Name: ....

Roll No.: ....

Invigilator's Signature: ....

CS/B.Tech(CSE/IT)/SEM-5/CS-501/2009-10

2009

OPERATING SYSTEM

Time Alloted: 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 Question)

1. Choose the correct alternatives for the following: [Marks 10*1 = 10]

   i)   If a process has 32 k bytes logical address space and the page size is

   2048 bytes than the number of frames of that process is

   a) 4   b) 8

   c) 16   d) 16

   ii)   What is a shell?

   a) It is a hardware component.

   b) It is a command interpreter.

c) It is a part in compiler.

d) It is a tool in CPU scheduling.

iii) Variable partition memory allocation can lead to

a) External fragmentation.

b) Internal fragmentation.

c) Both (a) and (b).

d) None of these.

iv) Suppose that a process is in BLOCKED state waiting for some I/O service.

when the service is completed, it goes to the

a) RUNNING state.   b) READY state.

c) SUSPENDED state.   d) TERMINATED state.

v) IPC stands for

a) Internal Program Controller.   b) Internal Process Control.

c) Interprocess Communication.   d) None of these.

vi) SPOOLING stands for

a) Spontaneous Peripheral Operation Online.

b) Small Peripheral Operation Online.

c) Simultaneous Peripheral Operation Online.

d) None of these.

vii) Page fault occurs when

a) The page is corrupted by application software.

b) The page is not in main memory.

c) The page is in main memory.

d) One tries to divide a number by 0.

viii)   Page Stealing is

a) A sign of efficient system.

b) Taking larger disk spaces for pages paged out.

c) Taking page frames from other working sets.

d) One of the tuning goals.

ix)   The general structure of a process consists of

a) Critical Section.   b) Reminder Section.

c) Race Condition.   d) Both (a) and (b).

x)   Scheduling a process from Ready Queue to CPU is done by

a) Short Term Scheduler.

b) Middle Term Scheduler.

c) Long Term Scheduler.

d) Dispatcher

GROUP – B

(*Short Answer Type Questions*)

Answer any *three* of the following   [Marks 3*5 = 15]

2. a) What is 'response time'?   [Marks 1]

   b) With the help of a state transition diagram, explain various states of a process.

                                                                               [Marks 2]

c) What is a zombie process and how it may manifest itself?   [Marks 2]

3. Suppose a disk drive has 300 cylinders, numbered 0 to 299. The current head

    position of the disk is at 90. The queue of pending requests, in FIFO order is 36,

    79, 15, 120, 199, 270, 89, 170.   [Marks 3]

    Calculate the average cylinder movements for Shortest Seek Time First (SSTF)

    algorithm. Mention any one disadvantage of SSTF.   [Marks 2]

4. a) Describe Process control Block with proper explanation.   [Marks 3]

    b) What is the purpose of system calls?   [Marks 2]

5. a) Mention one characteristic each of Time sharing System andBatch Processing

       System.   [Marks 2]

    b) What are the advantages and disadvantages of having unequal size partitions in

       fixed partitioning scheme?   [Marks 3]

6. a) Why are page sizes always power of 2?   [Marks 2]

   b) What is the difference between logical and physical address?   [Marks 3]

GROUP – C

(*Long Answer Type Questions*)

Answer any *three* of the following   [Marks 3*15 = 45]

7. a) Consider the following snapshot of a system where r_i (i= 1.......4) denote resource types and p_1 to p_5 denote processes. The vector 'Available' has usual meaning.

Available :

r_1	r_2	r_3	r_4
2	0	0	0

Current Allocation: *Maximum Demand:*

Process	r_1	r_2	r_3	r_4	r_1	r_2	r_3	r_4
p_1	0	0	1	2	0	0	1	2
p_2	2	0	0	0	2	7	5	0
p_3	0	0	3	4	6	6	5	6
p_4	2	3	5	4	4	3	5	6
p_5	0	3	3	2	0	6	5	2

   i) Is this system currently in a safe state? Justify your answer.   [Marks 4]

   ii) If a request from p_3 arrives for (0, 1, 0, 0), can that request be safely granted immediately?   [Marks 3]

b) Consider the following set of process. CPU burst time of them are given milliseconds.

Process	CPU Burst Time (ms)
p_1	15
p_2	5
p_3	7
p_4	10

Draw the Gnatt Chart for Round Robin Scheduling where time quantum q = 4

milliseconds. Calculate the Average Waiting Time and Turn Around Time.

[Marks 4]

Mention the advantages and disadvantages of Round Robin Scheduling.

[Marks 4]

8. a) Consider a system with a 32-bit logical address space, a two-level paging scheme,
4 byte page table entries, 1 kB pages and a 4 entry TLB. The page-table base
register access time is 0 ns, TLB access time is 10 ns and memory access time is
100 ns.

   i) How many address bits are needed for the page offset?   [Marks 2]

   ii) How much memory in bytes is required to store the outer page table entirely

       in main memory?   [Marks 3]

   b)   i) Given references to the following pages by a program.

       0, 9, 1, 8, 1, 8, 7, 8, 7, 1, 2, 8, 2, 7.

       How many page faults will occur if the program has three (3) page frames

       available to it?   [Marks 2]

       And uses both FIFO replacement strategy and LRU strategy?   [Marks 3]

       ii) Which replacement strategy in the above performs better & why? [Marks 2*4 +2]

9. a) On a simple paged system, if references satisfied by the associative registers take 100 ns & references through the main memory page table take 180 ns, what must the hit ratio be to achieve an effective access time of 125 ns?   [Marks 6]

   b) What are the two major differences between segmentation & paging?   [Marks 3]

   c) How is paging implemented in hardware?   [Marks 4]

   d) What is Internal Fragmentation?   [Marks 2]

10. a) What is Context Switching? Why is it considered to be an overhead?   [Marks 5]
    b) What are the differences between process and thread?   [Marks 3]
    c) "All unsafe states may not lead to deadlock"- Why or why not?   [Marks 3]
    d) What is thrashing? What is its effect on the system?   [Marks 4]

11. Write short notes on the following:
    a) Kernel Level Thread   [Marks 3]
    b) Scan Disk Scheduling Algorithm   [Marks 3]
    c) Linked File Allocation Technique   [Marks 3]
    d) Belady's Anomaly   [Marks 3]
    e) Shortest Job First (SJF) Scheduling   [Marks 3]