



# CBCS SCHEME

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18CS43

Fourth Semester B.E. Degree Examination, Dec.2023/Jan.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. What is Operating System? Explain the role of operating system from different view points. (05 Marks)
- b. With a neat diagram, describe the storage structure and I/O structure of operating system. (10 Marks)
- c. Explain the dual mode of operation of an operating system. (05 Marks)

OR

- 2 a. List and explain the services provided by operating system for the user and efficient operation of system. (06 Marks)
- b. Describe the implementation of interprocess communication using shared memory and message passing. (08 Marks)
- c. Explain the different states of a process, with a neat diagram. (06 Marks)

### Module-2

- 3 a. Explain different types of multithreading models. (07 Marks)
- b. Explain different scheduling criteria in process scheduling concept. (05 Marks)
- c. Consider the following set of processes with CPU burst time (in ms).

Process	Arrival Time	Burst Time
P1	0	6
P2	1	3
P3	2	1
P4	3	4

Compute the average waiting time and average turnaround time for the above processes using FCFS and Round Robin (Time Quantum = 2 ms) scheduling algorithm. (08 Marks)

OR

- 4 a. What is critical section problem? What are the requirements that solution to the critical reaction problem must satisfy? (06 Marks)
- b. With an example, explain the Peterson's solution for critical section problem and prove that all the three requirements are preserved. (07 Marks)
- c. Show how semaphores provide solution to reader writers problem. (07 Marks)

### Module-3

- 5 a. What is deadlock? What are the necessary conditions an operating system must satisfy for a deadlock to occur? (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- b. Determine whether the following system is in safe state by using Banker's algorithm.

Process	Allocation			Maximum			Available		
	A	B	C	A	B	C	A	B	C
P <sub>0</sub>	0	1	0	7	5	3	3	3	2
P <sub>1</sub>	2	0	0	3	2	2			
P <sub>2</sub>	3	0	2	9	0	2			
P <sub>3</sub>	2	1	1	2	2	2			
P <sub>4</sub>	0	0	0	4	3	3			

If a request for P<sub>1</sub> arrives for (1 0 2), can the request be granted immediately. (10 Marks)

- c. Discuss the various approaches used for deadlock recovery. (05 Marks)

OR

- 6 a. With a neat diagram, explain the various steps of address binding. (07 Marks)  
 b. Distinguish between internal and external fragmentation. (04 Marks)  
 c. What are Translation Lookaside Buffer (TLB)? Explain TLB in detail with a simple paging system with a neat diagram. (09 Marks)

#### Module-4

- 7 a. Describe the steps in handling a page fault. (10 Marks)  
 b. Consider the following page reference string 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1. Assuming there are 3 memory frames and all are initially empty. How many page faults would occur in case of (i) FCFS (ii) LRU (iii) Optimal Page replacement (10 Marks)

OR

- 8 a. Explain briefly the various operations performed on files. (05 Marks)  
 b. Explain the various types of directory structure with a neat diagram. (10 Marks)  
 c. Explain the various access methods of files. (05 Marks)

#### Module-5

- 9 a. Explain the following disk scheduling algorithm with examples:  
 (i) FCFS (ii) SSTF (iii) SCAN (iv) LOOK (10 Marks)  
 b. Explain the access matrix model of implementing protection in operation system. (10 Marks)

OR

- 10 a. Explain the components of Linux system with a neat diagram. (05 Marks)  
 b. Explain process management in a Linux system. (08 Marks)  
 c. Explain the file system implementation in Linux. (07 Marks)

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