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Paper Code : PE-EC702B   Digital Image and Video Processing

Time Allotted : 3 Hours   Full Marks :70

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following :   [1 x 10 = 10]

   (I) For what purpose Wiener filter is used?

   (II) Representation & description almost always follow the output of which blosk of the image processing system?

   (III) Colour image is represented by how many bit?

   (IV) How many video frames the surveillance camera captures per second of video?

   (V) The image f(x,y) is transformed to g(u,v) using a image transformation with the following forward kernel

   $$1/N = \Pi\ (-1)^{[b(x)b}{}_{n-1-u}(x)+b(y)b_{n-1-u}(y)$$

   Name the image transformation technique

   (VI) FWT stands for what?

   (VII) What is the intensity level in 8 bit image

   (VIII) Why do we use histogram technique?

   (IX) Name one useful descriptor of a boundary, whose value is given by the ratio of length of the major axis to the minor axis?

   (X) Accuracy of the chain code depends on which factor?

   (XI) Mask of which operator is given by the following 3 × 3 matrix?

-1	-2	-1
0	0	0
1	2	1

   (XII) What will be the 8 directional chain code representation of a square starting from the left top position?

Group-B (Short Answer Type Question)
Answer any three of the following   [5 x 3 = 15]

2. Explain why the discrete histogram equalization technique will not in general yield a flat histogram   [5]

3. Find second order derivatives of the given image strip 5 5 3 2 0 0 6 0 8 10   [5]

4. Compare Rod cell and Cone cell   [5]

5. Find the DC component of the following image. Suggest one way of generating colour histogram in RGB frame. What will be the number of histogram components in this case?   [5]

1	3	6
8	2	4
11	3	7

6. a) Explain the operation of any single image sensor   [5]
   b) A medical image has a size of 8x8 inches. The sampling resolution is 5 cycles/mm. How many pixels are required? Will an image of size 256x256 be enough?

Group-C (Long Answer Type Question)
Answer any three of the following   [15 x 3 = 45]

7. a) Differentiate between image and scene   [5+5+5]
   b) Explain one method of image acquisition
   c) Explain the term i. connectivity, ii. path, iii. Adjacency in context of image

8. a) Explain the operation of median filtering   [5+5+5]
   b) Compare the basic frequency domain filters
   i) Ideal low pass
   ii) Butterworth low pass
   iii) Gaussian low pass
   c) Explain the homomorphic filter.

9. a) Brightness discrimination is poor at low levels of illumination. Explain   [6+6+3]
   b) Explain the operation of any array sensor and strip image sensor
   c) Assume that a 10 m high structure is observed from a distance of 50 m. what is the size of the retinal image?

10. a) Explain the difference between lossy and lossless compression.   [2+5+8]
    b) Explain the following noise
       I. Salt & Pepper noise
       ii.Gaussian noise
    c) Perform histogram stretching for the image distributions shown in the following table so that new image has dynamic range of [0,7].

Gray level (r)	0	1	2	3	4	5	6	7
No. of pixel (p)	0	0	50	60	50	20	10	0

11. a) Explain any lossless compression technique.   [5+10]
    b) Calculate coding redundancy for the given symbols.

Symbol	1	2	3	4	5	6
Probability	0.4	0.2	0.2	0.1	0.05	0.05
Huffman Code	0	10	110	1110	11110	11111

*** END OF PAPER ***