14|12|24 (AN)

B.E (FT) END SEMESTER EXAMINATIONS – NOV / DEC 2024

Computer Science and Engineering

Seventh Semester

CS6018 – IMAGE PROCESSING

(Regulation 2018 - RUSA)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

Note: Assume data, if required

PART-A (10 x 2 = 20 Marks)

1.	How is an analog image converted to a digital image?	2
2.	State the purpose of a colour model. Give two examples of colour models.	2
3.	State and prove the properties exploited in FFT algorithms.	2
4.	How is periodic noise handled?	2
5.	What is an image pyramid?	2
6.	Illustrate the two types of error encountered in delta modulation.	2
7.	Compare and contrast first order derivative and second order derivative in the context of its application in edge detection.	2
8.	What is the role of Principal Component Analysis in Image Processing?	2
9.	Give two applications of clustering.	2
10.	Compare and contrast watermarking and steganography.	2

PART – B (8 x 8 = 64 marks)

(Answer any 8 questions)

11.	Explain the steps involved in digital image processing with a neat block diagram and an example technique for each step.	8
12.	Explain eight File Formats bringing forth the features of the file format and the scenario in which the file format is most appropriate.	8

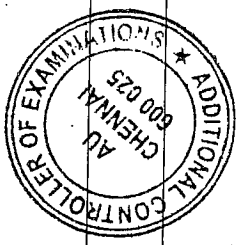
13.	Illustrate histogram specification by performing histogram specification of the image A, assuming the target image as B.	8

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

Image A

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

Image B



14.	Consider the following image G. Find the response of 4 types of mean filters and 4 types of order statistics filters on the pixel (2,2).	8

0	1	0	6	7
2	0	1	6	5
1	1	7	5	6
1	0	6	6	5
2	5	6	7	6

Image G

15.	Derive the Haar kernel for N=8.	8
16.	Illustrate Huffman encoding and arithmetic coding on the given image F with 5 gray levels.	8

180	160	160	140	120
110	110	120	140	120
110	140	120	120	140
120	160	160	170	170
170	120	110	140	110

Image F

17.	Illustrate the following algorithms on the image F using the predicate $P(R) = \max\{f(x,y)\} - \min\{f(x,y)\} \leq T$, where max and min are the maximum and minimum defined over the region concerned and the threshold T = 3. a) Region growing with f(4,1) and f(6,3) as seed points b) Region splitting	4+4

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

Image F

18.	Explain any four feature measures under each of the three broad categories of features.	8
19.	Explain k-nearest neighbor classifier and linear classifiers in detail with respect to image classification.	8
20.	Explain the application of image processing in Remote sensing.	8
21.	a) Explain the different types of redundancy exploited by image compression and the mechanism to handle each type. b) Explain transform coding with a neat block diagram.	4+4
22.	Explain subband image coding using a two-dimensional four-band filter bank and decoding with a neat block diagram.	8
	PART – C (2 x 8 = 16marks)	
23.	Design a system that can be used in computer aided diagnosis of a specific type of disease. Choose a disease of your choice. Draw the architecture and give the detailed design.	8
24.	For each of the scenarios given below identify the suitable image processing approach and explain the same. a) Text image corrupted by spot shading b) Mask mode radiography	8