

Basavarajeswari Group of Institutions  
**BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT**  
(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code **22CS/AI/CA/CD/33**

Third Semester B.E. Degree Examinations, September 2024

**OPERATING SYSTEM**

(Common to CSE, AIML, CSE- AI, CSE- DS)

**Duration: 3 hrs**

**Max. Marks: 100**

**Note:** 1. Answer any FIVE full questions choosing ONE full Question from each Module.  
2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO: PO)</u>
<b><u>MODULE – 1</u></b>			
1.	a. Draw the neat diagram for an abstract view of computer system, explain about all the components with an example.	07	(3 :1 : 1.7.1)
	b. List and explain in detail the following: (i) Advantages of multiprocessor system (ii) Types of multiprocessor system	07	(3 :1 : 1.7.1)
	c. Identify the various operating system services available for user and system.	06	(3 :1 : 1.7.1)
<b>(OR)</b>			
2.	a. What is Dual mode operation? With a neat diagram illustrate the working of dual mode operation of an operating system.	07	(3 :1 : 1.7.1)
	b. Define system program. List and explain different types of system programs.	07	(3 :1 : 1.7.1)
	c. Compare multiprogramming and multitasking systems.	06	(3 :1 : 1.7.1)
<b><u>MODULE – 2</u></b>			
3.	a. Draw the neat diagrams for PCB and state transition diagram and explain both in brief.	07	(3 :2 : 1.7.1)
	b. Compare pre-emptive and non-pre-emptive scheduling with appropriate examples.	07	(3 :2 : 1.7.1)
	c. Describe the following: (i) Scheduling queues (ii) Schedulers (iii) Context switch	06	(3 :2 : 1.7.1)
<b>(OR)</b>			
4.	a. For what reasons the processes may need to communicate with each other? Explain the fundamental models for processes' communication, with the help of figures.	07	(3 :2 : 1.7.1)
	b. Consider the following set of processes with burst time and arrival time given in milliseconds.	07	(3 :2 : 1.7.1)

Process	BT	AT
P1	6	2
P2	3	1
P3	7	3
P4	12	0

Draw Gantt chart for non-pre-emptive SJF, and pre-emptive SJF (SRTF) scheduling. For both the scheduling algorithms compute waiting time, turnaround time for each process and also compute average waiting time and average turnaround time.

- c. Compare single threaded and multi-threaded processes, and what are the advantages of multi-threaded systems. **06** (3 :2 : 1.7.1)

### MODULE – 3

5. a. Define the deadlock state of a system with the help of a suitable Resource Allocation Graph (RAG), list and explain the different methods for handling deadlock. **07** (3 :3 : 1.7.1)

- b. Consider the following snapshot of a system **07** (3 :3 : 1.7.1)

	ALLOCATION				MAX				AVAILABLE			
Process	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	2	1	0	0
P1	2	0	0	0	2	7	5	0				
P2	0	0	3	4	6	6	5	6				
P3	2	3	5	4	4	3	5	6				
P4	0	3	3	2	0	6	5	2				

(i) Compute the **NEED** matrix (ii) Is the system in a **safe state**? Give the safe sequence (iii) If a request from P3 arrives for (0, 1, 0, 0), can the request be granted immediately?

- c. Explain the concept of swapping with a neat diagram, and find the total swap time for a user process of size 100 MB with a disk transfer rate of 50 MB per second. **06** (3 :3 : 1.7.1)

**(OR)**

6. a. Identify different methods being used for  
(i) Deadlock detection (ii) Recovery from deadlock **07** (3 :3 : 1.7.1)

- b. Why TLB is important? Explain with a neat diagram and EAT. **07** (3 :3 : 1.7.1)

- c. Explain about segmented memory management. Also, check if any address generates segment fault in the given snapshot. **06** (3 :3 : 1.7.1)

Segment	Base	Length
0	330	124
1	876	211
2	111	99
3	498	302

(i) 0,99 (ii) 2,78 (iii) 1, 265 (iv) 3, 222 (v) 0, 111

### MODULE – 4

7. a. Discuss how the limited amount of actual memory is supported by virtual memory. Illustrate with figure. **07** (3 :4 : 1.7.1)

- b. List and discuss about different types of files with their purpose and extensions being used. **07** (3 :4 : 1.7.1)

- c. Write the short notes on:  
(i) Allocation of frames (ii) Thrashing **06** (3 :4 : 1.7.1)

**(OR)**

8. a. Describe different operations possible on a directory with example. **07** (3 :4 : 1.7.1)

- b. 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  
Analyse how many page fault would occur for **FIFO, LRU** and **Optimal** page replacement algorithm, assuming 3 free frames. Which one of the above is more efficient? **07** (3 :4 : 1.7.1)

- c. Explain various allocation methods in implementing file systems. **06** (3 :4 : 1.7.1)

## **MODULE – 5**

- 9.**    **a.** List and explain the disk scheduling algorithms. **07**    (3 :5 : 1.7.1)
- b.** Write the notes on: **07**    (3 :5 : 1.7.1)  
          (i) Disk structure    (ii) Disk attachment
- c.** Discuss in brief about process management and memory management in Linux. **06**    (3 :5 : 1.7.1)
- (OR)**
- 10.**   **a.** A drive has 200 cylinders numbered 0 to 199. The drive is currently serving a request at cylinder 53. The queue of pending requests in FIFO order is: 98, 183, 37, 122, 14, 124, 65, and 67. Starting from the current head position, what is the total distance travelled (in cylinders) by the disk arm to satisfy the requests using algorithms FCFS, SSTF, SCAN, CSCAN, LOOK, CLOOK. Illustrate with figure in each case. **07**    (3 :5 : 1.7.1)
- b.** Write the notes on: **07**    (3 :5 : 1.7.1)  
          (i) File system in Linux    (ii) IPC in Linux
- c.** Write the notes on: **06**    (3 :5 : 1.7.1)  
          (i) Disk Formatting    (ii) Boot Block    (iii) Bad Blocks

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