

# CBCS SCHEME

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18CS43

## Fourth Semester B.E. Degree Examination, Feb./Mar. 2022 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 the dual mode operation of operating system. (07 Marks)  
b. Explain layered approach structure of operating system with diagram. (07 Marks)  
c. Differentiate client server computing and peer-to-peer computing. (06 Marks)

OR

- 2 a. Explain operating system services with respect to user and system with figure. (07 Marks)  
b. What is Process? Explain different states of a process with state diagram. (07 Marks)  
c. With a neat diagram, explain the concept of virtual machines. (06 Marks)

### Module-2

- 3 a. Draw the Gantt chart and calculate average waiting time and turn around time for the following snapshot of processes using i) FCFS ii) SRTF iii) RR (2ms). (07 Marks)

Process id	Burst time	Arrival time
P <sub>1</sub>	6	0
P <sub>2</sub>	3	1
P <sub>3</sub>	1	2
P <sub>4</sub>	4	3

- b. Explain different types of multithreading models. (07 Marks)  
c. Explain Dining philosopher's problem using monitors. (06 Marks)

OR

- 4 a. Calculate the average waiting time and turn around time for the following snapshot of process using:  
i) Non-preemptive SJF  
ii) Non-preemptive priority  
iii) Round Robin (TQ = 1ms).

P	Burst Time	Priority
P <sub>1</sub>	10	3
P <sub>2</sub>	1	1
P <sub>3</sub>	2	3
P <sub>4</sub>	1	4
P <sub>5</sub>	5	2

- b. Show how semaphores provides solution to reader writers problem. (07 Marks)  
c. Explain critical section problem. What are the requirements that critical section problem must satisfy. (06 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.

**Module-3**

- 5 a. Describe the resource allocation graph i) With deadlock ii) With a cycle but no deadlock (06 Marks)
- b. Using Bankers algorithm determine whether the following system is in a safe state.

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P <sub>0</sub>	0	0	2	0	0	4	1	0	2
P <sub>1</sub>	1	0	0	2	0	1			
P <sub>2</sub>	1	3	5	1	3	7			
P <sub>3</sub>	6	3	2	8	4	2			
P <sub>4</sub>	1	4	3	1	5	7			

If a request from process P<sub>2</sub> arrives for (0, 0, 2) can the request be granted immediately?

(07 Marks)

- c. Illustrate with example the internal and external fragmentation problem. (06 Marks)

**OR**

- 6 a. What are Translation Loadaside Buffer (TLB)? Explain TLB in detail with a simple paging system with a neat diagram. (07 Marks)
- b. What is deadlock? What are necessary conditions for deadlock? (07 Marks)
- c. With the help of a neat diagram, explain the various steps of address binding. (06 Marks)

**Module-4**

- 7 a. 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, how many page faults would occur in case of  
i) LRU ii) Optimal algorithm note that initially all frames are empty. (07 Marks)
- b. Explain the various operations performed on files. (07 Marks)
- c. With suitable example, explain any two methods of implementation of free space list. (06 Marks)

**OR**

- 8 a. Illustrate how demand paging affects system performance. (07 Marks)
- b. Explain the various access methods of files. (07 Marks)
- c. What is thrashing? How it can be controlled? (06 Marks)

**Module-5**

- 9 a. Describe the different Linux Kernel modules. (07 Marks)
- b. Explain different IPC mechanisms available in Linux. (07 Marks)
- c. Explain process scheduling in a Linux system. (06 Marks)

**OR**

- 10 a. With a neat diagram, explain in detail the component of a Linux operating system. (07 Marks)
- b. Explain the various disk scheduling algorithm with example. (07 Marks)
- c. Explain the file system implementation in Linux. (06 Marks)

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