AIM

- **Write a program to implement Bidirectional Associative Memory (BAM) network to store and test the given patterns**

In [13]:

```
import numpy as np
x1 = np.array([[1,1,1,-1,1,-1,-1,1,-1,-1,1,-1]])
x2 = np.array([[1,1,1,1,-1,1,1,-1,1,1,1,1]])
x3 = np.array([[1,1,1,-1,1,-1,-1,1,-1,1,1,1]])

t1 = np.array([[-1],[1]])
t2 = np.array([[1],[1]])

w1 = np.zeros((12,2),dtype=int)
w2 = np.zeros((12,2),dtype=int)
w = np.zeros((12,2),dtype=int)

i = 0
while(i!=12):
    w1[i][0]=x1[0][i]*t1[0][0]
    w1[i][1]=x1[0][i]*t1[1][0]
    w2[i][0]=x2[0][i]*t2[0][0]
    w2[i][1]=x2[0][i]*t2[1][0]
    i=i+1
    w=w1+w2
print('The Weight Matrix is:\n')
print(w)

Yin11=Yin12=Yin21=Yin22=Yin31=Yin32=0
y1=0
y2=0
i=0
while(i!=12):
    Yin11=Yin11+(x1[0][i]*w[i][0])
    Yin12=Yin12+(x1[0][i]*w[i][1])
    Yin21=Yin21+(x2[0][i]*w[i][0])
    Yin22=Yin22+(x2[0][i]*w[i][1])
    Yin31=Yin31+(x3[0][i]*w[i][0])
    Yin32=Yin32+(x3[0][i]*w[i][1])
    i=i+1
    if(Yin11>0):
        Yin11=1
    else:
        Yin11=-1
    if(Yin12>0):
        Yin12=1
    else:
        Yin12=-1
    if(Yin21>0):
        Yin21=1
    else:
        Yin21=-1
    if(Yin22>0):
        Yin22=1
    else:
        Yin22=-1
    if(Yin31>0):
        Yin31=1
    else:
        Yin31=-1
    if(Yin32>0):
        Yin32=1
    else:
        Yin32=-1
```

```
if((Yin11==-1) and (Yin12==1)):
    print('Pattern T is recognized for Y-Layer')
else:
    print('Pattern T is not recognized for Y-Layer')
if((Yin21==1) and (Yin22==1)):
    print('Pattern O is recognized for Y-Layer')
else:
    print('Pattern O is not recognized for Y-Layer')

i=0
Xin1 = np.zeros((12,1),dtype=int)
Xin2 = np.zeros((12,1),dtype=int)
while(i!=12):
    Xin1[i][0]=Xin1[i][0]+((Yin11*w[i][0])+(Yin12*w[i][1]))
    if(Xin1[i][0]>0):
        Xin1[i][0]=1
    else:
        Xin1[i][0]=-1

    Xin2[i][0]=Xin2[i][0]+((Yin21*w[i][0])+(Yin22*w[i][1]))
    if(Xin2[i][0]>0):
        Xin2[i][0]=1
    else:
        Xin2[i][0]=-1
    i=i+1

Xin1=Xin1.T
Xin2=Xin2.T

print('\n')
if((Xin1==x1).all()):
    print('Pattern T is recognized for X-Layer')
else:
    print('Pattern T is not recognized for X-Layer')
if((Xin2==x2).all()):
    print('Pattern O is recognized for X-Layer')
else:
    print('Pattern O is not recognized for X-Layer')

print('\nTesting of I \nValues for I are:', Yin31 ,'\t',Yin32)
```

```
The Weight Matrix is:

[[ 0  2]
 [ 0  2]
 [ 0  2]
 [ 2  0]
 [-2  0]
 [ 2  0]
 [ 2  0]
 [-2  0]
 [ 2  0]
 [ 2  0]
 [ 0  2]
 [ 2  0]]
Pattern T is recognized for Y-Layer
Pattern O is recognized for Y-Layer


Pattern T is recognized for X-Layer
Pattern O is recognized for X-Layer

Testing of I
Values for I are: 1   1
```

In [ ]: