Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/(EEE-NEW)/SEM-6/EEE-604A/2013

2013

OPERATING SYSTEM

Time Allotted : 3 Hours *Full Marks :* 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :

10 × 1 = 10

i) Which system call is used to replace a process image.

a) Sysreplace ( )

b) execl ( )

c) getpid ( )

d) msgget ( )

ii) Which of the following multithreading model does not exist ?

a) One to One

b) One to Many

c) Many to One

d) Many to Many.

iii) Which of the following page replacement strategy suffers from Belady's anomaly ?

a) LRU

b) FIFO

c) Optimal

d) Both (a) and (b).

iv) In a system where multiple number of Processor are engaged to execute multiple no task is

a) Multiprogramming

b) Multitasking

c) Multiprocessing

d) None of these.

v) The time spent by a process in a ready queue and when it first gets the CPU for execution is

a) Turnaround time

b) Response time

c) Waiting time

d) None of these.

vi) Fixed partition memory allocation leads to

a) Internal Fragmentation

b) External Fragmentation

c) Both (a) & (b)

d) None of these.

vii) Which is not a layer in a Operating System ?

a) Shell

b) Kernel

c) Application Programs

d) Critical System.

viii) Round robin scheduling is essentially the preemptive version of

a) FIFO

b) Shortest job first

c) Shortest remaining time

d) Longest time first.

ix) Let *S* and *Q* be two semaphores initialized to 1, where PO and P1 processes the following statements wait (S); wait (Q); .... : signal (S); signal (Q) and wait (Q); wait (S); ...; signal (Q); signal (S); respectively. The above situation depicts a ..... .

a) Semaphore

b) Deadlock

c) Monitor

d) Interrupt.

x) What is a shell ?

a) It is a hardware component

b) It is command interpreter

c) It is a part in compiler

d) It is a tool in CPU scheduling.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What is a process ? Draw the state transition diagram of a process. Explain PCB. 1 + 2 + 2
3. What is the difference between multiprogramming and multitasking ?
4. a) What is Virtual memory ? Describe its advantages.
   b) Describe the differences between short term & long term scheduler. 3 + 2
5. a) Explain the condition of deadlock.
   b) What is starvation ? 3 + 2
6. Briefly explain the role of Semaphore in critical section problem.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Consider the following page reference string :

   1, 2, 3, 4, 21, 56, 21, 2, 3, 7, 6, 3, 2, 1, 2, 36

   How many page faults would occur for the following replacement algorithm.

   Assume 4 frames are available

   i) LRU Replacement

   ii) Optimal replacement.

   b) When does page fault occur ?

   c) What is the problem of fragmentation and how can it be solved ? 8 + 2 + 5

8. a) Define waiting time and turnaround time and response time of a process.

b) Explain how the performance of Round Robin scheduling algorithm depends on the size of time quantum with respect to context switch.

c) Consider the following set of processes, with the length of CPU burst given in Milliseconds.

Process	Arrival Time	Burst time	Priority
P1	0	5	2
P2	1	2	2
P3	1	4	1
P4	2	2	3
P5	3	3	4

Draw the Gantt chart for the execution of these processes using the following scheduling algorithms and also determine the average waiting time for each process.

i) Shortest Job First

ii) Priority

iii) Round Robin (Assume that time quantum size is 3)

3 + 3 + 9

9. a) Consider a disk drive with 2000 cylinders, numbered from 0 to1999. The disk head is at cylinder 105 while it was servicing the request and moving towards cylinder 0. The disk request are pending for service according to the following order

   125, 525, 925, 325, 1125, 1725, 1425, 625, 225, 825,

   Starting from the current position, what is the total distances (in cylinders) that the disk arm moves for each of the disk scheduling algorithms ?

   i) SSTF

   ii) SCAN

   iii) C-SCAN

   b) What do you mean by synchronous I/O and asynchronous I/O ?

   c) What is bootstrap program ? Define sek time and rotational latency ? 6 + 4 + 5

10. a) What are the drawbacks of semaphore ?

    b) How the Readers — Writer problem can be solved using semaphore ?

    c) What is the difference between deadlock & starvation ? 4 + 7 + 4

11. Write short notes for any *three* of the following : 3 × 5

    a) Dining Philosopher's problem

    b) Direct Memory access

    c) Directory Implementation of file systems

    d) Demand Paging

    e) User level thread and kernel level thread.