Model Question Paper-I with effect from 2023-24 (CBCS Scheme)

USN | | | | | | | | | | |

Third Semester B.E. Degree Examination
Operating Systems

TIME: 03 Hours **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

		Module -1	***Bloom's Taxonomy Level**	**Marks**
Q.01	a	Distinguish between the following terms. (i) Multiprogramming and Multitasking (ii) Multiprocessor System and Clustered System	L2	6
	b	Define operating Systems. Explain the dual-mode operating system with a neat diagram.	L2	7
	c	With a neat diagram, explain the concept of the virtual machine.	L2	7
		OR		
Q.02	a	Explain the layered approach of operating system structure with a supporting diagram.	L2	6
	b	What are system calls? Briefly point out its types with illustrations.	L2	6
	c	Explain the services of the operating system that are helpful for the user and the system.	L2	8
		Module-2		
Q. 03	a	With a neat diagram, explain the states of a process with a transition diagram and process control block.	L2	6
	b	What is inter-process communication? Discuss message passing and the shared memory concept of IPC.	L2	6
	c	Calculate average waiting and turnaround times by drawing the Gantt chart using FCFS and RR (q=2ms). Processes | Arrival Time | Burst Time P1 | 0 | 9 P2 | 1 | 4 P3 | 2 | 9 P4 | 3 | 5	L3	8
		OR		
Q.04	a	Discuss in detail the multithreading model, its advantages and disadvantages with suitable illustration.	L2	7
	b	Explain five different scheduling criteria used in the computing scheduling mechanism.	L2	5
	c	Calculate the average waiting time and the average turnaround time by drawing the Gantt chart using SRTF and the Priority scheduling algorithm. Processes | Arrival Time | Burst Time | Priority P1 | 0 | 8 | 3 P2 | 1 | 4 | 2 P3 | 2 | 9 | 1 P4 | 3 | 5 | 4	L3	8

<table>
<tr><td colspan="3">Module-3</td><td></td><td></td></tr>
<tr><td rowspan="3">Q. 05</td><td>a</td><td>Define deadlock. What are the necessary conditions for deadlock to occur?</td><td>L2</td><td>5</td></tr>
<tr><td>b</td><td>Illustrate Peterson’s solution for the critical section problem.</td><td>L2</td><td>6</td></tr>
<tr><td>c</td><td>Consider the following snapshot of the system:

<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>P_0</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>1</td><td>5</td><td>2</td><td>0</td></tr>
<tr><td>P_1</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><td></td><td></td><td></td><td></td></tr>
<tr><td>P_2</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><td></td><td></td><td></td><td></td></tr>
<tr><td>P_3</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><td></td><td></td><td></td><td></td></tr>
<tr><td>P_4</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><td></td><td></td><td></td><td></td></tr>
</table>
Answer the following questions using Banker’s algorithm:
a. What is the content of the need matrix?
b. Is the system in a safe state? If yes, mention the safe sequence.
If a request from process P1 arrives for (0,4,2,0) can the request be granted immediately?</td><td>L3</td><td>9</td></tr>
<tr><td colspan="3">OR</td><td></td><td></td></tr>
<tr><td rowspan="3">Q. 06</td><td>a</td><td>Explain different methods to recover from deadlocks.</td><td>L2</td><td>6</td></tr>
<tr><td>b</td><td>What is a resource allocation graph? Consider an example to explain how it is very useful in describing a deadly embrace.</td><td>L2</td><td>6</td></tr>
<tr><td>c</td><td>What is a semaphore? State a Dining Philosopher problem gives a solution using semaphore.</td><td>L2</td><td>8</td></tr>
<tr><td colspan="3">Module-4</td><td></td><td></td></tr>
<tr><td rowspan="3">Q. 07</td><td>a</td><td>What is TLB? Explain TLB in detail with a paging system with a neat diagram.</td><td>L2</td><td>6</td></tr>
<tr><td>b</td><td>With the help of a neat diagram, explain the various steps of address binding.</td><td>L2</td><td>6</td></tr>
<tr><td>c</td><td>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 three frames. Determine the number of page faults using the FIFO, Optimal, and LRU replacement algorithms. Which algorithm is most efficient?</td><td>L3</td><td>8</td></tr>
<tr><td colspan="3">OR</td><td></td><td></td></tr>
<tr><td rowspan="3">Q. 08</td><td>a</td><td>What is demand paging? Explain the steps in handling page faults using the appropriate diagram.</td><td>L2</td><td>6</td></tr>
<tr><td>b</td><td>What is segmentation? Explain the basic method of segmentation with an example.</td><td>L2</td><td>6</td></tr>
<tr><td>c</td><td>Discuss the structure of the page table with a suitable diagram.</td><td>L2</td><td>8</td></tr>
<tr><td colspan="3">Module-5</td><td></td><td></td></tr>
<tr><td rowspan="3">Q. 09</td><td>a</td><td>What is a file? What are its attributes? Explain file operations.</td><td>L2</td><td>6</td></tr>
<tr><td>b</td><td>Explain in detail about various file operations in a file system.</td><td>L2</td><td>6</td></tr>
<tr><td>c</td><td>Discuss various directory structures with neat diagrams.</td><td>L2</td><td>8</td></tr>
<tr><td colspan="3">OR</td><td></td><td></td></tr>
<tr><td rowspan="3">Q. 10</td><td>a</td><td>Explain contiguous and linked disk space allocation methods.</td><td>L2</td><td>6</td></tr>
<tr><td>b</td><td>Explain the access matrix method of system protection with the domain as objects and its implementation.</td><td>L2</td><td>6</td></tr>
<tr><td>c</td><td>Given the following sequences 95,180,34,119,11,123,62,64 with the track 50 and ending track 199. What is the total disk travelled by the disk arm using FCFS, SSTF, LOOK and CLOOK algorithm</td><td>L3</td><td>8</td></tr>
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*****Bloom’s Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of question.