Question 1 a).

Items	I1	I2	I3	I4	I5	I6
Transection-1 (T1)	0	0	1	0	1	0
T2	0	1	1	1	0	1
T3	1	0	0	0	1	0
T4	1	1	1	0	0	0
T5	0	0	0	1	0	0
T6	1	0	0	1	0	1
T7	0	0	1	1	1	1
T8	1	0	1	0	1	0
T9	1	0	0	1	0	0
T10	0	1	1	0	0	1

Scan Iteration-1:-

C1 ->

Transaction	Items
T1	{I3, I5}
T2	{ I2, I3, I4, I6 }
T3	{ I1, I5}
T4	{ I1, I2, I3}
T5	{ I4}
T6	{ I1, I4, I6}
T7	{ I3, I4, I5, I6}
T8	{ I1, I3, I5}
T9	{ I1, I4 }
T10	{ I2, I3, I6 }

C1 -> L1

Items	Support Count
I1	5
I2	3
I3	6
I4	5
I5	4
I6	4

Scan Iteration-2:-

C2 ->

Item set	Support Count
{ I1, I2 }	1
{ I1, I3 }	2
{ I1, I4 }	2
{ I1, I5 }	2
{ I1, I6 }	1
{ I2, I3 }	3
{ I2, I4 }	1
{ I2, I5 }	0
{ I2, I6 }	2
{ I3, I4 }	2
{ I3, I5 }	3
{ I3, I6 }	3
{ I4, I5 }	1
{ I4, I6 }	3
{ I5, I6 }	1

C2 -> L2

Item set	Support Count
{I2, I3}	3
{I3, I5}	3
{I3, I6}	3
{I4, I6}	3

L2 -> C3

Item set	Support Count
{ I3, I5, I6 }	1

Scan Iteration-3:-

In step C3->L3, There won't be any items in L3 since no item set has minimum support of 3.

Question 1 b).

If we pick one of the maximal set {I2, I3} from L2, the association rules are as follows

Let X = {I2, I3}: 3

Non-empty subsets of X are {I2}: 3 and {I3}: 6

So, we get the following association rules for {I2, I3}

1. {I2} => {I3} = $\frac{Support\ count\ of\ \{I2,I3\}}{Support\ count\ of\ \{I2\}} = \frac{3}{3} = 1.0$
2. {I3} => {I2} = $\frac{Support\ count\ of\ \{I2,I3\}}{Support\ count\ of\ \{I3\}} = \frac{3}{6} = 0.5$

Since the given confidence cut-off is 0.6, we would report only the first rule which is {I2} => {I3}, confidence = 1.0

Question 3).

The L3 frequent pattern set (Length-3) is:-

Frequent sequences L3
< {2} {3} {4} >
< {2 5} {3} >
< {3} {4} {5} >
< {1} {2} {3} >
< {1} {2 5} >
< {1} {5} {3} >
< {5} {3 4} >

Step 1: Join - Generation of candidates set C4

< ~~{2}~~ {3} {4} >	< {2} {3} ~~{4}~~ >
	< {2 5} ~~{3}~~ >
	< {3} {4} ~~{5}~~ >
	< {1} {2} ~~{3}~~ >
	< {1} {2 ~~5}~~ >
	< {1} {5} ~~{3}~~ >
	< {5} {3 ~~4~~} >

< {~~2~~ 5} {3} >	< {2} {3} ~~{4}~~ >
	< {2 5} ~~{3}~~ >
	< {3} {4} ~~{5}~~ >
	< {1} {2} ~~{3}~~ >
	< {1} {2 ~~5~~} >
	< {1} {5} ~~{3}~~ >
	< {5} {3 ~~4~~} >

< {3} {4} {5} >	< {2} {3} {4} >
	< {2 5} {3} >
	< {3} {4} {5} >
	< {1} {2} {3} >
	< {1} {2 5} >
	< {1} {5} {3} >
	< {5} {3 4} >

< {1} {2} {3} >	< {2} {3} {4} >
	< {2 5} {3} >
	< {3} {4} {5} >
	< {1} {2} {3} >
	< {1} {2 5} >
	< {1} {5} {3} >
	< {5} {3 4} >

< {1} {2 5} >	< {2} {3} {4} >
	< {2 5} {3} >
	< {3} {4} {5} >
	< {1} {2} {3} >
	< {1} {2 5} >
	< {1} {5} {3} >
	< {5} {3 4} >

< {1} {5} {3} >	< {2} {3} {4} >
	< {2 5} {3} >
	< {3} {4} {5} >
	< {1} {2} {3} >
	< {1} {2 5} >
	< {1} {5} {3} >
	< {5} {3 4} >

< {5} {3 4} >	< {2} {3} {4} >
	< {2 5} {3} >
	< {3} {4} {5} >
	< {1} {2} {3} >
	< {1} {2 5} >
	< {1} {5} {3} >
	< {5} {3 4} >

Candidate Generation
< {2} {3} {4} {5} >
< {2 5} {3 4} >
< {1} {2} {3} {4} >
< {1} {2 5} {3} >
< {1} {5} {3} {4} >
< {5} {3 4} {5} >

Step 2: Pruning - Candidate Pruning

To Check if all k-1 length's subsequences of a candidates is in Lk-1.

< {2} {3} {4} {5} >	< {3} {4} {5} >
	< {2} {4} {5} >
	< {2} {3} {5} >
	< {2} {3} {4} >

< {2 5} {3 4} >	< {5} {3 4} >
	< {2} {3 4} >
	< {2 5} {4} >
	< {2 5} {3} >

< {1} {2} {3} {4} >	< {2} {3} {4} >
	< {1} {3} {4} >
	< {1} {2} {4} >
	< {1} {2} {3} >

< {1} {2 5} {3} >	< {2 5} {3} >
	< {1} {5} {3} >
	< {1} {2} {3} >
	< {1} {2 5} >

< {1} {5} {3} {4} >	{5} {3} {4}
	{1} {3} {4}
	{1} {5} {4}
	{1} {5} {3}

< {5} {3 4} {5} >	< {3 4} {5} >
	< {5} {4} {5} >
	< {5} {3} {5} >
	< {5} {3 4} >

-->

Length-3 Frequent Sequences L3
< {2} {3} {4} >
< {2 5} {3} >
< {3} {4} {5} >
< {1} {2} {3} >
< {1} {2 5} >
< {1} {5} {3} >
< {5} {3 4} >

-->

Candidate Pruning
< {1} {2 5} {3} >

Final Results after Pruning:-

Frequent sequences L3
< {2} {3} {4} >
< {2 5} {3} >
< {3} {4} {5} >
< {1} {2} {3} >
< {1} {2 5} >
< {1} {5} {3} >
< {5} {3 4} >

-->

Candidate Generation C4
< {2} {3} {4} {5}>
< {2 5} {3 4} >
< {1} {2} {3} {4} >
< {1} {2 5} {3} >
< {1} {5} {3} {4} >
< {5} {3 4} {5} >

-->

Candidate Pruning L4
< {1} {2 5} {3} >

Question 4)

The cost matrix for the given two time series:-

40	1	4	3	1	6	2	1	3
39	0	5	4	0	7	1	0	4
39	0	5	4	0	7	1	0	4
39	0	5	4	0	7	1	0	4
44	5	0	1	5	2	6	5	1
41	2	3	2	2	5	3	2	2
44	5	0	1	5	2	6	5	1
37	2	7	6	2	9	1	2	6
	39	**44**	**43**	**39**	**46**	**38**	**39**	**43**

Highlighted is the optimal warping path

40	15	18	20	6	11	13	9	11
39	14	19	17	5	12	13	8	12
39	14	15	13	5	12	9	8	12
39	14	10	9	5	12	8	8	12
44	14	5	5	9	7	13	18	19
41	9	5	4	5	10	13	15	17
44	7	2	3	8	10	16	21	22
37	2	9	15	17	26	27	29	35
	39	**44**	**43**	**39**	**46**	**38**	**39**	**43**

DTW Distance between X,Y is 11.

Question 2).

Scanned copy for the handout is attached with the submission. (Question2.pdf)