B.E. COMPUTER SCIENCE AND ENGINEERING
FOURTH YEAR SECOND SEMESTER

Home Assignments on Image Processing

Time: 24 Hours **Full Marks: 50**

Instructions:

- Put your Name, Class Roll No, Primary Mobile phone no, Email at the first page
- Put Class Roll No at the top-right corner of every page
- Put your signature at the bottom of every page

Answer ALL questions

1. Answer the following short questions in brief.
- **a)** What are 4-, 8-, and *m-adjacency?*
- **b)** What is intensity slicing in pseudo-colour images?
- **c)** What is Adaptive Median Filtering?
- **d)** What is Chain Code representation of a digital image?
- **e)** What is *unsharp masking*?

(5 x 2=10)

2. **a)** Discuss the algorithm for histogram equalization.
b) What is a Mexican Hat filter for edge detection?
c) What are morphological Open & Close operations? Design the morphological operations required for boundary extraction of an object.

(3+3+4=10)

3. **a)** Briefly discuss about Weiner Filtering for noise removal in frequency domain
b) What is first derivative filtering? Derive the convolution masks for a first derivative filter. What is Sobel's edge detection operator?

(5+5=10)

4. **a)** Briefly discuss *Gaussian*, *Rayleigh* and *Gamma* noise models.
b) Discuss the effects of Harmonic and contra harmonic mean filters for the removal of salt and pepper noise.

(5+5=10)

5. Write the algorithm for construction of a Huffman Tree. Use Huffman Coding to encode/decode the text "my name is" followed by your own name in lower case. For example, the text will be "my name is sourav ganguly", if your name is "Sourav Ganguly". Create the frequency table, Huffman tree and show the encoding and decoding steps with examples (consider space/blank as a character).

(10)