**CSI 4500 Operating System**

**Homework** **on Synchronization**

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

Total: 50 pts

Question 1. [25 pts] In the following code, four processes produce output using the routine “printf” and synchronize using three semaphores “R”, “S” and “T.” We assume function ‘printf’ wont cause context switch.

Semaphore R=1, S = 3, T = 0; /\* initialization \*/

/\* process 1 \*/ /\* process 2 \* /\* process 3 \*/ /\*process 4 \*/

while(true) { while(true) { while(true) { while(true) {

P(S); P(T); P(T); P(R);

printf(‘A’); printf (‘B’); printf (‘D’); printf (‘E’);

printf (‘C’); V(R); V(T);

V(T); } }

} }

a) How many A and B’s are printed when this set of processes runs?

b) What is the smallest number of D’s that might be printed when this set of processes runs?

c) Is AEBCBCDAA a possible output sequence when this set of processes runs? Clarify your answer.

Question 2. [**Critical Section: 25 pts**] Consider the following two processes P[i] and P[j]. Initially, flag[i] = flag [j] = false.

Do{

flag[i]=true;

While(flag[j]);

critical section

flag[i] = false;

remainder section

} while(1);

Do{

flag[j]=true;

While(flag[i]);

critical section

flag[j] = false;

remainder section

} while(1);

a) Does the above program satisfy the “progress” requirement? Justify your answer with an informal proof or counterexample. [Simple “Yes” or “No” without explanation]

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b) Is mutual exclusion assured? Justify your answer with an informal proof or counterexample.

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