C7-R4: DIGITAL IMAGE PROCESSING & COMPUTER VISION

NOTE:

1.	**Answer question 1 and any FOUR from questions 2 to 7.**
2.	**Parts of the same question should be answered together and in the same sequence.**

Time: 3 Hours **Total Marks: 100**

1.

a) What is dithering? What is/are the advantage(s) of dithering?

b) Explain the use of discrete and continuous wavelet transforms.

c) Discuss the problem of median filter with even number of points in the window.

d) Define Weber's law? How it can be used for visual modalities?

e) What's the effect of setting the lowest bit of all the pixels to zero on the histogram of an image?

f) What are the advantages of using B frames for motion compensation?

g) How can an image be converted from a square grid to hexagonal grid?

(7x4)

2.

a) Explain the characteristics of 8 bit GIFF images? What are the different methods for converting a 24 bit image into an equivalent 8 bit color image? Explain any two in detail.

b) Describe contrast stretching on an image. What's the effect of increasing brightness and contrast on the level graph the original image?

(12+6)

3.

a) Write the condition(s) for distance function or distance metric for pixels p, q and r with coordinates as (x, y), (s, t) and (z, w). Write an expression for Euclidean, city block and chessboard distances between two points' p and q.

b) Discuss the effect of smoothening on an image. How it is done?

c) Explain homomorphic filtering? What are the advantages of homomorphic filtering?

(8+6+4)

4.

a) What is HSI color model? How can an image represented through HSI model be converted into corresponding RGB represented image?

b) What is JPEG image format? What are the special features of progressive JPEG?

c) Explain any one wavelet transform, such as Harr Transform. Elaborate how wavelets are used for Multi-resolution Image Processing.

(8+4+6)

5.

a) What is variable length encoding? Discuss the advantages of variable length encoding over fixed length encoding. Give two schemes where variable length encoding is used.

b) Encode the sequence AAABBCCDDABBA using LZW transform.

The initial Dictionary is having symbols A, B, C and D with code as 1, 2, 3 and 4 respectively.

c) Calculate the compression achieved for the above sequence when encoded through LZW transform.

(6+8+4)

6.

a) Explain the three fundamental steps performed in edge detection. Why is edge detection useful?

b) List the advantages of Sobel operator over Laplacian edge operator for edge detection.

c) List the properties of opening and closing operation for morphological image processing.

(6+6+6)

7.

a) What is an active contour model? How contours are represented using this model?

b) What are the weaknesses of traditional snakes?

c) What is Gradient Vector Flow? How the weaknesses of traditional snakes are overcome using Gradient Vector Flow (GVF)?

(6+6+6)