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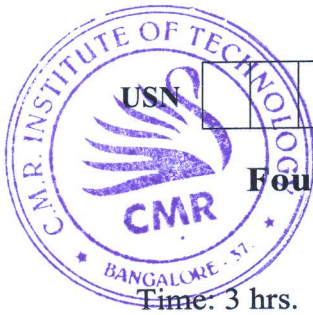
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# CBCS SCHEME

18CS43

## Fourth Semester B.E. Degree Examination, July/August 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. Distinguish between the following terms:
  - i) Multi programming and multitasking. (10 Marks)
  - ii) Multi processor systems and clustered systems. (05 Marks)
- b. Define Operating Systems. Explain dual mode of operating systems with a neat diagram. (05 Marks)
- c. Explain about system calls with an example of handling a user application invoking the open( ) system call. (05 Marks)

OR

- 2 a. What is a process? Illustrate with a neat diagram the different states of a process and control block. (05 Marks)
- b. Discuss the implementation of IPC using message passing systems in detail. (10 Marks)
- c. List and explain the services provided by OS for the user and efficient operation of system. (05 Marks)

### Module-2

- 3 a. Give a brief description about multithreading and explain the different multi threading models. (05 Marks)
- b. Discuss the issues that come with multithreaded programming. (10 Marks)
- c. Explain CPU scheduling criteria. (05 Marks)

OR

- 4 a. Calculate the average waiting time and the average turnaround time by drawing the Gantt chart using FCFS, SRTF, RR (q = 2ms) and priority algorithms. Lower priority number represents higher priority.

Process	Arrival Time	Burst Time	Priority
P <sub>1</sub>	0	9	3
P <sub>2</sub>	1	4	2
P <sub>3</sub>	2	9	1
P <sub>4</sub>	3	5	4

(12 Marks)

- b. What is critical section problem? What are the requirements for the solution to critical section problem? Explain Peterson's solution. (08 Marks)



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**Module-3**

- 5 a. What is a deadlock? What are the necessary conditions for the deadlock to occur? (05 Marks)  
 b. How to prevent the occurrence of deadlock, explain in detail. (05 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
P <sub>0</sub>	2	0	0	1	4	2	1	2	3	3	2	1
P <sub>1</sub>	3	1	2	1	5	2	5	2				
P <sub>2</sub>	2	1	0	3	2	3	1	6				
P <sub>3</sub>	1	3	1	2	1	4	2	4				
P <sub>4</sub>	1	4	3	2	3	6	6	5				

Answer the following using Banker's algorithm.

- i) Is the system in safe state? If so, give the safe sequence.  
 ii) If process P<sub>2</sub> requests (0, 1, 1, 3) resources can it be granted immediately? (10 Marks)

**OR**

- 6 a. Explain paging hardware with TLB. (05 Marks)  
 b. Explain segmentation in detail. (05 Marks)  
 c. Discuss structure of page table with suitable diagrams. (10 Marks)

**Module-4**

- 7 a. Describe the steps in handling page faults. (06 Marks)  
 b. Consider the page reference string: 1, 0, 7, 1, 0, 2, 1, 2, 3, 0, 3, 2, 4, 0, 3, 6, 2, 1 for a memory with 3 frames. Determine the number of page faults using FIFO, optimal and LRU replacement algorithms. Which algorithm is most efficient? (14 Marks)

**OR**

- 8 a. Explain the different allocation methods. (10 Marks)  
 b. Discuss the various directory structures with required diagrams. (10 Marks)

**Module-5**

- 9 a. Explain access matrix method of system protection with domain as objects and its implementation. (10 Marks)  
 b. A drive has 5000 cylinders numbered 0 to 4999. The drive is currently serving a request at 143 and previously serviced a request at 125. The queue of pending requests in FIFO order is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from current head position, what is the total distance travelled (in cylinders) by disk arm to satisfy the requests using FCFS, SSTF, SCAN, LOOK and C-LOOK algorithms. (10 Marks)

**OR**

- 10 a. With a neat diagram, explain the components of a Linux system. (08 Marks)  
 b. Explain the different IPC mechanisms available in Linux. (06 Marks)  
 c. Discuss about scheduling in Linux. (06 Marks)

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**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)

**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**

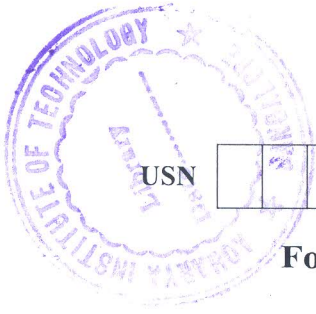
- 9 a. Describe the different Linux Kernel modules. (07 Marks)  
 b. Explain different IPC mechanisms available in Linux. (07 Marks)  
 c. Explain process scheduling in a Linux system. (06 Marks)

**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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18CS43

## Fourth Semester B.E. Degree Examination, Jan./Feb. 2021 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 in detail about abstract view of the components of a computer system with a neat diagram. (10 Marks)
- b. Explain about computer system organization with a neat diagram. (10 Marks)

OR

- 2 a. Discuss briefly about operating system operations with diagram. (10 Marks)
- b. Discuss briefly about types of system calls with illustration. (10 Marks)

### Module-2

- 3 a. Discuss in detail about multithreading models with suitable illustration. (10 Marks)
- b. Explain about the different scheduling criteria in process scheduling concept. (10 Marks)

OR

- 4 a. Explain in detail about multiple – processor scheduling with example. (10 Marks)
- b. Discuss briefly about the critical – section problem with example. (10 Marks)

### Module-3

- 5 a. Discuss briefly about semaphores in synchronization. (10 Marks)
- b. Discuss in detail about deadlock characteristics with example. (10 Marks)

OR

- 6 a. Discuss in detail about contiguous memory allocation with illustration. (10 Marks)
- b. Explain in detail about paging in a memory management scheme. (10 Marks)

### Module-4

- 7 a. Discuss briefly about demand – paging in memory management scheme. (10 Marks)
- b. Discuss briefly about file attributes in a file system. (10 Marks)

OR

- 8 a. Explain in detail about various file operations in a file system. (10 Marks)
- b. Explain in detail about various file types in a file system. (10 Marks)

### Module-5

- 9 a. Explain in detail about over view of mass storage structure. (10 Marks)
- b. Discuss about design principles of LINUX system. (10 Marks)

OR

- 10 a. Discuss about process management in a LINUX system. (10 Marks)
- b. Explain about inter process communication in the LINUX system. (10 Marks)

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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.