



# CBCS SCHEME

21CS44

## Fourth Semester B.E. Degree Examination, June/July 2023 Operating System

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. With neat diagram, explain :  
i) Operating System (08 Marks)  
ii) Dual Mode Operation in O.S. (06 Marks)
- b. Explain the Operating System services with respect to programs and the users. (06 Marks)
- c. What is a Process? Explain different states of a process with state diagram. (06 Marks)

OR

- 2 a. With neat diagram, explain the concept of Non virtual machine, Virtual machine and VMware architecture. (10 Marks)
- b. Define : i) Context switching ii) Direct and Indirect communication  
iii) Automatic and Explicit buffering. (10 Marks)

### Module-2

- 3 a. What is Multithreaded process? Explain four benefits of Multithreaded programming. (06 Marks)
- b. Consider the set of process with Arrival time, CPU burst time (in milliseconds) and priority shown below (Lower number represents higher priority).

Process	Arrival Time	Burst Time	Priority
P1	0	10	3
P2	1	1	1
P3	2	2	4
P4	3	1	5
P5	4	5	2

Write the Gantt chart and solve the Average waiting time and Average turnaround time for  
i) SJF Scheduling (Preemptive) ii) Priority Scheduling (Preemptive).

(NOTE : Consider Arrival Time for both Algorithms).

(14 Marks)

OR

- 4 a. Explain with diagram : i) Multithreading models ii) Multilevel queue scheduling. (08 Marks)
- b. What is Critical – Section? How do you implement a monitor solution to the dining – philosophers problem? (12 Marks)

### Module-3

- 5 a. What is a Deadlock? What are the four necessary conditions for the deadlock to occur? (04 Marks)
- b. What are the two methods to eliminate deadlock? (02 Marks)

- c. Consider the following snapshot of a system :

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P1	2	0	0	1	4	2	1	2	3	3	2	1
P2	3	1	2	1	5	2	5	2				
P3	2	1	0	3	2	3	1	6				
P4	1	3	1	2	1	4	2	4				
P5	1	4	3	2	3	6	6	5				

Answer the following using Banker's algorithm.

- Is the system is in safe state? If so, what is the safe sequence?
- If request from process P2 (0, 1, 1, 1) is considered immediately, what is the System state and Sequence? (14 Marks)

OR

- Which are the commonly used strategies to select a free hole from the available holes? (06 Marks)
- With suitable diagram, explain external fragmentation. (04 Marks)
- With neat diagram, explain paging hardware with TLB. (10 Marks)

Module-4

- What is Demand Paging? Explain the steps in handling page fault using appropriate diagram. (10 Marks)
- Consider the page reference string : 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with 3 frames. Determine the number of page faults using Optimal and LRU replacement algorithms. Which algorithm is most efficient? (10 Marks)

OR

- With neat diagram, explain Two – level and Three – level directory structure. (08 Marks)
- Explain Contiguous and Linked disk space allocation methods with diagram. (12 Marks)

Module-5

- A drive has 200 cylinders 0 to 199. Head starts at 53 to serve the request queue : 98, 183, 37, 122, 14, 124, 65, 67. Draw disk head schedule diagram and explain for FCFS , SSTF, C – SCAN and C – LOCK. (12 Marks)
- How the Access matrix model of protection can be viewed in OS? (08 Marks)

OR

- With neat diagram, explain SAN and MULTICS. (08 Marks)
- Explain the components of a Linux System. (06 Marks)
- Explain in brief fork ( ) and exec ( ) system calls in Linux / UNIX OS, also write a program to implement these system calls in C language. (06 Marks)

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