**Department of Computer Science and Engineering** **Data Science**

**Academic Year: 2024-2025 Name of Student: Diya Thakkar**

**Semester: VI Student ID: 22107040**

**Class / Branch: TE CSE (DS)** **Date of Performance:3-3-25 Subject: ML Lab Date of Submission:3-3-25**

**Name of Instructor: Prof.Ujwala Pagare**

**Experiment No. 5**

**Aim:**-: To implement the Hebbian Learning algorithm.

**Program:-**

**def hebbian\_learning(*samples*):**

**print**(**f**'{"Input"**:^8**} {"target"**:^1**} {"weight changes": **^15**} {"weights"**:^25**}')

w1, w2, b**=** **0**, **0**, **0**

**print**(' ' **\*40**, **f**'({w1**:2**},{w2**:2**}, {b**:2**})')

**for** x1,x2,y **in** samples:

w1**=**w1 **+** x1 **\*** y

w2**=**w2 **+** x2 **\*** y

b**=**b **+** y

**print**(**f**'({x1**:2**},{x2**:2**} {y**:4**}) ({x1**\***y**:4**}, {x2**\***y**:4**}, {y**:4**})({w1**:4**},{w2**:4**},{b**:4**})')

**AND\_samples = {**

'binary\_input\_binary\_output': [

[**1**,**1**,**1**],

[**1**,**0**,**0**],

[**0**,**1**,**0**],

[**0**,**0**,**0**]

],

'binary\_input\_bipolar\_output': [

[**1**,**1**,**1**],

[**1**,**0**,**-1**],

[**0**,**1**,**-1**],

[**0**,**0**,**-1**]

],

'bipolar\_input\_bipolar\_output': [

[**1**,**1**,**1**],

[**1**,**-1**,**-1**],

[**-1**,**1**,**-1**],

[**-1**,**-1**,**-1**]

]

}

**print**('AND with binary input and binary output')

hebbian\_learning(AND\_samples['binary\_input\_binary\_output'])

**print**('AND with binary input and bipolar output')

hebbian\_learning(AND\_samples['binary\_input\_bipolar\_output'])

**print**('AND with bipolar input and bipolar output')

hebbian\_learning(AND\_samples['bipolar\_input\_bipolar\_output'])

OUTPUT:

