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**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 <sub>0</sub>	24
P <sub>1</sub>	3
P <sub>2</sub>	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 <sub>0</sub>	0	0	1	0	0	1	1	5	2
P <sub>1</sub>	1	0	0	1	7	5			
P <sub>2</sub>	1	3	5	2	3	5			
P <sub>3</sub>	0	6	3	0	6	5			
P <sub>4</sub>	0	0	1	0	6	5			

Justify can P<sub>1</sub>(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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