



Program: B.Tech Computer Engineering
End Semester Examination: B.Tech. Semester IV
Course Code: CEC403
Course Name: Operating System
Time: 2 hours
Max. Marks: 60

23 MAY 2022

Instructions: 1. All three questions are compulsory

Que. No.	Question	Max. Marks	CO	BT
Q1	Solve any Four			
i)	Describe in brief microkernel structure of operating system.	5	CO1	2
ii)	What do you mean by process? Draw and explain process state diagram.	5	CO2	2
iii)	Explain race condition with an example.	5	CO3	2
iv)	What are the differences between a deadlock prevention and deadlock Avoidance?	5	CO4	3
v)	What is fragmentation? Which type of fragmentation occurs in paging? Why?	5	CO5	4
vi)	Describe the Structure of a magnetic disk	5	CO6	2

Que. No.	Question	Max. Marks	CO	BT
Q2 A	Solve any Two			
i)	What is context switch? Why it is said that context switch is pure overhead?	5	CO2	4
ii)	What is system call? Explain user mode and kernel mode giving example of any one system call.	5	CO1	3
iii)	Consider a disk queue with requests for I/O to blocks on cylinders 98, 183, 41, 122, 14, 124, 65, 67. The C-SCAN scheduling algorithm is used. The head is initially at cylinder number 53 moving towards larger cylinder numbers on its servicing pass. The cylinders are numbered from 0 to 199. Determine the total head movement (in number of cylinders) incurred while servicing these requests.	5	CO6	5
iv)	Explain schedulers and its types? Which scheduler is responsible for the degree of multiprogramming?	5	CO2	4
Q2 B	Solve any One			
i)	Consider the following page reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for the LRU and FIFO replacement algorithms, assuming five frames? Remember that all frames are initially empty, so your first unique pages will cost one fault each.	10	CO5	5
ii)	What are semaphores? How do they implement mutual exclusion for Producer Consumer problem?	10	CO3	4



Que. No.	Question	Max. Marks	CO	BT																								
Q3	Solve any two																											
i)	<p>Consider the following set of processes with the length of cpu burst time in ms.</p> <table border="1"> <thead> <tr> <th>Process</th><th>Arrival Time</th><th>Burst Time</th><th>Priority</th></tr> </thead> <tbody> <tr> <td>P0</td><td>0</td><td>10</td><td>5</td></tr> <tr> <td>P1</td><td>0</td><td>6</td><td>2</td></tr> <tr> <td>P2</td><td>1</td><td>7</td><td>4</td></tr> <tr> <td>P3</td><td>2</td><td>5</td><td>1</td></tr> <tr> <td>P4</td><td>3</td><td>5</td><td>3</td></tr> </tbody> </table> <p>(i) Draw Gantt charts for FCFS, Priority(non-pre-emptive)</p> <p>(ii) Evaluate the Average Turnaround Time of each process for FCFS, Priority(non-pre-emptive)</p> <p>(iii) Evaluate the Average Waiting Time of each process for FCFS, Priority(non-pre-emptive)</p> <p>Compare algorithm results and identify the algorithm which provides the minimum average waiting time?</p>	Process	Arrival Time	Burst Time	Priority	P0	0	10	5	P1	0	6	2	P2	1	7	4	P3	2	5	1	P4	3	5	3	10	CO2	5
Process	Arrival Time	Burst Time	Priority																									
P0	0	10	5																									
P1	0	6	2																									
P2	1	7	4																									
P3	2	5	1																									
P4	3	5	3																									
ii)	Under what circumstances do page faults occur? Describe the actions taken by the operating system when a page fault occurs.	10	CO5	4																								
iii)	What are the necessary and sufficient conditions for deadlock to occur? Explain in detail deadlock prevention techniques with respect to any one condition.	10	CO4	3																								

Course Outcomes (CO) -Learner will be able to:

CO1: Understand the role of Operating System in terms of system call, system program and functions of operating system.

CO2: Apply and analyze the concept of process and threads for resource management.

CO3: Apply and analyze process synchronization.

CO4: Apply and analyze deadlock handling.

CO5: Understand the memory management and virtual memory.

CO6: Apply and analyze different techniques of file and I/O management

BT1- Remembering, BT2- Understanding, BT3- Applying, BT4- Analyzing, BT5- Evaluating, BT6- Creating