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MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

IV SEMESTER B.TECH. (COMPUTER AND COMMUNICATION ENGINEERING)

MAKEUP EXAMINATIONS, JUNE 2017

SUBJECT: OPERATING SYSTEMS [ICT 2251]

REVISED CREDIT SYSTEM
(12/06/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data, if any, may be suitably assumed.

1A. A processor uses a prioritized round robin scheduling policy. New processes are assigned an initial quantum of length q. Whenever a process uses its entire quantum without blocking, its new quantum is set to twice its current quantum. If a process blocks before its quantum expires, its new quantum is reset to q. Assume that every process requires a finite total amount of CPU time.

i. Suppose the scheduler gives higher priority to processes that have larger quantum. Is starvation possible in this system? Why or why not?

ii. Suppose the scheduler gives higher priority to processes that have smaller quantum. Is starvation possible in this system? Why or why not? **5**

1B. With a neat diagram explain the process states. Indicate the next state of currently executing process for each of the following conditions.

i. Process makes a page fault.

ii. Process requests access to secondary storage to save the output. **3**

iii. The process is interrupted by another process.

1C. What is the drawback of global page replacement algorithm? What measure can be taken to overcome it? **2**

2A. Consider the following sequence of memory references for a program of page size 1KB: 5 2 4 1 2 0 5 0 6 8 2 4 3 5 1 7. If 3 KB of primary memory is allocated to this program, calculate the number of page faults for the following page replacement algorithms.

i. FIFO

ii. LRU

iii. Optimal page replacement

Is Belady's anamoly seen in any of the above page replacement algorithms if the primary memory allocated is increased to 4KB ? Justify. **5**

2B. Write a solution for readers-writers problem using semaphores. **3**

2C. Distinguish between client-server computing and peer-to-peer computing. **2**

3A. Consider the following snapshot of a system. Answer the following questions using the banker's algorithm:

Table Q. 3A

Process	Allocation	Maximum	Available
	A B C D	A B C D	A B C D
P0	3 1 0 0	3 4 4 0	2 1 0 0
P1	0 0 1 2	0 0 1 3	
P2	0 2 3 4	3 3 4 6	
P3	2 0 0 1	3 0 0 1	

i. Calculate the need matrix and the total resource vector.
ii. Is the system in safe state? If yes, what is the safe sequence?
iii. If a request from process P0 arrives for (0, 1, 0, 0) can the request be granted immediately?
iv. If a request from process P2 arrives for (1, 1, 0, 0) can the request be granted immediately? **5**

3B. List and explain the classification of real time systems with example. **3**

3C. What is the priority inversion problem? Describe a method to overcome it with an example. **2**

4A. A disk has 100 tracks numbered 0 through 99. The read-write head is currently positioned at track 15 and is moving towards the low numbered tracks. Compute the total number of head movements to satisfy the following requests: 4, 30, 55, 40, 11, 35, 7, 68, 83, 2 and 14 using SSTF(Shortest Seek Time First), FCFS (First Come Fist Serve), SCAN, C-SCAN and C-LOOK scheduling policies with neat diagrams. **5**

4B. What values can a semaphore have? Name the operations on a semaphore and describe what they do. Demonstrate that the current value of the semaphore is dependent on its starting value and the number of operations of each type done on it. **3**

4C. Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames. How many bits are there in logical address and physical address? **2**

5A. Check if the real time tasks T1(5, 1), T2(4, 3) and T3(20, 2) can be scheduled using earliest deadline first approach. Also show the Gantt chart. Suggest the minimum frame size if the above tasks have to be scheduled using cyclic executive. **5**

5B. Explain any three issues to be considered with multi-threaded programming. **3**

5C. What are the protocols used to ensure that hold and wait condition never occurs in a system? **2**