JHARKHAND Rai University
RANCHI

PRACTICE SET

End Semester (I Sem.) Examination, Dec 2025

Course: Operating System
Semester: I
Program: MCA
Course Code: 3CIT102

Course Outcomes	Description
CO1	Create processes and threads.
CO2	Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
CO3	For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
CO4	Design and implement file management system.

Section A (Each carries 5 marks)

1. What is an operating system? List the functions of an operating system. [CO1, Remember, LOT, UNIT 1]
2. Explain the components of an operating system using suitable diagram. [CO1, Understand, LOT, UNIT 1]
3. Define interrupt. List the types of interrupts. [CO2, Remember, LOT, UNIT 1]
4. Compare and contrast between hardware interrupt and software interrupt. [CO2, Analyze, LOT, UNIT 1]
5. Explain briefly about the Direct Memory Access. [CO3, Understand, LOT, UNIT 1]
6. List the objectives of Operating system. [CO1, Understand, LOT, UNIT 1]
7. What is a process? Using suitable diagram, discuss the different states of a process. [CO1, Remember, LOT, UNIT 1]
8. What is a scheduler? List the types of Schedulers with one example each. [CO2, Remember, LOT, UNIT 2]
9. Explain the concepts of context switching. [CO1, Understand, LOT, UNIT 2]

10. What is CPU Scheduling? Explain pre-emptive and non-pre-emptive scheduling. [CO2, Understand, LOT, UNIT 2]
11. List the scheduling criteria used in CPU Scheduling. [CO2, Understand, LOT, UNIT 2]
12. Explain critical section problem briefly. [CO1, Understand, LOT, UNIT 2]
13. Using suitable diagram, explain the hierarchy of memory. [CO3, Understand, LOT, UNIT 3]
14. What is swapping? Explain the concept of overlays. [CO2, Understand, LOT, UNIT 3]
15. Define roll-out and roll-in. [CO2, Remember, LOT, UNIT 3]
16. Explain the concept of directory. [C03, Remember, LOT, UNIT 4]

Section B (Each carries 10 marks)

17. Compare and contrast between Process and Thread. (Any 8 points) [CO1, Analyze, HOT, UNIT 1]
18. List out the differences between single processor and multi-processor system. What are the different types of multi-processor system? [CO2, Understand, HOT, UNIT 1]
19. Discuss about Real Time Operating System (RTOS)? Explain its two types. Also give the advantages and disadvantages of RTOS. [CO1, Understand, LOT, UNIT 1]
20. Explain the characteristics/ functions of Operating System. [CO1, Remember, LOT, UNIT 1]
21. How can Panchakosha Theory (five sheaths of human existence) be used as an analogy to explain different layers of system management in an operating system? [CO1, Analyze, HOT, UNIT 1]
22. Explain the Reader–Writer Problem in operating systems. Discuss how synchronization is applied to avoid starvation of readers or writers. [CO2, Understand, LOT, UNIT 2]
23. Consider the following set of processes with the CPU-burst time given in milliseconds. [CO2, Evaluate, HOT, UNIT 2]

Process ID	Arrival Time	Burst Time
P1	0	8
P2	1	4
P3	2	9
P4	3	5

Draw the Gantt charts explaining the execution of these processes using Pre-emptive Shortest Job First Scheduling.

a) Find the average Turnaround Time
b) Find the average Waiting Time
c) Find the CPU throughput

d) Find the CPU utilization

24. Consider the following set of processes with the CPU-burst time given in milliseconds. [CO2, Evaluate, HOT, UNIT 2]

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

Draw the Gantt charts explaining the execution of these processes using Round Robin Scheduling with time quantum 2.

a) Find the average Turnaround Time
b) Find the average Waiting Time
c) Find the CPU throughput
d) Find the CPU utilization

25. Consider the following set of processes with the CPU-burst time given in milliseconds. [CO2, Evaluate, HOT, UNIT 2]

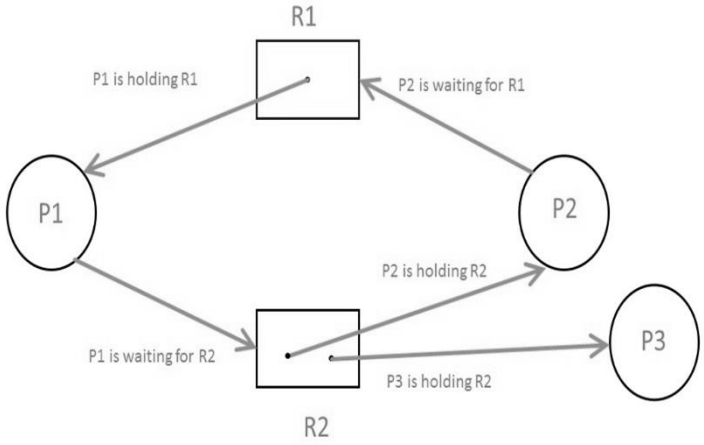
Process ID	Arrival Time	Burst Time	Priority
P1	0	11	2
P2	5	28	0(highest)
P3	12	2	3
P4	2	10	1
P5	9	16	4(lowest)

Draw the Gantt charts explaining the execution of these processes using Priority based Scheduling.

a) Find the average Turnaround Time
b) Find the average Waiting Time
c) Find the CPU throughput
d) Find the CPU utilization

26. What is Semaphore? Explain the different types of semaphore? [CO1, Understand, LOT, UNIT 2]
27. Define Deadlock. What are the necessary conditions for deadlock? [CO2, Understand, LOT, UNIT 2]
28. Write the differences between contiguous memory allocation and non-contiguous memory allocation. [CO3, Analyse, HOT, UNIT 3]
29. What is fragmentation? Differentiate between internal and external fragmentation. [CO3, Analyse, HOT, UNIT 3]

30. What is segmentation? Write advantages and disadvantages of segmentation. [CO3, Understand, LOT, UNIT 3]
31. What is paging? What are its advantages and disadvantages? Also explain page fault. [CO3, Understand, LOT, UNIT 3]
32. Detect whether the given Resource Allocation Graph (RAG) contains deadlock or not: [CO4, Analyse, Evaluate, HOT, UNIT 3].



Also create the table of allocation and request for the same RAG for detecting Deadlock.

33. Describe single level directory, two level directory, Tree structured directory, and acyclic graph directory. [CO4, Understand, LOT, UNIT 4]
34. What is disk scheduling algorithm? Explain any two-disk scheduling algorithm. [CO4, Understand, LOT, UNIT 4]
35. What is multithreaded process? Explain different multithreading models. [C01, Understand. LOT, UNIT 4]
36. Briefly explain the process control block with schematic diagram. [C01, Understand, LOT, UNIT 4]
37. Explain File allocation methods. With the help of an example for each explain contiguous allocation, linked list allocation and indexed allocation. Also write advantages and disadvantages for each. [CO4, Understand, HOT, UNIT 4]

Section C (Each carries 20 marks)

38. Describe the key characteristics and advancements of each generation of operating systems from the first to the fifth. Include examples to illustrate your points. [CO1, Analyze, HOT, UNIT 1]
39. Compare and contrast the core principles, functionalities, and use cases of the following types of operating systems: [CO1, Understand, HOT, UNIT 1]
    a. Batch Operating System

b. Time-Sharing Operating System
c. Distributed Operating System
d. Network Operating System

40. Analyse the concepts of deadlock handling and deadlock avoidance, and evaluate their effectiveness in ensuring system reliability. How can these strategies be optimized for complex real-world scenarios? [C02, Understand, HOT, UNIT 2]
41. Evaluate the mechanisms of deadlock detection and recovery. How can these approaches be effectively integrated into modern systems to minimize downtime and optimize resource utilization in complex environments? [C02, Understand, HOT, UNIT 2]
42. Given memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and 600 KB. How would each of the First fit, Best-Fit and Worst-Fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB? [CO3, Evaluate, HOT, UNIT 3]
43. Suppose a sequence of the string with 3 no. of frames is given. Calculate the page fault using: [CO3, Evaluate, HOT, UNIT 3]
    a. FIFO Page replacement algorithm
    b. Optimal Page replacement algorithm
    c. Least Recently Used Page replacement algorithm

    Sequence of string: 0,1,2,3,0,1,2,3,0,1,2,3,4,5,6,7
44. Consider a disk queue with requests for I/O to blocks on cylinders 98, 183, 41, 122, 14, 124, 65, 67. The head is initially at cylinder number 53. The cylinders are numbered from 0 to 199. Find out the total head movement (in number of cylinders) incurred while servicing these requests using following Disk Scheduling Algorithm: [CO4, Evaluate, HOT, UNIT 4]
    a. First Come First Serve
    b. Shortest Seek Time First
    c. SCAN
    d. C-SCAN (Circular SCAN)

Summary Sheet:
CO Wise

CO	Q. No	Marks
CO1	1,2,6,7,9,12,17,19,20,21,26,35,36,38,39	140
CO2	3,4,8,10,11,14,15,18,22,23,24,25,27,40,41	135
CO3	5,13,16,28,29,30,31,42,43	95
CO4	32,33,34,37,44	60
Total		**430**

Unit Wise

Unit	Q. No	Marks
Unit 1	1,2,3,4,5,6,7,17,18,19,20,21,38,39	125
Unit 2	8,9,10,11,12,22,23,24,25,26,27,40,41	125
Unit 3	13,14,15,28,29,30,31,32,42,43	105
Unit 4	16,33,34,35,36,37,44	75
Total		**430**

Blooms Taxonomy Level (BTL) Wise

BTL	Q. No	Marks
LOT	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,19,20,22,26,27,30,31,33,34,35,36	190
HOT	17,18,21,23,24,25,28,29,32,37,38,39,40,41,42,43,44	240
Total		**430**

Prepared By: Dr. Kumar Amrendra **Reviewed By:**

Disclaimer: - This is a Practice Set. The Question in End term examination will differ from the Practice set. This Practice set is meant for practice only.