

B033414(033)

**B. Tech. (Fourth Semester) Examination,
April-May 2022**

(Scheme : AICTE)

(IT Engg. Branch)

OPERATING SYSTEM

(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 part (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. 4

| 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 turnaround time and average waiting time for FCFS, and SRTF 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 ₀ | 0 | 1 | 1 | 0 | 0 | 2 | 1 | 0 | 1 | 5 | 2 | 0 |
| P ₁ | 1 | 2 | 3 | 1 | 1 | 6 | 5 | 2 | | | | |
| P ₂ | 1 | 3 | 6 | 5 | 2 | 3 | 6 | 6 | | | | |
| P ₃ | 0 | 6 | 3 | 2 | 0 | 6 | 5 | 2 | | | | |
| P ₄ | 0 | 0 | 1 | 4 | 0 | 6 | 5 | 6 | | | | |

Answer the following 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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PTO

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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. 8
- 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?
- (c) How many page fault 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. 8
- Give 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 (in order)? Which algorithm makes the most efficient use of memory?

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[5]

5. (a) Explain Input Output buffering. 4
- (b) Explain various File Allocation 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 needs 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

100]

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