NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI
END SEMESTER EXAMINATION - JAN. 2020 SESSION

DEPARTMENT : CSE

DATE & TIME OF EXAM : 20.07.2020 10.00 a.m.– 12 .30 p.m.

SUB CODE : CSPC26 DURATION: 2 hours

FACULTY NAME : S.MARY SAIRA BHANU

Note to Student:

1. **Make sure the 'Declaration and statement of authorship' is uploaded along with the answer sheet as cover sheet (First Sheet)**
2. **TIME MANAGEMENT IS YOUR RESPONSIBILITY**

SUB.CODE & TITLE: CSPC26 OPERATING SYSTEMS

TIME:10.00 a.m. – 12.30 p.m. DATE: 20.07.2020 MAX. MARKS: 50
(30 minutes Buffer Time)

ANSWER ALL QUESTIONS

1a. What is a Kernel? Why is it needed? How is it different from the library? What are the operations that are performed by Kernel at the time of initialization?

b. Compare i) Multithreading and Multicore programming.

ii) Emulation and Virtualization. (6, 6)

2a. Consider the following snapshot of a system. There are no current outstanding queued unsatisfied requests.

	Current allocation				Maximum demand			
Process	R1	R2	R3	R4	R1	R2	R3	R4
P1	0	0	1	2	0	0	1	2
P2	2	0	0	0	2	7	5	0
P3	0	0	3	4	6	6	5	6
P4	2	3	5	4	4	3	5	6
P5	0	3	3	2	0	6	5	2

Is this currently in safe or unsafe state? If a request from P3 arrives for (0, 1, 0, 0) can that request be granted immediately?

b. Consider a producer-consumer problem with one consumer and three producers P1, P2 and P3. To consume, the consumer needed the product from any one of the P1 and P2 and the product of P3. Write a solution to this problem using semaphores. (6, 6)

3a. Explain the use of counters and stacks in LRU algorithm implementation.

Given the references to the following pages by a program,

0, 2, 4, 5, 6, 1,3,0, 1, 4, 2, 3,5, 6,1

How many page faults will occur if the program has three page frames available to it and uses LRU? Demonstrate using counter and stack.

b. What is a Buddy system? Assume the RAM size is 1 MB. The details of the job size, arrival and completion times are as follows:

Time	Job	Size
T1	J1 arrives	150K
T2	J2 arrives	500K
T3	J3 arrives	350K
T4	J1 completes	
T5	J4 arrives	120K
T6	J2 completes	
T6	J5 arrives	150K
T7	J6 arrives	80K

Demonstrate the working of the buddy system. (7, 7)

4a. Using a diagram, explain how a write operation is performed in a file system.

b. What is the need for buffering? Explain double buffering using an example. Explain the effect of buffering on the runtime of a CPU – bound process. (8, 6)

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