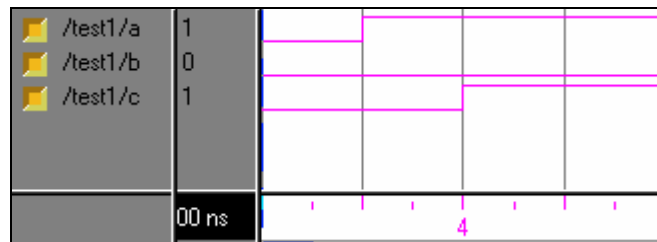


## COE 405 HW#3 Solution

Q.1. (4.2)

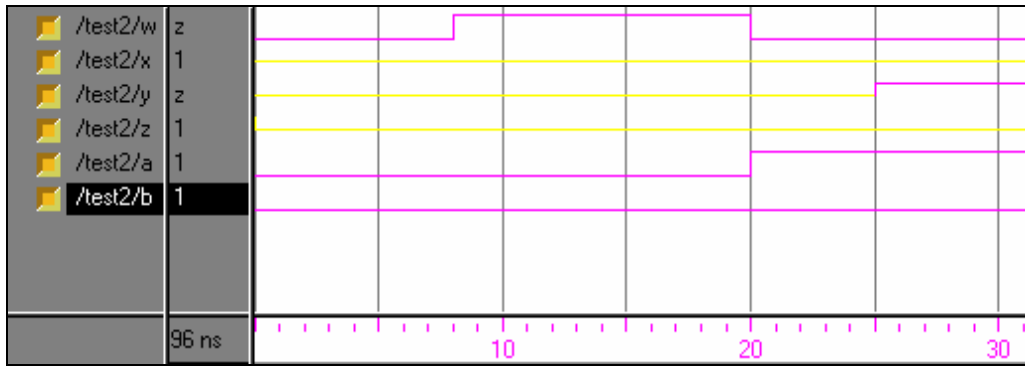
		T(0)	T(2)	T(4)	T(5)
A	Value	'0'	'1'	'1'	'1'
	Transaction(s)	('1', 2 ns)	---	---	---
B	Value	'0'	'0'	'0'	'0'
	Transaction(s)	('1', 3 ns)	<del>('1', 1 ns)</del> ('0', 3 ns)	('0', 1 ns)	---
C	Value	'0'	'0'	'1'	'1'
	Transaction(s)	('1', 4 ns)	('1', 2 ns)	---	---



Q.2. (4.6)

	T(0)	T(0+ $\delta$ )	T(0+2 $\delta$ )	T(8)	T(10)	T(20)	T(25)
W	'0'	'0'	'0'	'1'	'1'	'0'	'0'
	('1',8) (1',10)	('1', 8) (1',10)	('1', 8) (1',10)	(1',2)	---	---	---
X	'Z'	'Z'	'Z'	'Z'	'Z'	'Z'	'Z'
	---	---	---	---	---	---	---
Y	'Z'	'Z'	'Z'	'Z'	'Z'	'Z'	'1'
	---	---	---	---	---	(1',5)	---
Z	'1'	'Z'	'Z'	'Z'	'Z'	'Z'	'Z'
	('Z', $\delta$ )	---	---	---	---	---	---
A	'0'	'0'	'0'	'0'	'0'	'1'	'1'
	('0', $\delta$ ) (1',20)	(1',20)	(1',20)	(1',12)	(1',10)	---	---
B	'0'	'0'	'0'	'0'	'0'	'0'	'0'
	('0', $\delta$ ) (1',40)	(1',40)	(1',40)	(1',32)	(1',30)	(1',20)	(1',15)

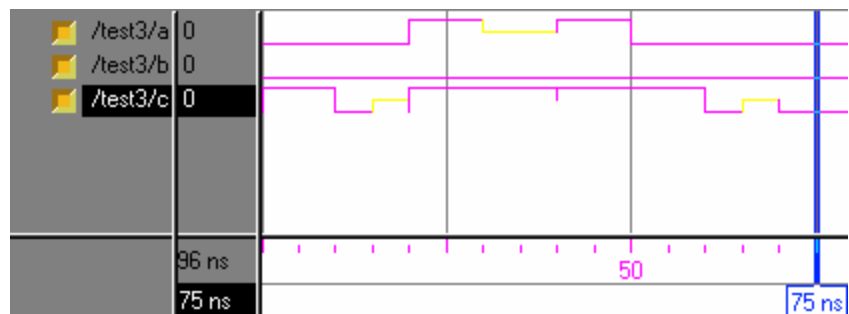
	T(40)	T(40+ $\delta$ )	T(40+2 $\delta$ )	T(48)	T(52)	T(55)
W	'0'	'0'	'0'	'Z'	'Z'	'Z'
	(1',10) (0',13) (Z',8)	(Z',8)	(Z',8)	---	---	---
X	'Z'	'1'	'1'	'1'	'1'	'1'
	(1', $\delta$ )	---	---	---	---	---
Y	'1'	'1'	'1'	'1'	'0'	'Z'
	(0',12) (Z',15)	(0',12) (Z',15)	(0',12) (Z',15)	(0',4) (Z',7)	(Z',3)	---
Z	'Z'	'Z'	'1'	'1'	'1'	'1'
	---	(1', $\delta$ )	---	---	---	---
A	'1'	'1'	'1'	'1'	'1'	'1'
	---	---	---	---	---	---
B	'1'	'1'	'1'	'1'	'1'	'1'
	---	---	---	---	---	---



Q.3. (4.14)

	T(0)	T(0+ $\delta$ )	T(10)	T(14)	T(15)	T(20)	T(20+ $\delta$ )	T(30)
A	'0'	'0'	'0'	'0'	'0'	'1'	'1'	'Z'
	( $'0', \delta$ )	( $'1', 20$ )	( $'1', 10$ )	( $'1', 6$ )	( $'1', 5$ )	( $'Z', 10$ )	( $'Z', 10$ )	(1', 10) (0', 20)
	(1', 20)	(Z', 30)	(Z', 20)	(Z', 16)	(Z', 15)	(1', 20)	(1', 20)	
	(Z', 30)	(1', 40)	(1', 30)	(1', 26)	(1', 25)	(0', 30)	(0', 30)	
	(1', 40)	(0', 50)	(0', 40)	(0', 36)	(0', 35)			
(0', 50)								
B	'0'	'0'	'0'	'0'	'0'	'0'	'0'	'0'
	(0', $\delta$ ) (0', 14)	(0', 14)	(0', 4)	---	---	---	(1', 14)	(1', 4) (Z', 14)
C	'0'	'1'	'0'	'0'	'Z'	'0'	'1'	'1'
	(1', $\delta$ )	(0', 10)	(Z', 5)	(Z', 1)	(0', 5)	---	(1', 10)	(Z', 5)
	(0', 10)	(Z', 15)	(0', 10)	(0', 6)			(Z', 15)	(0', 10)
	(Z', 15)	(0', 20)				(0', 20)	(Z', 15)	
	(0', 20)						(0', 20)	

	T(40)	T(40+ $\delta$ )	T(50)	T(60)	T(64)	T(65)	T(70)
A	'1'	'1'	'0'	'0'	'0'	'0'	'0'
	(0', 10)	(0', 10)	---	---	---	---	---
B	'0'	'0'	'0'	'0'	'0'	'0'	'0'
	(Z', 4)	(Z', 4) (1', 14)	(1', 4) (0', 14)	(0', 4)	---	---	---
C	'Z'	'1'	'1'	'0'	'0'	'Z'	'0'
	(Z', 5)	(Z', 5)	(Z', 5)	(Z', 5)	(Z', 1)	(0', 5)	---
	(0', 10)	(0', 10)	(0', 10)	(0', 10)	(0', 6)		
	(1', 10)						
	(Z', 15)						
(0', 20)							



## Q.4.

*Entity Q4 is*

*End Q4 ;*

Architecture concurrent of Q4 is

signal x, x1, x2, y : bit;

begin

y <= '0', '1' after 10 ns,

'0' after 20 ns, '1' after 24 ns, '0' after 28 ns, '1' after 40 ns,

'0' after 44 ns, '1' after 50 ns, '0' after 70 ns, '1' after 74 ns,

'0' after 78 ns, '1' after 90 ns, '0' after 94 ns, '1' after 98ns;

x1 <= transport y after 5 ns;

x2 <= y after 5 ns;

x <= unaffected when x2'active else x1;

end concurrent;