

Code No: P18CST09

HALL TICKET NUMBER

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PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)

III B.TECH I SEMESTER END SUPPLEMENTARY EXAMINATIONS, MARCH/APRIL – 2023

OPERATING SYSTEMS

(Common to CSE CSIT, IT, CSE(IOTCSBT) Branches)

Time: 3 hours

Max. Marks: 60

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answer all the questions in Part-A (5X2=10M).

Q.No.	Questions	Marks	CO	KL
1.	a) List the basic functions of an OS.	[2M]	1	1
	b) Differentiate between bounded and unbounded buffer in producer and consumer problem.	[2M]	2	2
	c) Define safe and un-safe state in deadlocks.	[2M]	3	1
	d) Describe Belady's anomaly problem?	[2M]	4	2
	e) List the operations performed on Files.	[2M]	5	1

PART-B

Answer One Question from each UNIT (5X10=50M)

Q.No.	Questions	Marks	CO	KL																					
UNIT-I																									
2.	a) Justify the role played by a System Call and how are they categorized. Explain at least three different system calls for each category.	[5M]	1	5																					
	b) Define a Process State and Illustrate the Process lifecycle through a State transition diagram.	[5M]	1	1																					
OR																									
3.	a) List five services provided by an operating system. Explain how each provides convenience to the users. Explain also in which cases it would be impossible for user-level programs to provide these services.	[5M]	1	1																					
	b) List the conditions when a Parent processes needs to terminate its child process.	[5M]	1	1																					
UNIT-II																									
4.	a) Consider the following set of processes, with the length of the CPU- burst time and the arrival time given in milliseconds. Draw a Gantt chart illustrating the execution of these processes using Round Robin and First Come First Serve scheduling algorithms. Calculate waiting time and turnaround time of each process.	[5M]	2	3																					
<table border="1"><thead><tr><th>Process name</th><th>Arrival time</th><th>Burst time</th></tr></thead><tbody><tr><td>P1</td><td>0</td><td>4</td></tr><tr><td>P2</td><td>1</td><td>5</td></tr><tr><td>P3</td><td>2</td><td>2</td></tr><tr><td>P4</td><td>3</td><td>1</td></tr><tr><td>P5</td><td>4</td><td>6</td></tr><tr><td>P6</td><td>6</td><td>3</td></tr></tbody></table>		Process name	Arrival time	Burst time	P1	0	4	P2	1	5	P3	2	2	P4	3	1	P5	4	6	P6	6	3			
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P6	6	3																							



	b)	A barbershop consists of a waiting room with n chairs and the barber room containing the barber chair. If there are no customers to be served, the barber goes to sleep. If a customer enters the barbershop and all chairs are occupied, then the customer leaves the shop. If the barber is busy but chairs are available, then the customer sits in one of the free chairs. If the barber is asleep, the customer wakes up the barber. Using semaphore, illustrate the functions used to coordinate the barber and the customers.	[5M]	2	3																												
OR																																	
5.	a)	Differentiate between Multilevel and Multilevel feedback queue.	[5M]	2	2																												
	b)	Priority inversion is a condition that occurs in real time systems - Analyze the statement.	[5M]	2	4																												
UNIT-III																																	
6.	a)	Consider the following snapshot of a system: <table style="margin-left: 40px; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;"><i>Allocation</i></th> <th style="text-align: center;"><i>Max</i></th> <th style="text-align: center;"><i>Available</i></th> </tr> <tr> <th></th> <th style="text-align: center;"><i>ABCD</i></th> <th style="text-align: center;"><i>ABCD</i></th> <th style="text-align: center;"><i>ABCD</i></th> </tr> </thead> <tbody> <tr> <td><i>T0</i></td> <td style="text-align: center;">0 0 1 2</td> <td style="text-align: center;">0 0 1 2</td> <td style="text-align: center;">1 5 2 0</td> </tr> <tr> <td><i>T1</i></td> <td style="text-align: center;">1 0 0 0</td> <td style="text-align: center;">1 7 5 0</td> <td></td> </tr> <tr> <td><i>T2</i></td> <td style="text-align: center;">1 3 5 4</td> <td style="text-align: center;">2 3 5 6</td> <td></td> </tr> <tr> <td><i>T3</i></td> <td style="text-align: center;">0 6 3 2</td> <td style="text-align: center;">0 6 5 2</td> <td></td> </tr> <tr> <td><i>T4</i></td> <td style="text-align: center;">0 0 1 4</td> <td style="text-align: center;">0 6 5 6</td> <td></td> </tr> </tbody> </table> <p>Apply Banker's algorithm and solve the following questions. a. What is the content of the matrix <i>Need</i>? b. Is the system in a safe state? c. If a request from thread <i>T1</i> arrives for (0,4,2,0), can the request be granted</p>		<i>Allocation</i>	<i>Max</i>	<i>Available</i>		<i>ABCD</i>	<i>ABCD</i>	<i>ABCD</i>	<i>T0</i>	0 0 1 2	0 0 1 2	1 5 2 0	<i>T1</i>	1 0 0 0	1 7 5 0		<i>T2</i>	1 3 5 4	2 3 5 6		<i>T3</i>	0 6 3 2	0 6 5 2		<i>T4</i>	0 0 1 4	0 6 5 6		[5M]	3	3
	<i>Allocation</i>	<i>Max</i>	<i>Available</i>																														
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	b)	Explain how to recovery from deadlock.	[5M]	3	2																												
OR																																	
7.	a)	Differentiate deadlock avoidance and deadlock prevention? Illustrate deadlock avoidance algorithm in detail.	[5M]	3	2																												
	b)	A system is composed of four processes, {P1, P2, P3, P4}, and three types of consumable resources, {R1, R2, R3}. There are 2 units each of R1 and R3 and 1 unit of R2. <ul style="list-style-type: none"> • P1 requests a unit of R1 and a unit of R3. • P2 uses a unit of R1 and R3 and requests 1 unit of R2. • P3 requests 1 unit each of R1 and R3. • P4 uses a unit of R2 and requests a unit of R3. (a) Draw the resource-allocation graph. (b) Is there any deadlock in this situation? Briefly Explain. Which if any of the processes are deadlocked in this state? What is a possible order of completion if no deadlock exists?	[5M]	3	3																												
UNIT-IV																																	
8.	a)	Memory partitions of 100kb, 500 kb, 200 kb, 300kb, 600 kb are available how would best, worst, first fit algorithm to place processes 212, 417, 112, 426 in order. Determine the best algorithm?	[5M]	4	1																												
	b)	Consider the following page-reference string: 0 1 3 6 2 4 5 2 5 0 3 1 2 5 4 1 0 How many page faults would occur for the LRU and optimal replacement algorithms, assuming 4 frames? Remember that all frames are initially empty, so your first unique pages will all cost one fault for each. Also, compute Hit ratio of each algorithm.	[5M]	4	2																												
OR																																	
9.	a)	Differentiate between Contiguous and Non-Contiguous Memory allocation	[5M]	4	2																												
	b)	Explain about allocation of frames.	[5M]	4	1																												



UNIT-V					
10.	a)	Discuss briefly about Segmentation.	[5M]	5	4
	b)	Explain various methods for free-space management.	[5M]	5	2
OR					
11.	a)	Discuss various methods to implement directory in file management.	[5M]	5	4
	b)	Consider a disk system with 600 cylinders. The requests to access the cylinders occur in the sequence: 20, 270, 569, 340, 325, 232, 410, 267, 115 and 90. Assuming that the head is currently at cylinder 69, calculate the time taken to satisfy all requests if it takes 1ms to move from one cylinder to adjacent one by using SSTF and FCFS?	[5M]	5	2
