Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B. Tech (EE) /SEM-5/CS-513/2011-12

2011
SYSTEM PROGRAMMING AND 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 : $10 \times 1 = 10$

   i) Which of the following translator programs converts assembly language program to object program ?

   a) Assembler b) Loader

   c) Compiler d) Linker.

   ii) In absolute loading scheme, ... loader function is accomplished by an assembler.

   a) relocation b) allocation

   c) linking d) loading.

   iii) Wait-for graph is used for

   a) deadlock prevention b) deadlock avoidance

   c) deadlock detection d) all of these.

iv) Elevator algorithm is also known as ..... algorithm.

a) FCFS b) SSTF

c) C-SCAN d) SCAN.

v) 'Allocate the smallest hole that is big enough', defines ..... memory allocation scheme.

a) first fit b) best fit

c) worst fit d) partitioning.

vi) Compaction is required to get rid of

a) paging

b) internal fragmentation

c) segmentation

d) external fragmentation.

vii) Which one of the following is not a program threat ?

a) Virus b) Worm

c) Trojan horse d) None of these.

viii) The ..... scheduler selects the jobs from the pool of jobs and loads them to the ready queue.

a) long term b) medium term

c) short term d) none of these.

ix) When a running process is interrupted, it switches its state to ..... state.

a) terminated

b) ready

c) waiting

d) either ready or waiting.

x) If the time quantum is very large, then Round Robin scheduling algorithm approaches to ..... scheduling algorithm.

a) SJF b) Priority

c) SRTF d) None of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.

$3 \times 5 = 15$

2. a) What is the advantage of two-pass assembler over a single-pass assembler ?

b) What are absolute loader and relocating loader ? 2 + 3

3. a) Write down the advantages of assembly languages.

b) What is LC processing ? 3 + 2

4. Explain the interrupt driven I/O cycle. 5

5. a) Explain the conditions of deadlock.

b) What is starvation and rollback ? 3 + 2

6. a) What is a semaphore ?

b) Explain semaphore with a classical synchronization problem. 2 + 3

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) What do you mean by forward referencing ?

   b) Discuss about various data structures and passes of a two pass assembler.

   c) What is nested macro call ?

   d) What are the function of a compiler ? 2 + 8 + 2 + 3

8. a) Define waiting time and turn around time and preemptive scheduling algorithm.

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

   c) Briefly explain critical section problem

   d) 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 determine the average waiting time for each process.

i) SJF

ii) Priority

iii) Roun Robin (time quantum = 3) 3 + 3+ 3 + 6

9. a) Explain paging technique paging technique with TLB in brief.

b) Discuss demand paging.

c) What is Belady's anomaly ?

d) Consider the following page reference string : 1, 2, 3, 4, 2, 1, 5, 6, 2, 1,2, 3, 6, 3, 2, 1.

How many page faults would occur for LRU & Optimal replacement algorithms, (assuming four frames are free) ? 4 + 3 + 2 + 6

10. a) What is bootstrap program ? Define seek time and rotational latency.

b) Consider a disk drive with 2000 cylinders, numbered 0 to 1999. The disk head is at cylinder 105 while it was servicing the request and moving towards cylinder 0. The disk requests 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

c) Write do you mean by synchronous I/O and asynchronous I/O ? 2 + 3 + 6 + 4

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

a) Distributed Operating System

b) Thread

c) Operating system services

d) Macro

e) Editors and debuggers.