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CS-A , Roll no: 64 __/__/____

Q.1 The following program consists of 3 concurrent processes and 3 binary semaphores. S0 = 1, S1 = 0, S2 = 0

P0	P1	P2

while (true)
{
Wait(S0);
Print(0);
release(S1);
release(S2);
}
	Wait(S1);
	Release(S0);
		Wait(S2);
		Realse(S0);

Case I: S0 = X Ø X X 0, S1 = Ø 1 , S2 = Ø 1

P0 → P1 → P2 → P0

↓ ↓

'0' '0'

'0' printed twice.

Case II : S0 = X Ø X X 0, S1 = Ø 1, S2 = Ø 1

P0 → P2 → P1 → P0

↓ ↓

'0' '0'

'0' printed twice

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Case III :

S0 = ✗ Ø ✗ Ø 1 , S1 = Ø ✗ Ø 1 , S2 = Ø ✗ ✗ 0

P0 → P1 → P0 → P2 → P0 ....
↓ ↓ ↓
0 0 0

This can go on & on.
∴ Answer is atleast twice.

Q2. Given, W and X reads x from memory, increments by 1 & stores it to memory.
Y and Z reads x from memory, decrements by 2 & stores it to memory.

Semaphore is initialised to 2. , x = 0
S [2]

1.) W executes, S [2] 1 , x = 1 , this is not stored.
2.) Y executes, S [1] 0 , decrements x , x = 0 - 2 = -2
UP/Release = S [1]
3.) Z executes, S [1] 0 , x = -2 - 2 = -4
UP/Relase = S [Ø] 1
4.) W executes, updates x = -4 to 1 as it resumes & S [1] 2
5.) X executes, x = 1 + 1 = 2