

Class Test – I

MCA 2<sup>nd</sup> Year 2<sup>nd</sup> Semester

Session: 2016-17

Date: 09/09/2016

Full Marks: 30

Time: 50 minutes

Name: \_\_\_\_\_

Class Roll: \_\_\_\_\_

Marks Obtained: \_\_\_\_\_

Write proper justifications for all your answers

1.  $P_1$ ,  $P_2$  and  $P_3$  are three processes executing their respective tasks. They should synchronize among themselves using semaphores such that the string "ABCACB" gets printed infinite times. Determine, minimum number of semaphores required and their initial values. Also identify places where operations on those semaphore should be inserted in the code of  $P_1$ ,  $P_2$  and  $P_3$ .

$P_1$ while(true){ print("A"); }	$P_2$ while(true){ print(" B"); }	$P_3$ while(true){ print("C"); }
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2. Consider the following set of processes with the arrival times and the CPU burst times given in milliseconds

Process	Arrival Time	Burst Time (ms)
$P_1$	0	6
$P_2$	1	4
$P_3$	2	3
$P_4$	4	2

Determine the turnaround time and waiting time for all the processes using preemptive and non-preemptive shortest job first scheduling policy. In both the cases ties are broken by giving priority to the process with lowest id. If the context switch time is 1 ms, determine the total time required to execute all the processes in both the cases.

3. A system has four processes and four allocable resource types each having 3, 12, 10, and 9 instances respectively. The current allocation and maximum requirements for each process are as follows:

Process	Allocation	Maximum
$P_1$	0 0 1 1	0 0 1 2
$P_2$	1 0 0 1	1 6 5 1
$P_3$	1 2 4 3	2 3 4 5
$P_4$	0 5 2 2	0 6 5 2

Is the system in a safe state? If a request from process  $P_2$  arrives for (0, 4, 2, 0) can the request be granted immediately.

4. Modify the solution to the Readers-Writers problem to restrict at most 3 simultaneous Readers. Other synchronization requirements remain the same.

8+8+10+4=30