PRACTICAL No. 3

Aim: Linear Cross correlation of a 2D matrix, Circular correlation between two signals and Linear auto correlation of a 2D matrix, Linear Cross correlation of a 2D matrix

A] Linear Cross correlation of a 2D matrix

Code:
```
clc;
x = [3,1;2,4];
h1 = [1,5;2,3];
h2 = h1(:,$:-1:1);
h = h2($:-1:1,:);
y = conv2(x,h)
disp(y, 'Linear cross Correlation result y=')
```

Output:
```
Linear cross Correlation result y=
   9.   9.   2.
  21.  24.   9.
  10.  22.   4.
```

B] Circular correlation between two signals

Code:
```
clc;
 x = [1,5;2,4];
 h = [3,2;4,1];
 h = h(:,$:-1:1);
 h = h($:-1:1,:);
 X = fft2(x);
 H = fft2(h);
 Y = X.*H;
 y = ifft(Y);
 disp(y,'Circular Correlation result y=')
```

Output:
```
Circular Correlation result y=

37.  23.

35.  25.
```

C] Linear auto correlation of a 2D matrix

Code:
```
clc;
 x1 = [1,1;1,1];
 x2 = x1(:,$:-1:1);
 x2 = x2($:-1:1,:);
 x = conv2(x1,x2)
 disp(x,'Linear auto Correlation result x=')
```

Output:
Linear auto Correlation result x=

    1. 2. 1.

    2. 4. 2.

    1. 2. 1.

D] Linear Cross correlation of a 2D matrix

Code:
```
clc;
x = [1,1;1,1];
h1 = [1,2;3,4];
h2 = h1(:,$:-1:1);
h = h2($:-1:1,:);
y = conv2(x,h)
disp(y, ' Linear cross Correlation result y=')
```

Output:
Linear cross Correlation result y=

    4. 7.   3.

    6. 10. 4.

    2. 3.   1.