Q.6) Given $k_1 = \begin{pmatrix} 0 & 1 & 0 \\ 1 & -4 & 1 \\ 0 & 1 & 0 \end{pmatrix}$ and $k_2 = \begin{pmatrix} -1 & -1 & -1 \\ -1 & 8 & -1 \\ -1 & -1 & -1 \end{pmatrix}$

For,

k_1: from the matrix we get

$$L_1(x,y) = I(x,y+1) + I(x+1,y) + I(x,y-1) + I(x-1,y) - 4I(x,y)$$

$$\Rightarrow L_1(u,v) = \left(e^{i2\pi v/N} + e^{i2\pi u/N} + e^{-i2\pi v/N} + e^{-i2\pi u/N} - 4\right) I(u,v)$$

Similarly for k_2:

$$L_2(x,y) = -I(x-1,y-1) - I(x+1,y-1) - I(x-1,y+1) - I(x+1,y+1) - I(x,y-1) - I(x,y+1) - I(x-1,y) - I(x+1,y) + 8I(x,y)$$

$$L_2(u,v) = -\Big(e^{-i2\pi\frac{(u+v)}{N}} + e^{-i2\pi\frac{(-u+v)}{N}} + e^{-i2\pi\frac{(u-v)}{N}} + e^{-i2\pi\frac{(-u-v)}{N}} + e^{-i2\pi v/N} + e^{+i2\pi v/N} + e^{-i2\pi u/N} + e^{+i2\pi u/N} - 8\Big) I(u,v)$$