Smoothing:-

clc,close,clear all;

im = imread('cameraman.tif');figure(1);subplot(331);

imshow(im);impixelinfo;title("Original Image");

im=im2double(im);

[rows, cols] = size(im);

im\_fft = fft2(im);subplot(332);%FFT of image

imshow(log(abs(im\_fft)));impixelinfo; title("FFT of Image");

imfft\_shifted = fftshift(im\_fft);subplot(333);%FFT shifted

imshow(log(abs(imfft\_shifted)));impixelinfo;title("Shifted FFT of Image");

D0 = input('Enter the distance from center');

mask = zeros(rows, cols);

Cx = round(rows/2); Cy = round(cols/2);

for i = 1 : rows

for j = 1 : cols

D = sqrt(((Cx-i)^2)+((Cy-j)^2));

if D <= D0

mask(i, j) = 255;%Create mask

end

end

end

subplot(334);imshow(uint8(mask));impixelinfo;title("Mask");

im\_filtered = mask .\* imfft\_shifted; %Multiplication

subplot(335);imshow(uint8(im\_filtered));

impixelinfo;title("Filtered image,not shifted");

im\_ishift = ifftshift(im\_filtered);

subplot(336);imshow(uint8(im\_ishift));

impixelinfo;title("Filtered image,not shifted");

im\_ifft = ifft2(im\_ishift);

subplot(336);imshow(uint8(im\_ifft));impixelinfo;title("IFFT of Image");

plt=log(abs(imfft\_shifted));figure;mesh(plt);

Sharpening:-

clc,close,clear all;

im = imread('cameraman.tif');figure(1);subplot(331);

imshow(im);impixelinfo;title("Original Image");

im=im2double(im);

[rows, cols] = size(im);

im\_fft = fft2(im);subplot(332);

imshow(log(abs(im\_fft)));impixelinfo; title("FFT of Image");

imfft\_shifted = fftshift(im\_fft);subplot(333);

imshow(log(abs(imfft\_shifted)));impixelinfo;title("Shifted FFT of Image");

D0 = input('Enter the distance from center');

mask = zeros(rows, cols);

Cx = round(rows/2); Cy = round(cols/2);

for i = 1 : rows

for j = 1 : cols

D = sqrt(((Cx-i)^2)+((Cy-j)^2));

if D0 <= D

mask(i, j) = 255;

end

end

end

subplot(334);imshow(uint8(mask));impixelinfo;title("Mask");

im\_filtered = mask .\* imfft\_shifted;

subplot(335);imshow(uint8(im\_filtered));

impixelinfo;title("Filtered image,not shifted");

im\_ishift = ifftshift(im\_filtered);

subplot(336);imshow(uint8(im\_ishift));

impixelinfo;title("Filtered image,not shifted");

im\_ifft = ifft2(im\_ishift);

subplot(336);imshow(uint8(im\_ifft));impixelinfo;title("IFFT of Image");

plt=log(abs(imfft\_shifted));figure;mesh(plt);