**T.Y .BTech (Electronics) – Image Processing**

**Expt No -5: Image Sharpening**

**Problem Statement** –

* + 1. Write a program for image sharpening using low pass filters and high pass filter in frequency domain.
* **Objective:** To analyze the effect of image Sharpening on image.
* **Tools Required:** MATLAB
* **Theory:** *Brief describe in short*
* **Specify the syntax used in MATLAB for following sharpening operation**.

. *Hint : you tube link shared on classroom*

* **Conclusion**:
* **Discussion** –

1. ***Program 1:*** Write a program for image sharpening using low pass filters and high pass filter in frequency domain.

image = imread('butterfly.jpg');

if size(image, 3) == 3

image = rgb2gray(image);

end

F = fft2(double(image));

F\_shifted = fftshift(F);

[M, N] = size(image);

[U, V] = meshgrid(1:N, 1:M);

D0 = 30;

D = sqrt((U - N/2).^2 + (V - M/2).^2);

H\_low = exp(-(D.^2) / (2\*(D0^2)));

H\_high = 1 - H\_low;

F\_low = F\_shifted .\* H\_low;

image\_low\_filtered = abs(ifft2(ifftshift(F\_low)));

F\_high = F\_shifted .\* H\_high;

image\_high\_filtered = abs(ifft2(ifftshift(F\_high)));

image\_sharpened = double(image) - image\_low\_filtered;

subplot(2, 3, 1);

imshow(image, []);

title('Original Image');

subplot(2, 3, 2);

imshow(image\_low\_filtered, []);

title('Low-pass Filtered Image');

subplot(2, 3, 3);

imshow(image\_high\_filtered, []);

title('High-pass Filtered Image');

subplot(2, 3, 4);

imshow(image\_sharpened, []);

title('Sharpened Image');

*Output:*

