Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/(ICE-NEW)/SEM-6/IC-604D/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) Banker's algorithm solves the problem of

a) deadlock avoidance

b) deadlock recovery

c) deadlock prevention

d) mutual exclusion.

ii) A thread is a

a) task b) process

c) program d) light weight process.

iii) The time to move the disk arm to the desired cylinder in hard disk is known as

a) rotational latency b) seek time

c) positional time d) disk time.

iv) Thrasing

a) reduces page I/O

b) decrease the degree of multiprogramming

c) implies excessive page I/O

d) improve the system performance.

v) ..... provides an interface to the operating system for the user.

a) Kernel b) Micro kernel

c) Shell d) None of these.

vi) Which scheduling policy is most suitable for a time-shared operating system ?

a) Shortest job first b) Round robin

c) First come first serve d) Priority.

vii) Compaction is used to solve the problem of

a) external fragmentation

b) internal fragmentation

c) both of these

d) none of these.

viii) RAID configuration disk are used to provide

a) fault tolerance b) nearest cylinder next

c) high data density d) none of these.

ix) The scheduler which selects jobs from the pool of jobs and loads to the ready queue is

a) long term b) short term

c) medium term d) none of these.

x) Part of the program where the shared memory accessed and which should be executed indivisibly, is called

a) semaphores b) directory

c) critical section d) mutual exclusion.

GROUP – B
(Short Answer Type Questions)

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

2. a) What is an Operating System ?

   b) Explain the functions of an Operating System.

   c) Give an example of a batch system. 1 + 3 + 1

3. a) What is a Critical Region ?

   b) What is a process ? Explain the state diagram for process wrt UNIX O/S.

   c) What is Kernel thread ? 1 + 3 + 1

4. a) What do you mean by preemptive & non-preemptive scheduling ?

   b) What are the different scheduling criteria ? 3 + 2

5. a) What is context switching ?

   b) What is semaphore ?

   c) What is multilevel feedback queue scheduling ?

   2 + 1 + 2

6. What is fragmentation ? Explain different types of fragmentation. 2 + 3

GROUP – C
(Long Answer Type Questions)
Answer any *three* of the following. 3 × 15 = 45

7. What is paging ? Explain the hardware for paging. How does paging differ from segmentation wrt Hardware ? What is Virtual memory ? How can segmentation be done with the concept of virtual memory ? What is external fragmentation ?

2 + 5 + 2 + 1 + 3 + 2

8. What is Dead Lock ? What are the conditions for deadlock ? Give practical examples to demonstrate recovery from deadlock ? What are allocation, need and max matrices wrt Banker's algorithm ? Does presence of cycle in a resource allocation graph necessarily creates deadlock ? Explain your answer. What are safe and unsafe states ? What is a resource allocation graph ? 1 + 3 + 2 + 2 + 3 + 3 + 1

9. a) What is job scheduling ? What are CPU and I/O bursts ?

b) Suppose that the following processes arrived for execution at the times indicated :

Process	Arrival time	Burst time
P1	0.0	8
P2	0.4	4
P3	1.0	1

What is the average waiting time for these processes with FCFS scheduling algorithm and RR scheduling algorithm with time quantum = 2 ?

c) What is Dispatch Latency ?

d) What is SRT scheduling ? 2 + 3 + 5 + 2 + 3

10. a) State 50% rule. How it affects fragmentation ?

b) Given a process size memory size 1024 k. Allocate the following processes with sizes 100k, 90k, 230k, 38k, 120k. Calculate internal & external fragmentation.

c) What is compaction ? Why is it useful ? 5 + 5 + 5

11. a) Explain thrashing. Thrashing is severe in global page replacement — Justify.

b) Calculate page faults using LRU and Optimal page replacement algorithm with the following reference string with four page frames.

1 2 3 4 5 3 4 1 6 7 8 7 8 9 7 8 9 5 4 5 4 2

$6 + \left(4\frac{1}{2} + 4\frac{1}{2} \right)$