Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent institution of MAHE, Manipal)

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

MAKEUP EXAMINATIONS, JUNE 2018

SUBJECT:– OPERATING SYSTEMS [ICT 2251]

REVISED CREDIT SYSTEM
(12/06/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. Assume you have the following jobs to execute with one processor, with the jobs arriving in the order listed and the priority assigned as in Table Q.1A. **5**

Table Q.1A

Process No.	Execution Time	Arrival Time	Priority
1	10	4	3
2	1	2	1
3	2	3	4
4	1	1	5
5	5	5	2

Calculate the waiting time and turnaround time for each of these processes using

i) Priority preemptive scheduling algorithm.
ii) Shortest job preemptive scheduling algorithm.

1B. What are threads? What are the benefits of threads? Explain the various multithreaded models with neat sketches. **3**

1C. Distinguish between the client–server and peer-to-peer models of computing environments. **2**

2A. Consider the resource allocation graph of Fig. Q.2A **5**

i. Apply the deadlock detection algorithm and either indicate whether the system is deadlocked or not. If not specify the order of execution of the processes.

ii. If the process P5 also request 2 instances of resource r3, does the system enter a deadlock? Why?

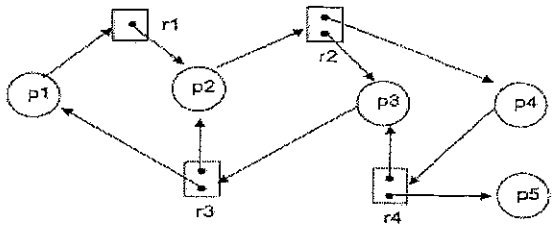

Fig.Q.2A

2B. With the help of neat diagram explain process state transitions. Give two examples of when a process might go directly from the state 'running' to the state 'ready'. **3**

2C. What are General or Counting semaphores? Write the code for wait and signal operations of a general semaphore. **2**

A counting semaphore was initialized to 10. Then six P (wait) operations and four V (signal) operations were completed on this semaphore. What is the resulting value of this semaphore?

3A. What is segmentation? How is it different from paging? How is the mapping form logical to physical address done in segmentation technique? **5**

3B. Consider a demand-paging system with a paging disk that has an average access and transfer time of 20 milliseconds. Addresses are translated through a page table in main memory, with an access time of 1 microsecond per memory access. Thus, each memory reference through the page table takes two accesses. To improve this time, we have added an associative memory that reduces access time to one memory reference if the page-table entry is in the associative memory. Assume that 80 percent of the accesses are in the associative memory, and that, of the remaining, 10 percent (or 2 percent of the total) cause page faults. What is the effective memory access time? **3**

3C. Given the memory partitions of 10KB, 50KB, 20KB,30KB and 60 KB(in order), how would each of the best fit and worst file algorithms place processes of 21KB, 41KB, 11KB, 43KB and 5KB(in order)? **2**

4A. A drive has 5000 cylinders. The drive is currently serving a request at cylinder at 120 and the previous request was at cylinder 0. The queue of pending requests in FIFO order is : 81, 1, 1470, 913, 1774, 948, 1509, 1022, 1750, 160. Starting from the current head position, what is the total distance travelled (in cylinders) by the disk arm to satisfy the requests using FCFS, SSTF, C-SCAN and LOOK. Illustrate with figure in each case. **5**

4B. Consider the sequence of memory references 351, 0, 55, 104, 10, 169, 10, 239, 104, 169, 11, 198, 139, 69, 139, 49,50, 351, 48, 99 made by a program of 395 words. Assume the page size to be of 50 words. Write the page reference string. Calculate the number of page faults for FIFO and LRU replacement algorithms considering number of frame to be 3. **3**

4C. With a neat diagram explain how protection is achieved in paged memory allocation technique. **2**

5A. Check if real time tasks T1(5, 1) , T2(4, 2) 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 executives. **5**

5B. Explain are the various task characteristics of a real workload. **3**

5C. Identify the key differences between hard real-time and soft real-time systems. Give at least one example of real-time tasks corresponding to the two categories and justify. **2**