes of 212 Kb, 417 Kb, 112 Kb and 426 Kb

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- (in order)? Which algorithm makes the most efficient use of memory? 8
5. (a) Explain Input output buffering. 4
- (b) Explain various File Allocatoin methods. 8
- (c) Suppose that the head of a moving disk with 200 tracks numbered 0 to 199, is currently serving a request at track 53 the disk queue has the requests :  
98, 183, 37, 122, 14, 124, 65, 67  
What is the total no. of head movements need to satisfy these requests for following disk scheduling algorithms : FCFS, SCAN, SSTF? 8
- (d) Draw and explain Disk structure, also define seek time and Latency time. 8