Subject Code:102305CS

B.Tech. – 4th Semester Class Test - I (26/10/2021)

Subject: Operating Systems

Time: 2 Hrs. **Maximum Marks: 40**

Note: Attempt all questions. Part (a) of each question is compulsory and carries 04 marks; attempt any two parts from (b), (c) and (d) carrying 08 marks.

CO1: Identify the role of operating system in making computers execute data-processing jobs

CO2: Realize managing computer's resource complexity during concurrent process execution through OS layers and Analyze the reasons of resource bottlenecks-concurrency, deadlock and various synchronization mechanisms available.

Sl. No.		Question	Marks	CO	BL	PI
1	*a)*	(I) What is the difference between a trap and an interrupt? Explain with an example. (II) What is an operating system? Explain various functions of an operating system?	**(4)**	**CO1**	**L1**	**1.4.1**
	b)	Discuss the components of operating system in detail and analyze each of them.	**(8)**	**CO1**	**L2**	**2.1.2**
	c)	Analyze the difference between Multiprogramming and Time sharing system with an example.	**(8)**	**CO1**	**L2**	**2.1.2**
	d)	How could we enforce the memory protection in operating system in order to prevent a program from modifying the memory associated with other programs.	**(8)**	**CO1**	**L4**	**2.1.2**
2	*a)*	(I) What are the four necessary conditions for characterizing deadlock? What is the only reasonable condition that can be used to prevent deadlock from occurring? (II) Four jobs to be executed on a single processor system arrive at time 0,1,2,3 in the order A, B, C, D. their burst CPU time requirements are 2, 1, 6, 1time units respectively. What will be the sequence of completion of these processes using RR Scheduling with TQ=1	**(4)**	**CO2**	**L1**	**1.4.1**
	b)	Consider a system with five processes: P0, P1, P2, P3, P4 and three resource types: A, B and C. For each process, the current allocation and the maximum required allocation are given by the allocation and Max matrices. The current available resources are given by the available vector.	**(8)**	**CO2**	**L4**	**4.1.2**

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	1	1	2	4	3	3	2	1	0
P1	2	1	2	3	2	2			
P2	4	0	1	9	0	2			
P3	0	2	0	7	5	3			
P4	1	1	2	11	2	3			

a) Draw the resource allocation graph for the given snapshot.
b) Determine the total amount of resources of each type.
c) What is the "Need Matrix"?
d) Determine if this state is "safe" using the safety Algorithm.
e) Starting with the allocation resource state given above,suppose the current request for each process is given by the request matrix below. Assume that these requests are granted.

Request Matrix:

	A	B	C
P0	3	3	1
P1	1	1	0
P2	6	0	1
P3	7	2	3
P4	0	1	1

Will the system be in a deadlock state?

c) Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order PI, P2, P3, P4, P5,all at time 0.

a. Draw four Gantt charts illustrating the execution of these processesusing FCFS, SJF, a non-preemptive priority (a smaller priority numberimplies a higher priority), and RR (quantum = 1) scheduling.

b. What is the turnaround time, waiting time and response time of each process for RR scheduling algorithm in part a?

c. What are the benefits of RR over FCFS?

(8) CO2 L4 4.1.2

d) Define Semaphore. How does it solve Bounded BufferProducer-Consumer Problem?

OR

What is the difference between a program and a process? With the help of a state transition diagram, explain various states of a process.

(8) CO2 L2 2.1.3

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