Reg. No. ☐☐☐☐☐☐☐☐☐☐

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

V SEMESTER B.TECH. (INFORMATION TECHNOLOGY)

END SEMESTER EXAMINATIONS, NOVEMBER 2017

SUBJECT: OPERATING SYSTEMS [ICT 3101]

REVISED CREDIT SYSTEM
(24/11/2017)

Time: 3 Hours   MAX. MARKS: 50

1A. With the help of a Gantt Chart (Use the data as shown in Table Q. 1A) calculate Average waiting time and average turn around time for the following scheduling algorithm.
  1. Preemptive Priority
  2. Round Robin algorithm

Show waiting time and turnaround time for each job with detailed calculations. Consider time quantum as 3ms. Lower the priority value, higher the priority of the process.

Table Q. 1A

Process	Burst Time(in ms)	Arrival Time (in ms)	Priority
P1	12	0	2
P2	10	0	1
P3	4	1	0
P4	10	4	2
P5	12	2	1

5

1B. What resources are used when a thread is created? How do they differ from those used when a process is created?   **3**

1C. List the parameters used to define the multilevel feedback queue scheduler.   **2**

2A. Write the general structure of a critical section solution. Write and explain the solution to Dining- Philosopher problem using Monitors.   **5**

2B. Write the neat diagram to show the states of the process. Demonstrate the context switch of two processes with neat diagram.   **3**

2C. Distinguish between the client-server and peer to peer models of distributed systems.   **2**

3A. Consider a computer system that runs 5000 jobs per month with no deadlock-prevention or deadlock-avoidance scheme. Deadlocks occur about twice a month,

and the operator (a salaried employee) must terminate and rerun about 10 jobs per deadlock. The operator notices immediately when deadlock has occurred because their screen shows the computer's running processes. Each job is worth about $2 (in CPU time), and the jobs terminated tend to be about half-done when they are aborted. A system programmer has estimated that a deadlock-avoidance algorithm (like the banker's algorithm) could be installed in the system with an increase in the average execution time per job of about 10 percent. Since the machine currently has a 30 percent idle time, all 5000 jobs per month could still be run.

Should the company install the algorithm? List the reasons why or why not. Also explain deadlock prevention methods.   5

3B. Explain disk space allocation methods.   3

3C. Consider a computer system with a 32-bit logical address of 4-KB page size. The system supports up to 512 MB of physical memory. How many entries are there in each of the following?
    i. A conventional single-level page table.   2
    ii. An inverted page table.

4A. Explain common schemes for defining logical level structure of directory.   5

4B. Explain sharing of code in a paging environment with a neat diagram.   3

4C. Compare the throughput achieved by a RAID level 5 organization with the RAID level 1 organization for the following:
a. Read operations on single blocks
b. Read operations on multiple contiguous blocks.   2

5A. Consider the following page reference string: 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. How many page faults would occur for replacement by LRU, FIFO and Optimal? Consider the frame size as 3 & 7. All frames are initially empty and first unique page reference causes a page fault.   5

5B. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests in order is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms?

    i. SSTF
    ii. C-SCAN
    iii. LOOK   3

5C. Is it possible to have a deadlock involving only a single process? Explain.   2