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
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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
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P1	0	8	3
P2	1	4	2
P3	2	9	1
P4	3	5	4		L3	8

		Module-3		
Q. 05	a	Define deadlock. What are the necessary conditions for deadlock to occur?	L2	5
	b	Illustrate Peterson's solution for the critical section problem.	L2	6

	c	Consider the following snapshot of the system:
		
		 (table below)
		
		 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?
			L3	9

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	0	0	1	2	0	0	1	2	1	5	2	0
P_1	1	0	0	0	1	7	5	0				
P_2	1	3	5	4	2	3	5	6				
P_3	0	6	3	2	0	6	5	2				
P_4	0	0	1	4	0	6	5	6				

		OR		
Q. 06	a	Explain different methods to recover from deadlocks.	L2	6
	b	What is a resource allocation graph? Consider an example to explain how it is very useful in describing a deadly embrace.	L2	6
	c	What is a semaphore? State a Dining Philosopher problem gives a solution using semaphore.	L2	8
		Module-4		
Q. 07	a	What is TLB? Explain TLB in detail with a paging system with a neat diagram.	L2	6
	b	With the help of a neat diagram, explain the various steps of address binding.	L2	6
	c	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?	L3	8
		OR		
Q. 08	a	What is demand paging? Explain the steps in handling page faults using the appropriate diagram.	L2	6
	b	What is segmentation? Explain the basic method of segmentation with an example.	L2	6
	c	Discuss the structure of the page table with a suitable diagram.	L2	8
		Module-5		
Q. 09	a	What is a file? What are its attributes? Explain file operations.	L2	6
	b	Explain in detail about various file operations in a file system.	L2	6
	c	Discuss various directory structures with neat diagrams.	L2	8
		OR		
Q. 10	a	Explain contiguous and linked disk space allocation methods.	L2	6
	b	Explain the access matrix method of system protection with the domain as objects and its implementation.	L2	6
	c	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	L3	8

*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.