

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

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Course Code

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Fifth Semester B.E. Degree Examinations, April/May 2024
SYSTEM SOFTWARE AND OPERATING SYSTEM

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>(RBT:CO: PO)</u>																																																																											
<u>MODULE – 1</u>																																																																														
1.	a. Draw the neat diagram for an abstract view of computer system, explain about all the components with example.	07	(1 : 1 : 1.2.1)																																																																											
	b. Identify the responsibilities of OS with respect to (i) Process management (ii) Memory management (iii) Mass Storage management.	07	(1 : 1 : 1.2.1)																																																																											
	c. Describe about system programs. List and explain different types of system programs.	06	(1 : 1 : 1.2.1)																																																																											
OR																																																																														
2.	a. Distinguish between multiprogramming system and multi-tasking systems with figures.	07	(1 : 1 : 1.2.1)																																																																											
	b. Explain the following: (i) Dual mode operation (ii) Types of multiprocessor systems.	07	(1 : 1 : 1.2.1)																																																																											
	c. List and explain the different services OS provides for user and system.	06	(1 : 1 : 1.2.1)																																																																											
<u>MODULE – 2</u>																																																																														
3.	a. Discuss the following with the help of diagrams: (i) PCB (ii) Process state-transition diagram.	07	(2 : 1 : 1.2.1)																																																																											
	b. Consider the following snapshot of a system, and (i) Compute the NEED matrix. (ii) Is the system in a safe state? If yes, give the safe sequence. (iii) If a request from P1 arrives for (0, 4, 2, 0), can the request be granted immediately? Explain.	07	(2 : 1 : 1.2.1)																																																																											
<table><tr><td></td><td colspan="4">ALLOCATION</td><td colspan="4">MAX</td><td colspan="4">AVAILABLE</td></tr><tr><td></td><td>A</td><td>B</td><td>C</td><td>D</td><td>A</td><td>B</td><td>C</td><td>D</td><td>A</td><td>B</td><td>C</td><td>D</td></tr><tr><td>P0</td><td>0</td><td>0</td><td>1</td><td>2</td><td>0</td><td>0</td><td>1</td><td>2</td><td rowspan="5">1</td><td rowspan="5">5</td><td rowspan="5">2</td><td rowspan="5">0</td></tr><tr><td>P1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>7</td><td>5</td><td>0</td></tr><tr><td>P2</td><td>1</td><td>3</td><td>5</td><td>4</td><td>2</td><td>3</td><td>5</td><td>6</td></tr><tr><td>P3</td><td>0</td><td>6</td><td>3</td><td>2</td><td>0</td><td>6</td><td>5</td><td>2</td></tr><tr><td>P4</td><td>0</td><td>0</td><td>1</td><td>4</td><td>0</td><td>6</td><td>5</td><td>6</td></tr></table>					ALLOCATION				MAX				AVAILABLE					A	B	C	D	A	B	C	D	A	B	C	D	P0	0	0	1	2	0	0	1	2	1	5	2	0	P1	1	0	0	0	1	7	5	0	P2	1	3	5	4	2	3	5	6	P3	0	6	3	2	0	6	5	2	P4	0	0	1	4	0	6	5	6
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P4	0	0	1	4	0	6	5	6																																																																						
	c. Discuss with help of an example how the different scheduling algorithms schedule the processor among multiple processes.	06	(3 : 1 : 1.2.1)																																																																											
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4.	a. Identify the following: (i) Necessary conditions for Deadlock (ii) Methods to recovery from deadlock	07	(2 : 1 : 1.2.1)																																																																											

Note: (RBT:CO: PO) - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI- Performance Indicator)

- b. Consider the following set of processes with Arrival time and Burst time given in milliseconds **07** (2 : 1 : 1.2.1)

Process	Arrival time	Burst time
P1	1	10
P2	0	12
P3	3	8
P4	2	16

Draw Gantt charts for FCFS and pre-emptive SJF scheduling algorithms. Compute turnaround time, waiting time for each process and also average turnaround time and average waiting time.

- c. Identify different methods for: **06** (3 : 1 : 1.2.1)
(i) Deadlock handling (ii) IPC implementation

MODULE – 3

5. a. Discuss why TLB is important? Explain with a neat diagram and EAT. **07** (1 : 1 : 1.2.1)
b. Consider the following page reference string **07** (1 : 1 : 1.2.1)
7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1
Analyse how many page faults would occur for **FIFO**, **LRU**, and **Optimal** page replacement algorithm, assuming 3 free frames? Which one of the above is more efficient?
c. Discuss how the limited amount of actual memory is supported by virtual memory. Illustrate with figure. **06** (2 : 1 : 1.2.1)

OR

6. a. What is external fragmentation? How to resolve this problem? Discuss in detail. **07** (2 : 1 : 1.2.1)
b. What is page fault? Discuss how to handle page fault problem with the help of a neat diagram and steps. **07** (1 : 1 : 1.2.1)
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** (2 : 1 : 1.2.1)

MODULE – 4

7. a. Compare system software and application software, and discuss how the system software is dependent on machine architecture. **07** (1 : 4 : 1.2.1)
b. List and explain machine independent features of assembler. **07** (3 : 4 : 1.2.1)
c. Discuss in detail the machine architecture of SIC **06** (2 : 4 : 1.2.1)

OR

8. a. Compare the machine architectures of SIC and SIC/XE. **07** (2 : 4 : 1.2.1)
b. Write and explain the algorithm of PASS-2 of two pass assembler. **07** (2 : 4 : 1.2.1)
c. What is the main problem in one-pass assembler? How to resolve that problem? **06** (2 : 4 : 1.2.1)

MODULE – 5

9. a. What are basic functions of a loader? Develop an algorithm for a Bootstrap loader. **07** (1 : 5 : 1.2.1)
b. Write the notes on (i) Linkage editor (ii) Dynamic linking **07** (1 : 5 : 1.2.1)
c. What is relocating loader? Explain with example two methods of relocating loader. **06** (1 : 5 : 1.2.1)

OR

10. a. Demonstrate the roles of translator, linker, and loader with the help of a diagram **07** (1 : 5 : 1.2.1)
b. Explain in detail the machine dependent features of loader. **07** (2 : 1 : 1.2.1)
c. Explain the procedure of program linking when subprograms are external references. **06** (2 : 5 : 1.2.1)

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