



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech/EE(O)/SEM-5/CS-513/2012-13  
2012**

**SYSTEM PROGRAMMING & 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) Producer consumer problem can be solved by using
    - a) semaphores
    - b) monitors
    - c) all of these
    - d) none of these.
  - ii) The ..... scheduler selects the job from the pool of jobs and load them to the ready queue.
    - a) long term
    - b) short term
    - c) medium term
    - d) none of these.
  - iii) While booting from hard disk the bootstrap program is loaded into memory by
    - a) master boot program
    - b) bootstrap loader program
    - c) command.com
    - d) lo.SYS



- iv) A thread is a
- a) task
  - b) process
  - c) program
  - d) light-weight process.
- v) 8085 microprocessor supports
- a) 8-bit
  - b) 4-bit
  - c) 32-bit
  - d) 16-bit.
- vi) The technique of gradually increasing the priority of a process that wait in a system for a long time is known as
- a) blocking
  - b) starvation
  - c) ageing
  - d) convey effect.
- vii) Which of the following provides an interface from user to operating system ?
- a) Kernel
  - b) Shell
  - c) Microkernel
  - d) Monolithic kernel.
- viii) Compaction is used to solve the problem of
- a) external fragmentation
  - b) internal fragmentation
  - c) both of these
  - d) none of these.



- ix) Memory protection is normally provided by
- a) compiler
  - b) user program
  - c) operating systems modules
  - d) processor.
- x) RAID configuration disks are used to provide
- a) fault tolerance
  - b) nearest cylinder next
  - c) high data density
  - d) none of these.

**GROUP - B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. What is process control block ? Which information is maintained in it ?
3. What is the difference between absolute and relocatable loader schemes ?
4. Differentiate between process and thread. Differentiate between process and program.  $2 + 3$
5. What are the main purposes of operating system ? Draw the state diagram of a process.  $3 + 2$



**GROUP – C**

**( Long Answer Type Questions )**

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

6. For the process listed below :

<b><i>Process</i></b>	<b><i>Arrival time</i></b>	<b><i>CPU burst time</i></b>
<b><i>A</i></b>	0	4
<b><i>B</i></b>	2	7
<b><i>C</i></b>	3	2
<b><i>D</i></b>	3	2

Consider the following scheduling algorithm used :

- a) First come first serve
- b) Shortest job first
- c) Shortest remaining time first
- d) Round robin ( Quantum = 2 )
  - i) Draw a Gantt chart illustrating the execution for each of the scheduling algorithm.



- ii) Find average turnaround time for each of the scheduling algorithms.
- iii) Find average waiting time for each of the scheduling algorithms.

What is the difference between preemptive and non-preemptive scheduling policy ?

Describe the difference between long term scheduler and short term scheduler. 10 + 3 + 2

7. Write down the four necessary conditions of deadlock.

Consider the following snapshot of a system :

	<b>Allocation</b>				<b>Max</b>				<b>Available</b>			
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
$P_1$	0	0	1	2	0	0	1	2	1	5	2	0
$P_2$	1	0	0	0	1	7	5	0				
$P_3$	1	3	5	4	2	3	5	6				
$P_4$	0	6	3	2	0	6	5	2				
$P_5$	0	0	1	4	0	6	5	6				

Answer the following questions using Banker's algorithm :

- a) What is the content of the matrix need ?
- b) Is the system safe state ?
- c) If a request from process  $P_1$  arrives for ( 0, 4, 2, 0 ), can the request be granted immediately ? 5 + 10



8. a) What is critical section problem ? What are the conditions that must be satisfied by the solution to a critical section problem ? What is Belady's anomaly ?
- b) Consider three processes  $(P_1, P_2, P_3)$ .  $S_1, S_2, S_3$  are the statements of  $P_1, P_2, P_3$  respectively. We require that  $S_2$  be executed only after  $S_1$  has completed.  $S_3$  be executed after  $S_2$  has completed. Using semaphore solve the problem.
- c) Derive an algorithm for Dining Philosopher problem using semaphore.  $2 + 2 + 1 + 5 + 5$
9. a) Explain the working of a two-pass assembler.
- b) Given memory partitions of 100 K, 500 K, 200 K, 300 K and 600 K ( in order ) how would each of the first fit, best fit and worst fit algorithms place processes of 212 K, 417 K, 112 K and 426 K ( in order ) ? Which algorithm makes the most efficient use of memory ?



- c) Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143 and the previous request was at 125. The queue of pending requests, in FIFO order is 86, 1470, 913, 1774, 948. Starting from the current position what is the total distance ( in cylinders ) that the disk arm moves for each of the disk-scheduling algorithms ?

i) FCFS

ii) SCAN

iii) SSTF

iv) C-SCAN

5 + 5 + 5

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