**T.E. (Computer) (Semester – V) (RC) Examination, Nov./Dec. 2015**
**OPERATING SYSTEMS**

Duration : 3 Hours                                                      Total Marks : 100

**Instruction :** *Attempt **any five** questions by selecting at least **one** question from **each** Module.*

## MODULE – 1

1. a) What is an operating system ? State its goals.                                   4

   b) With the help of an appropriate diagram, explain process states and its transitions in a 5 state model.                                   8

   c) What is priority inversion ? How can this problem be solved ?         4

   d) Differentiate between preemptive and non preemptive scheduling.    4

2. a) Define Monitors. Write a solution to dining philosopher problem using monitors.                                   8

   b) What do you mean by multithreading ?                                   4

   c) Draw Gantt chart and calculate average wait time and average turnaround time for the following scheduling algorithms :

      i) Preemptive priority based scheduling

      ii) Shortest job first scheduling.

| Process | Arrival Time (ms) | Burst Time (ms) | Priority |
|---------|-------------------|-----------------|----------|
| $P_1$   | 1                 | 2               | 3        |
| $P_2$   | 2                 | 4               | 2        |
| $P_3$   | 2                 | 1               | 1        |
| $P_4$   | 3                 | 2               | 4        |

   Assume lower numbers means high priority.                                   8

## MODULE – 2

3. a) Explain paging as a memory management technique.                                    **6**

   b) How can we recover from deadlocks ?                                                 **6**

   c) Consider the following snapshot of a system :

| Processes | Allocation | | | | Max | | | | Available | | | |
|-----------|---|---|---|---|---|---|---|---|---|---|---|---|
|           | A | B | C | D | A | B | C | D | A | B | C | D |
| P0        | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 2 | 1 | 5 | 2 | 0 |
| P1        | 1 | 0 | 0 | 0 | 1 | 7 | 5 | 0 |   |   |   |   |
| P2        | 1 | 3 | 5 | 4 | 2 | 3 | 5 | 6 |   |   |   |   |
| P3        | 0 | 6 | 3 | 2 | 0 | 6 | 5 | 2 |   |   |   |   |
| P4        | 0 | 0 | 1 | 4 | 0 | 6 | 5 | 6 |   |   |   |   |

   Answer the following questions using the banker's algorithm :

   i) What is the content of the matrix need ?                                            **1**

   ii) Is the system in a safe state ? If so, find the safe sequence.                     **3**

   iii) Can a request (0, 4, 2, 0) from process P1 be granted immediately ?              **4**

4. a) Differentiate between external and internal fragmentation.                          **4**

   b) What do you understand by the term fetch policy ?                                   **6**

   c) Write a point of difference between logical address space and physical address
      space.                                                                             **2**

   d) Consider the following page reference strings :

      1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.

      How many page faults will occur for the following page replacement algorithms ?
      Assume a set of 3 page frames.

      i) LRU

      ii) Optimal.                                                                        **8**

## MODULE – 3

5. a) What are the different methods to handle bad blocks ?                               **6**

   b) State the various file access methods.                                             **6**

c) Define the following terms :
   i) Seek time
   ii) Rotational latency.     **2**

d) Suppose the disk has maximum 200 cylinders numbered from 0 to 199. The disk arm is currently at cylinder number 80 and the previous request was at 83. The queue of pending request in FIFO order is : 185, 15, 195, 65, 155, 85, 170, 90.

   Starting from the current head position, what is the total head movement in tracks for each of the following disk scheduling algorithms ?
   i) Shortest seek time first
   ii) SCAN.     **6**

6. a) How is swap space used ? Where is it located on a disk ?     **6**
   b) Write a short note on UNIX file management.     **6**
   c) Briefly explain the different directory structures.     **8**

## MODULE – 4

7. a) What is digital immune system ?     **6**
   b) Write a shell script to find the area of a rectangle.     **4**
   c) Explain any two password selection strategies.     **6**
   d) Explain with an example the following shell commands :
   i) Tail            ii) Who
   iii) Man          iv) WC.     **4**

8. a) Explain the purpose of salt in UNIX password protection technique.     **3**
   b) Write a shell script to print all prime numbers less than 20.     **7**
   c) What is a virus ? Explain the life cycle of a virus.     **6**
   d) Write shell commands for the following :
   i) To know the type of a file.
   ii) To know your personal shell.
   iii) To display the calender date of 21$^{st}$ January 2012.
   iv) To change file permissions.     **4**