DAY 1

1.1) Write a program to show the minimum and maximum pixel values of a 8 bit pixel gray-scale image. Also write a program to convert gray-scale image to binary image using threshold operation where
T_α=(minimum pixel value +maximum pixel value)/2.
Show the difference considering T_α=128.

1.2) Write a program to implement down-sampling/ up-sampling of an image by a factor of 2. Repeat these operations twice or thrice. Show the results of up-sampling by
i) duplication of rows and columns.
ii) by simple averaging interpolation.

DAY 2

2.1) Write a program to implement image negation operation.
S=L-1-R where, R is the pixel value of input image, S is the pixel value of output image, L is the maximum gray value.
See the effect of image negation for enhancing white or gray level embedded in dark regions of an image.

2.2) Change range from [a, b] to [c, d]
i) Subtract gray value 'a' from all pixel values:- [0, b-a]
ii) Multiply each by (d-c)/(b-a):- [0,d-c]
ii) Add c:- [c, d]

DAY 3

3.1) Write a program to implement gray-level slicing operation where gray values within the range a and b (get a and b from user input) to assigned value '1' and rest as value '0'.

3.2) Write a program to implement Power-Law transformation for enhancement of an image for ϒ value= 2.5, 1.8 and do the Inverse Power-Law transformation for the said ϒ values. Include dynamic range change operation.
Repeat the same problem for log and inverse log function.

DAY 4

4.1) Write a program to implement histogram equalization operation of a 8 bit/pixel gray-scale image. Show that a second pass of histogram equalization produces exactly the same result as the first pass. Also show that histogram equalization operation produces similar results for

a) low contrast
b) high contrast
c) dark and light image.

4.2) Write a program to implement histogram matching operation of an 8 bit/pixel gray-scale image, so that the output image would have a triangular probability density function.

DAY 5

5.1) Write a program to implement spatial mean operation and apply it on a gray-scale noisy image. Show the filtering effect for the variable window size. Discuss on the limiting effect of repeatedly applying a (3x3) mean filtering to a digital image.

5.2) Write a program to implement median filtering operation (and apply it on gray-scale noisy image). Show the filtering effect of the variable window size.

DAY 6

6.1) Write a program to implement Laplacian operation for the input image f(x, y) using the following operators.

$$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 4 & -1 \\ 0 & -1 & 0 \end{pmatrix}$$

6.2) Write a program to calculate Δx and Δy for each pixel of an input image f(x, y) using gradient (1, -1) and $\begin{pmatrix} 1 \\ -1 \end{pmatrix}$. Replace each pixel point by |Δx|+|Δy| and then implement image sharpening operation.

DAY 7

7.1) Write a program to implement the following image enhancement operation
g(x, y)=E. f(x, y) if M_{sxy} <= $K_0.M_G$ and $K_1.D_G$ <= σ_{Sxy} <= $K_2.D_G$

=f(x, y), otherwise.

i) M_{sxy} and σ_{Sxy} are local mean and standard deviation of blockwise NxN.
ii) M_G and D_G are global mean and standard deviation.
iii) E=4, K_0= 0.4, K_1= 0.02, K_2= 0.4.

Show the effect of different parameter values. Show the effect of different window size NxN.

DAY 8

8.1) Write a program to implement 2D-transformation by an amount of 5 units in the right and 7 units upwards to each pixel of an input image f(x, y).

8.2) Write a program to implement image scaling in horizontal direction by an amount of 1.4 units and vertical direction by an amount of 1.6 units.

8.3) Write a program to implement image rotation operation by

a) 25°

b) 45°

c) 60°

DAY 9

9.1) Write a program to implement iterative thresholding operation for segmentation of a gray-scale image.

9.2) Write a program to implement image segmentation operation using region-growing technique. Show the results using 4/8 connectivity and set Δ of your choice.

9.3) Write a program to implement image segmentation operation using split and merge algorithm.