CSE 313 Operating Systems

Class Test 2 Marks: 20 Time: 20 Minutes

Name _____ **Student ID** _____

There are **four** questions. Answer ALL.

1. **[10 points]** Consider the following state of a system with four processes, P1, P2, P3, and P4, and five types of resources, P, Q, R, S, and T:

C =

0	1	1	1	2
0	1	0	1	0
0	0	0	0	1
2	1	0	0	0

R =

1	1	0	2	1
0	1	0	2	1
0	2	0	3	1
0	2	1	1	0

E = (24144)

Using the deadlock detection algorithm for multiple resources, show that there is a deadlock in the system. Identify the processes that are deadlocked.

2. **[3 + 4 + 3 = 10 points]**
   a. What is the difference between a safe state and an unsafe state?
   b. Show that the following state is an unsafe state. Note that total resource count is 85.

	Has	Max
A	15	80
B	12	70
C	7	60
D	21	50
Free: 30		

   c. Assume that processes can release resources before requesting more. Give an example scenario for which starting from the state in Question 2 (b), all processes can complete execution. Write down the scheduling order. [No need to show the execution steps].