USN | | | | | | | | | | |
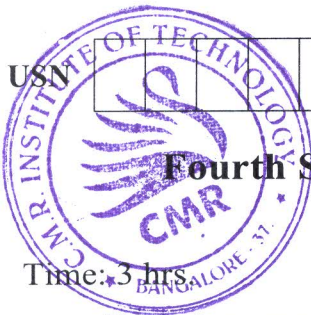
18CS43

# Fourth Semester B.E. Degree Examination, June/July 2024
## Operating Systems

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

### Module-1

1   a. Explain what is an operating systems. Discuss the role of operating system from different view points. **(06 Marks)**
    b. Explain the dual mode of operation of an operating system. **(07 Marks)**
    c. List and explain the different states of process with a neat diagram. **(07 Marks)**

### OR

2   a. With a neat diagram, explain the concept of virtual machine. **(07 Marks)**
    b. What are system calls? Explain the handling of open ( ) system call. **(07 Marks)**
    c. List the different operating system services and explain. **(06 Marks)**

### Module-2

3   a. Explain the different multi threading models with a diagram. List out the different threading issues with multi threaded models. Explain any one. **(10 Marks)**
    b. Calculate the average waiting time by drawing Gantt chart using first come first serve, shortest job first and round robin scheduling algorithms for the following process. Time quantum = 4

| Process | Burst time |
|---------|------------|
| $P_0$   | 24         |
| $P_1$   | 3          |
| $P_2$   | 3          |

**(10 Marks)**

### OR

4   a. What is a critical section problem? List and explain the solution to this problem using Peterson's algorithm. **(10 Marks)**
    b. What is Bounded Buffer problem? Explain how semaphores can be used for synchronization in this problem. **(10 Marks)**

### Module-3

5   a. What is a deadlock? Explain how can it be prevented. **(10 Marks)**
    b. Explain Banker's algorithm for deadlock avoidance. **(10 Marks)**

### OR

6   a. Given a system with total resources A(3) ; B(14) and C(12), determine whether the following system is in safe state or not using Banker's algorithm.

|       | Allocation | | | Max | | | Availability | | |
|-------|---|---|---|---|---|---|---|---|---|
|       | A | B | C | A | B | C | A | B | C |
| $P_0$ | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 5 | 2 |
| $P_1$ | 1 | 0 | 0 | 1 | 7 | 5 |   |   |   |
| $P_2$ | 1 | 3 | 5 | 2 | 3 | 5 |   |   |   |
| $P_3$ | 0 | 6 | 3 | 0 | 6 | 5 |   |   |   |
| $P_4$ | 0 | 0 | 1 | 0 | 6 | 5 |   |   |   |

Justify can $P_1(0, 0, 1)$ request be granted immediately? **(10 Marks)**
    b. Explain the concept of paging with a neat diagram. **(10 Marks)**

## Module-4

7  a.  What is demand paging? Explain the steps in handling a page fault with a neat diagram.
(10 Marks)

   b.  Consider the following page reference stream,
7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1
How many page faults would occur for LRU and FIFO page replacement algorithms assuming 3 Frames? What is Belady's anomaly? (10 Marks)

### OR

8  a.  Explain the two structures used to implement file systems.  (10 Marks)
   b.  List the different methods of disk allocation and explain any one.  (05 Marks)
   c.  List the different free space management approaches and explain any two.  (05 Marks)

## Module-5

9  a.  Explain access matrix and list its implementation.  (10 Marks)
   b.  Explain various disk scheduling algorithms with an example.  (10 Marks)

### OR

10 a.  Explain the various components of the Linux system.  (10 Marks)
   b.  Explain disk formatting, boot block and bad block.  (10 Marks)

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