Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/MCA/SEM-3/MCA-301/2012-13
2012
OPERATING SYSTEMS AND SYSTEMS SOFTWARE

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 from the following :

$10 \times 1 = 10$

i) Total time taken by a process to complete execution is called

    a) Waiting time   b) Turnaround time

    c) Response time   d) Throughput.

ii) Virtual memory means

    a) The job size is not bounded by the physical memory limit

    b) The job size is bounded by the physical memory limit

    c) Independent of physical memory limit

    d) None of these.

3074   [Turn over

iii) Banker's algorithm for resource allocation is used in

   a) deadlock prevention

   b) deadlock avoidance

   c) deadlock recovery

   d) mutual exclusion.

iv) Thrashing

   a) reduces page I/O

   b) decreases the degree of multiprogramming

   c) implies excessive page I/O

   d) improves the system performance.

v) Which of the following page replacement algorithms suffers from Belady's anomaly ?

   a) Optimal replacement   b)   LRU

   c) FIFO   d)   Both (a) & (c).

vi) Which scheduling policy is most suitable for the time sharing operating system ?

   a) Shortest job first

   b) Round robin

   c) First come First Serve

   d) Multilevel queue.

vii) The default remedy of starvation is

a) Ageing

b) Critical section

c) Mutual exclusion

d) All of these.

viii) An address generated by the CPU is commonly referred to as

a) Logical address

b) Physical address

c) Relational address

d) None of these.

ix) The time for the disk arm to move the heads to the cylinder containing the desired sector is

a) Seek time

b) Latency time

c) Seek and Latency time

d) Transmission time.

x) The scheduler who selects jobs from the pool of jobs and loads them to the ready queue is

a) Long term

b) Short term

c) Medium term

d) None of these.

GROUP – B

(Short Answer Type Questions)

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

2. Explain state transition diagram of a process.

3. a) What are external and iternal fragmentation ?

    b) How is external fragmentation solved ?

4. a) What is the role of a compliler ?

    b) State the difference between a compiler and an interpreter.   2 + 3

5. Consider the following set of processes :

Process	CPU burst time
P1	15
P2	5
P3	7
P4	10

    Draw the Gantt chart using RR scheduling where time quantum is 5 millisecond. Calculate the average waiting time.

    3 + 2

6. Discuss necessary conditions for deadlock.

GROUP – C

(Long Answer Type Questions)

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

7. a)   For the processes listed below :

Process	Arrival time	Processing time
A	0	4
B	2	7
C	3	2
D	3	2

Consider the Shortest-remaining-time-first scheduling algorithms :

i)   Draw a chart illustrating the execution.

ii)   Find average turn-around time of the processes.

iii)   Find average waiting time of the processes.

iv)   Find average response time of the processes.

b)   What do you mean by pre-emptive and non-pre-emtive scheduling ?

c)   Discuss multi-level feedback queue scheduling.

(2 + 2 + 2 + 2) + 3 + 4

8. a)   Consider the following snapshot of a system :

Process	Allocation	Max	Available
	A B C D	A B C D	A B C D
P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm :

i)   What is the content of the matrix need ?

ii)   Is the system in a safe state ?

    b)   What is the advantage of segmentation over paging ?

    c)   What are the conditions that must be satisfied by the solution to a critical section problem ?   (2 + 6) + 3 + 4

9.   a)   Consider the following page reference string :

        1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6

        How many page faults would occur for FIFO replacement algorithms ?

        Assume 4 (forur) frames are available.

    b)   Explain briefly the memory-management scheme of paging.

    c)   What is 'thrashing" ?   6 + 7 + 2

10. a)   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 and 170. Calculate the average cylinder movements for the following algorithms :

        i)   SSTF

        ii)   C-SCAN.

    b)   Describe a solution to the Dining philosopher's problem using monitor.

    c)   Explain contiguous-allocation of file space on disk.

                               (3 + 3) + 5 + 4

11. a) Given memory partitions of 100k; 500k, 200k, 300k & 600k (in order).

How would each of the first-fit, best-fit & worst-fit algorithms place processes of 212 k, 417k, 112k & 426k (in order) ? Which algorithm makes the most efficient use of memory ?

b) What is the advantage of two pass assembler over a single pass assembler ?

c) What are buffering and spoofing ?

d) What are the different phases of a compiler ?

$$(2 + 2 + 2) + 3 + (2 + 2) + 2$$