

DIP MID-2 MONSOON-2018 ANSWER KEY

1. Based on the assumptions : either ABC are correct or only D is correct.

2. D

3. B

4. Opening - D; Dilation - A; Erosion - B ; Closing - C

5. A,B (4 marks awarded only if both are marked)

6. A, B (2 marks awarded only if both are marked)

7. A (1 mark for correct answer only)

8. D (1 mark for correct answer only)

9.

Erosion Output -

O	O	O	O	O	O
O	O	O	O	O	O
O	O	X	X	O	O
O	O	X	X	O	O
O	O	O	O	O	O
O	O	O	O	O	O

Dilation Output -

O	O	O	O	O	O
O	X	X	X	X	O
X	X	X	X	X	X
X	X	X	X	X	X
X	X	X	X	X	X
O	X	X	X	X	O

X - Shaded cells

O - Empty cells

Matlab Code to Reproduce Results -

```
I=[000000;001100;011110;011110;011110;000000];
```

SE = [0 0 0 ; 1 1 1 ; 0 1 0];
Output = imdilate(I, SE);

10.

10.1

$$c\cos\theta + r\sin\theta = \rho$$

(2 marks awarded if correct equation is written else 0)

10.2 Value of M = 8 (6 marks only awarded if entire calculation is correct, along with correct answer)
(partial marks have been given for working)

10.3

$$\rho, \theta = (5, \pm 90 \text{ degrees})$$

(1 mark for value of Rho, and 1 mark for correct value of Theta)

Alternatively for Question 10 (Please take note of the Coefficients here)

10.1

$$r\cos\theta + c\sin\theta = \rho$$

(2 marks awarded if correct equation is written else 0)

10.2 Value of M = 8 (6 marks only awarded if entire calculation is correct, along with correct answer)
(partial marks have been given for working)

10.3

$$\rho, \theta = (5, 0 \text{ degrees})$$

11. Connected Components algorithm is considered for pixels marked as 1 and label only those pixels.

4- Connectivity

First Pass: (6 Marks)

Union Label Tree: 1<-3 from yellow marked cell, 2,4 (1 marks)

0	0	0	0	0	0	0	0
0	0	1	1	0	2	2	0
0	3	1	1	1	0	2	0
0	3	1	1	0	4	0	0

0	3	1	1	0	4	4	0
0	0	1	1	0	4	4	0
0	0	0	1	0	4	4	0
0	0	0	0	0	0	0	0

Second Pass: (3 Marks)

Replace 3 with 1, obtained from label tree.

0	0	0	0	0	0	0	0
0	0	1	1	0	2	2	0
0	1	1	1	1	0	2	0
0	1	1	1	0	4	0	0
0	1	1	1	0	4	4	0
0	0	1	1	0	4	4	0
0	0	0	1	0	4	4	0
0	0	0	0	0	0	0	0

8- Connectivity

First Pass: (6 Marks)

Union Label Tree: 1<-2 from yellow marked cell. (1 marks)

0	0	0	0	0	0	0	0
0	0	1	1	0	2	2	0
0	1	1	1	1	0	2	0
0	1	1	1	0	1	0	0
0	1	1	1	0	1	1	0
0	0	1	1	0	1	1	0
0	0	0	1	0	1	1	0
0	0	0	0	0	0	0	0

Second Pass: (3 Marks)

Replace 2 with 1, obtained from label tree.

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

12. (10 marks)

- Divide the intensity / luminance ranges to k uniformly distributed buckets for safe color space. (5 marks)
- Since for a grayscale image, luminance and intensities varies so move to HSI or Lab space with intensity or lumnniance mapped with the bucket intensities (5 marks)

13. 1) Resample (5 marks) :

Full marks are awarded even in case of minor changes due to subjectivity.

		X	X	X	X	X	X		
	X						X		
	X						X		
	X						X	X	
	X							X	
	X							X	
		X		X	X		X		
			x			X			

2) Chain code (10 marks):

0->0->0->0->0->6->6->6->0->6->6->5->5->3->4->5->3->3->2->2->2->2->1

Full marks are awarded if anticlockwise traversal is done.

3) Concavities (5 marks):

Concavities : 2

If the explanation of 3 concavities is given then full marks are awarded. Otherwise partial marks are given according to the answer.