Seat No: _____ **Enrollment No:** _____

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. Summer 2023 - 24 Examination

Semester: 4 **Date: 22/04/2024**
Subject Code: 303105251 **Time: 2:00 pm to 4:30 pm**
Subject Name: Operating System **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1	**Do As Directed** (All are compulsory) (Each of one mark)	(15)	CO-PO	Bloom's Taxonomy
	1. To access the services of the operating system, the interface is provided by the _____. a) Library b) API c) Assembly Instructions d) System call		1	**Remember**
	2. When a process is in a "Blocked" state waiting for some I/O service. When the service is completed, it goes to the _____. a) Terminated state b) Suspended state c) Running state d) Ready state		2	**Remember**
	3. _____ is a light weighted Process.		2	**Remember**
	4. What is paging in memory?		4	**Remember**
	5. In a typical memory hierarchy, which one is a right sequence of memory in an ascending order a) Register, Cache, RAM, Magnetic Disk, Magnetic Tap b) Cache, RAM, Magnetic Disk, Magnetic Tap c) Register , RAM, Cache ,Magnetic Disk, Magnetic Tap d) Magnetic Tap Register , RAM, Cache ,Magnetic Disk		1	**Understand**
	6. "I am core of Operating System", Who AM I? a) CPU b) Kernel c) Memory d) Processor		1	**Remember**
	7. Where Kernel lies in Operating system?		1	**Understand**
	8. Explain the following terms: a) Multiprogramming b) Multi-tasking		2	**Understand**
	9. What is process?		2	**Understand**
	10. Consider the following statements about process state transitions for a system using preemptive scheduling. I. A running process can move to ready state. II. A ready process can move to ready state. III. A blocked process can move to running state. IV. A blocked process can move to ready state. a) I, II, and IV only b) I, II and III only c) II and IV only d) None of above		2	**Analyze**
	11.Consider the following statement and answer True/False: If the resource has more than one instance then cycle is just a necessary condition		3	**Understand**

	but not the sufficient condition.			
	12. Which one or more of the following CPU scheduling algorithms can potentially cause starvation? a) FCFS b) Round-Robin c) LRU d) FIFO		**2**	**Understand**
	13. Explain Race Condition.		**2**	**Understand**
	14. What are the two main functions of an operating system?		**1**	**Understand**
	15. Full form of given term: PCB		**1**	**Remember**
Q.2	**Answer the following questions**. (Attempt any three)	**(15)**		
	A) A system has two processes and three identical resources. Each process needs a maximum of two resources. Is deadlock possible ? Explain your answer.		**3**	**Analyze**
	B) What is Critical section in IPC? Write a Peterson's solution to achieve a mutual exclusion		**2**	**Analyze**
	C) Explain the difference between internal fragmentation and external fragmentation. Which one occurs in paging system ? which one occurs in system using pure segmentation ?		**2**	**Analyze**
	D) Draw and explain the process state diagram (any 5 states)		**2**	**Apply**
Q.3	A) What is CPU Scheduling ? Find Average Waiting Time for Round-Robin (TQ=3):	**(07)**	**2**	**Evaluate**
	B) Given page reference string: 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 Find the number of page faults for LRU having 4 frames.	**(08)**	**5**	**Evaluate**
	OR			
	B) Suppose Disk drive has 200 cylinders. The current position of head is 53. The queue of pending requests is 98, 183, 37, 122, 14, 124, 65, 67.The Head pointer is at 53. Calculate head movement for the following algorithms. (i) FCFS (ii) SSTF.	**(08)**	**3**	**Evaluate**
Q.4	A) What is TLB? How does it help to speed up paging?	**(07)**	**2**	**Apply**
	OR			
	A)Considering a system with five processes P0 through P4 and three resources of type A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t0 following snapshot of the system has been taken:	**(07)**	**2**	**Evaluate**
	B) Explain the Semaphore using Dining Philosopher Problem.	**(08)**	**3**	**Apply**

Process	Arrival Time	Burst Time
P1	0	3
P2	1	4
P3	2	2
P4	3	5

Process	Allocation	Max	Available
	A B C	A B C	A B C
P_0	0 1 0	7 5 3	3 3 2
P_1	2 0 0	3 2 2	
P_2	3 0 2	9 0 2	
P_3	2 1 1	2 2 2	
P_4	0 0 2	4 3 3	