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CLASS:- B.E - 4
ROLL NO:- 04

Q For 3 bit 4x4 size image perform following operation
i Negation
ii Thresholding with T = 4
iii Intensity level slicing with background with $r_1 = 2$ & $r_2 = 5$
iv Bit plane slicing for MSB & LSB
v Clipping with $r_1 = 2$ & $r_2 = 5$.

1	2	3	0
2	4	6	7
5	2	4	3
3	2	6	1

Solution: i) Negation:

Image negative = $(L-1) - r = s$

$s = 8-1-r$

$= 7 - r$

$$\begin{bmatrix} 6 & 5 & 4 & 7 \\ 5 & 3 & 1 & 0 \\ 2 & 5 & 3 & 4 \\ 4 & 5 & 1 & 6 \end{bmatrix}$$

(iii) Thresholding with T = 4

$L = 8$

$$s = \begin{cases} L-1 & r \geq T \\ 0 & \text{otherwise.} \end{cases}$$

$$\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 7 & 7 & 7 \\ 7 & 0 & 7 & 0 \\ 0 & 0 & 7 & 0 \end{bmatrix}$$

(iii) Intensity level slicing with $r_1 = 2$ & $r_2 = 5$ without background.

$$S = L - 1 = 7 \quad 2 \le r \le 5$$
$$= 0 \quad \text{otherwise}$$

$$\begin{bmatrix} 0 & 7 & 7 & 0 \\ 7 & 7 & 0 & 0 \\ 7 & 7 & 7 & 7 \\ 7 & 7 & 0 & 0 \end{bmatrix}$$

With background

$$S = L - 1 = 7 \quad 2 \le r \le 5$$
$$= r \quad \text{otherwise}$$

$$\begin{bmatrix} 1 & 7 & 7 & 0 \\ 7 & 7 & 6 & 7 \\ 7 & 7 & 7 & 7 \\ 7 & 7 & 6 & 1 \end{bmatrix}$$

(iv) Bit plane slicing for MSB & LSB

001	010	011	000
010	100	110	111
101	010	100	011
011	010	110	001

MSB

0	0	0	0
0	1	1	1
1	0	1	0
0	0	1	0

LSB

1	0	1	0
0	0	0	1
1	0	0	1
1	0	0	1

5 Clipping with $r_1 = 2$, $r_2 = 5$

$$s = \begin{cases} r & 2 \le r \le 5 \\ 0 & \text{otherwise.} \end{cases}$$

$$\begin{bmatrix} 0 & 2 & 3 & 0 \\ 2 & 4 & 0 & 0 \\ 5 & 2 & 4 & 3 \\ 3 & 2 & 0 & 0 \end{bmatrix}$$