KIET Group of Institutions

(Department of Information Technology/CSIT)
B. Tech, 4th Semester
CT-2 Examination, (2020-21) EVEN Semester
(Operating System) (KCS-401)

Duration: 2 hrs **Max. Marks: 60**

Note: - Attempt All the Questions of All the Sections.

Section-A (2X10=20)					
Q. No.		**Question**	**Marks**	**CO**	**BL**
1.	**a**	Discuss safe state and unsafe state with example?	2	3	BL-2
	b	Explain race condition.	2	2	BL-2
	c	Explain busy waiting. Discuss how busy waiting can be avoided.	2	2	BL-2
	d	Explain the various conditions for deadlock occurrences.	2	3	BL-2
	e	Discuss the hardware type solution for critical section problem?	2	2	BL-2
	f	Illustrate how to convert resource allocation graph to wait for graph with example.	2	3	BL-4
	g	Define binary and counting semaphores.	2	2	BL-1
	h	Consider a system with three processes P1, P2, and P3. The peak demand of each process for a particular resource type R is 6, 9, and 12 respectively. Formulate the minimum number of resources required to ensure deadlock free execution?	2	3	BL-6
	i	What are the benefits of multithreaded programming?	2	3	BL-1
	j	List the requirements that a solution to the critical section problem must satisfy?	2	2	BL-1

Section-B (5X4=20)

Q. No.	**Question**	**Marks**	**CO**	**BL**
2	What is a thread? Explain how thread is different form a process. And also differentiate between user level threads and kernel level threads.	5	3	BL-3
	OR			
	Discuss in brief, different multithreading models for implementing threads.			
3	Draw Gantt chart. Calculate average waiting time and average turnaround time for the following given system. 1. Using Priority (non pre-emptive) 2. Using Priority (pre-emptive)	5	3	BL-4

Process id	Arrival time	Burst time (ms)	priority
P1	0	8	3
P2	1	4	4
P3	3	1	1
P4	2	9	2
P5	4	2	5

Note: Higher the priority number, higher is the priority.

OR

Calculate the average waiting time, average turn-around time and average response time for these processes with the SJF scheduling algorithm. Draw the Gantt chart.

Process id	**Arrival time (milliseconds)**	**Burst Time (milliseconds)**	**Priority number**
A	1	3	3
B	2	1	2
C	2	6	3

		D	3	2	1			
		E	4	8	5			
4	Explain the Multilevel Queue Scheduling and Multilevel Feedback Queue scheduling algorithms with suitable diagrams. OR Explain Context Switching in pre-emptive scheduling algorithms. Also discuss the convoy effect and state that which CPU scheduling algorithm suffers from this effect.						5	3	BL-4
5	Give the principles, which should be followed by any solution designed to achieve mutual exclusion in critical section problem? Also discuss how well these principles are followed in Dekker's solution? OR Write and explain the Peterson's algorithm for implementing critical section problem.						5	2	BL-5

Section-C **(10X2=20)**

Q. No.	Question	Marks	CO	BL
6	Discuss solution of producer consumer problem using semaphore. OR Describe lock variable. Explain how test and set operation is used for solving critical section problem.	10	2	BL-4
7	Consider below table and draw the Gantt chart and compute the average waiting time and average turnaround time for the following scheduling algorithm. **a.** Round Robin (Quantum=3 ms) **b.** Shortest Remaining Time First	10	3	BL-5

Process id	Arrival time	Burst time (ms)
P0	0	4
P1	2	7
P2	3	6
P3	4	3

OR

Consider the following snapshot of the system and answer the following questions using Banker's algorithm.
a. Compute the Need Matrix
b. Is the system in Safe state?

	Allocated			Maximum			Available		
Process	R1	R2	R3	R1	R2	R3	R1	R2	R3
P1	2	2	3	3	6	8	7	7	10
P2	2	0	3	4	3	3			
P3	1	2	4	3	4	4			

CO -Course Outcome generally refer to traits, knowledge, skill set that a student attains after completing the course successfully.

Bloom's Level (BL) - Bloom's taxonomy framework is planning and designing of assessment of student's learning.