SAHYADRI
COLLEGE OF ENGINEERING & MANAGEMENT
An Autonomous Institution
MANGALURU

USN										

21CS43

Third Semester B.E. Degree Examination, 2023

MODEL QUESTION PAPER
OPERATING SYSTEMS

Time: 3 hrs. **Max. Marks: 100**

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

Q. No.		Questions	Marks	BL/CO
		Module I		

1	a.	i. Explain the dual mode operation of operating system.
		ii. Summarize how many processes are created by the below program?
		#include <stdio.h>
		#include <unistd.h>
		
		int main() {
		int numProcesses = 8;
		int i;
		
		for (i = 0; i < numProcesses; i++) {
		printf("Process %d created\n", getpid());
		fork();
		}
		
		return 0;
		}
			5	CL2/CO1

	b.	Describe operating system also Explain multiprogramming and time sharing system.	8	CL2/CO1
	c.	Explain Operating System services with respect to User veiw & System view with a neat block diagram	7	CL2/CO1
		OR		
2	a.	Explain the various types of operating system structure along with a neat diagram.	7	CL2/CO1
	b.	Describe implementation of Inter Process Communication (IPC), with the following IPC Mechanisms-shared memory and memory passing.	8	CL2/CO1
	c.	i. Explain briefly about types of system calls with illustration ii.Summarize how many processes are created by the below program? #include <stdio.h> #include <unistd.h>	5	CL2/CO1

```
int main() {
int i;
for (i = 0; i < 7; i++) {
    fork();
    printf("Process %d created\n", getpid());
}
return 0;
}
```

Module II

3	a.	Explain multithreading models with suitable diagrams.	6	CL2/CO2
	b.	For the given Process snapshot below, Calculate the average waiting time and average turnaround time by Constructing Gantt charts using FCFS and SRTF algorithms.	8	CL3/CO2
	c.	Illustrate windows thread with suitable code snippet.	6	CL3/CO2

Process	Arrival Time	Burst Time
P_1	0	9
P_2	1	4
P_3	2	9
P_4	3	5

OR

4	a.	List and explain Threading Issues in multithreading concepts.	6	CL2/CO2
	b.	Consider the five processes arriving at time 0, in the order given, with the length of the CPU burst given in milliseconds. Apply Priority and SJF scheduling Algorithm and Draw the Gantt chart for above process assume lowest number highest priority. Calculate average waiting time and turnaround time for both the scheduling algorithms. Which algorithm would give the minimum average waiting time?	8	CL3/CO2
	c.	Illustrate Round robin Scheduling with suitable code snippet.	6	CL3/CO2

Process	Arrival time	Burst Time	Priority
P_1	0	10	3
P_2	2	29	2
P_3	3	3	1
P_4	4	7	4
P_5	5	12	5

Module III Harisha

<table>
<tr><td rowspan="3">5</td><td>a.</td><td>Illustrate how reader writer problems can be solved using semaphore.</td><td>8</td><td>CL3/CO3</td></tr>
<tr><td>b.</td><td>Determine whether the following system is in safe state, using banker's algorithm.

<table><tr><td>Process</td><td>Allocation</td><td>Maximum</td><td>Available</td></tr><tr><td>P0</td><td>0 1 0</td><td>7 5 3</td><td>3 3 2</td></tr><tr><td>p1</td><td>2 0 0</td><td>3 2 2</td><td></td></tr><tr><td>p2</td><td>3 0 2</td><td>9 0 2</td><td></td></tr><tr><td>p3</td><td>2 1 1</td><td>2 2 2</td><td></td></tr><tr><td>p4</td><td>0 0 0</td><td>4 3 3</td><td></td></tr></table></td><td>8</td><td>CL3/CO3</td></tr>
<tr><td>c.</td><td>with suitable example explain resource allocation graph.</td><td>4</td><td>CL2/CO3</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td rowspan="3">6</td><td>a.</td><td>Illustrate the dining philosopher problem and solution using monitor.</td><td>8</td><td>CL3/CO3</td></tr>
<tr><td>b.</td><td>Demonstrate Peterson's solution for critical section problem.</td><td>8</td><td>CL3/CO3</td></tr>
<tr><td>c.</td><td>Explain necessary conditions to hold deadlock.</td><td>4</td><td>CL2/CO3</td></tr>
<tr><td colspan="5">Module IV</td></tr>
<tr><td rowspan="3">7</td><td>a.</td><td>Consider the following page reference stream:2,3,5,6,3,8,3,1,6,8,3,8,6,5,6,3,5,2,3,5,10,12,9. Calculate How many page faults would occur using FIFO, LRU and optimal page replacement algorithms assuming 4 frames? Which one of the above is most efficient?</td><td>10</td><td>CL3/CO4</td></tr>
<tr><td>b.</td><td>Describe Steps in Handling page faults with suitable block diagram and explain the each steps.</td><td>6</td><td>CL3/CO4</td></tr>
<tr><td>c</td><td>Explain File Attributes and operations.</td><td>4</td><td>CL2/CO4</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td rowspan="3">8</td><td>a.</td><td>Explain in detail about various access methods of files.</td><td>4</td><td>CL2/CO4</td></tr>
<tr><td>b.</td><td>With neat diagram Illustrate the following directory structure a) Single-Level Directory b)Two-Level Directory c)Tree-Structured Directories d)Acyclic-Graph Directories.</td><td>10</td><td>CL3/CO4</td></tr>
<tr><td>c.</td><td>Illustrate Free-Space Management with example</td><td>6</td><td>CL3/CO4</td></tr>
<tr><td colspan="5">Module V</td></tr>
<tr><td rowspan="3">9</td><td>a.</td><td>Explain in details about overview of mass storage structure.</td><td>6</td><td>CL2/CO5</td></tr>
<tr><td>b.</td><td>Explain in details about various Swap-Space Management.</td><td>6</td><td>CL2/CO5</td></tr>
<tr><td>c.</td><td>Explain various disk scheduling algorithm with example.</td><td>8</td><td>CL3/CO5</td></tr>
</table>

		consider a disk queue with request for i/o to blocks on cylinders. 98, 183, 37, 122, 14, 124, 65, 67 Calculate Average Seek length using i) FIFO, SSTF, SCAN and C-SCAN algorithm.		
10	a.	Explain protection and access matrix with domains as objects. Also differentiate between mechanisms and policies.	6	CL2/CO5
	b.	A disk drive has 5000 cylinders from 0 to 4999. Currently the drive is at 143rd cylinder, and the previous request was at cylinder 125. Queue of pending requests in FIFO order I 86, 1470, 913, 1774, 948, 1509, 1022, 130. Calculate the total distance the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms from current position i) FCFS ii) SCAN iii)CSCAN.	8	CL3/CO5
	c.	Explain access matrix? Explain the different methods of implementing the access matrix.	6	CL2/CO5

Cognitive Levels of Bloom's Taxonomy

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

Course Outcomes

CO1	Illustrate the operating system, its components, and the ideas behind system calls and inter-process communication.	CL3
CO2	Apply the concepts of multithreading and demonstrate various algorithms by considering different scheduling criteria.	CL3
CO3	Illustrate the process synchronization, its classical approaches and discuss the concepts of deadlock.	CL3
CO4	Apply the concept of memory management, demand paging, and demonstrate the working of various page replacement algorithms and file system operations.	CL3
CO5	Analyze the structure of mass storage devices, various disk scheduling techniques and concepts of operating system protection.	CL4