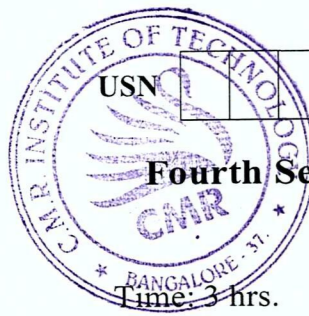


CBCS SCHEME



18CS43

Fourth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Operating Systems

Max. Marks: 100

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

Module-1

- 1 a. What is an Operating System and explain its goals? (04 Marks)
- b. Explain the following terms:
 i) Process Scheduling
 ii) Distributed System (10 Marks)
- c. Explain the dual mode operation of operating system with a neat diagram. (06 Marks)

OR

- 2 a. Explain the Operating System Services with respect to programs and users. (05 Marks)
- b. What are System Calls? List and explain the different types of system calls. (10 Marks)
- c. With a neat diagram explain the concept of virtual machines. (05 Marks)

Module-2

- 3 a. Explain the four benefits of multithreaded programming. (04 Marks)
- b. Explain the multithreaded models with diagrams. (06 Marks)
- c. Consider the following four processes, with the length of the CPU burst given in milliseconds:

Process	Arrival Time	Burst Time
P ₁	0	8
P ₂	1	4
P ₃	2	9
P ₄	3	5

- i) Draw Gantt charts illustrating the execution of these processes using preemptive SJF and nonpreemptive SJF scheduling. (10 Marks)
- ii) What is the average waiting time of the scheduling algorithms in (i)? (10 Marks)

OR

- 4 a. Illustrate Peterson's solution for critical section problem. (07 Marks)

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- b. Consider the following set of processes, with the length of the CPU burst time given in milliseconds:

Process	P ₁	P ₂	P ₃	P ₄	P ₅
Burst Time	10	1	2	1	5
Priority	3	1	3	4	2

The processes are assumed to have arrived in the order P₁, P₂, P₃, P₄, P₅, all at time 0 (zero).

- i) Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, nonpreemptive priority (a smaller priority number implies a higher priority), and RR (quantum = 1) scheduling.
- ii) What is the turnaround time of each process for each of the scheduling algorithms in part (i)?
- iii) What is the waiting time of each process for each of the scheduling algorithms in part (i)?
- iv) Which of the schedule in part (i) results in the minimal average waiting time (overall processes)? (13 Marks)

Module-3

- 5 a. What is Deadlock? What are the necessary conditions for deadlock? (05 Marks)
- b. Determine whether the following system is safe using Bankers algorithm. If the request for P₁ arrives for (1 0 2) can the request be granted immediately.

Process	Allocation			Maximum			Available		
	a	b	c	a	b	c	a	b	c
P ₀	0	1	0	7	5	3	3	3	2
P ₁	2	0	0	3	2	2			
P ₂	3	0	2	9	0	2			
P ₃	2	1	1	2	2	2			
P ₄	0	0	0	4	3	3			

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

OR

- 6 a. With a neat diagram, explain swapping of two processes using a disk as a backing store. (05 Marks)
- b. Illustrate with example, the internal and external fragmentation problem encountered in continuous memory allocation. (05 Marks)
- c. What is Paging? Explain with neat diagram paging hardware with TLB. (10 Marks)

Module-4

- 7 a. With a neat diagram, describe the steps in handling the page fault. (08 Marks)
- b. Find the number of page faults for the following page reference string using FIFO, optimal and LRU replacement policies with three free frames. Which algorithm gives the minimum number of page faults?

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

CMRIT LIBRARY BANGALORE - 560 037 (12 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.

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OR

- 8 a. Define File. List and explain the different file attributes and operations. (10 Marks)
- b. Explain the different allocation methods. (10 Marks)

Module-5

- 9 a. A drive has 200 cylinders numbered from 0 to 199. The disk queue with request for I/O to blocks of cylinders 98, 183, 37, 122, 14, 124, 65, 67 in that order. If the disk head is initially at cylinder 53, what is the total distance travelled (in cylinders) by disk arm to satisfy the request using FCFS, SSTF, SCAN, C-SCAN and C-Look disk scheduling algorithm. (10 Marks)
- b. Explain Role-based access control in Solaris 10. (05 Marks)
- c. Explain Revocation of Access Rights. (05 Marks)

OR

- 10 a. With a neat diagram, explain in detail the components of a Linux operating system. (08 Marks)
- b. Describe Driver Registration of Linux Kernel modules. (06 Marks)
- c. Explain different IPC mechanisms available in Linux. (06 Marks)
