GANPAT UNIVERSITY

B. Tech. Semester: VIII Biomedical & Instrumentation Engineering
Regular Examination April – June 2016
2BM801: Biological Digital Image Processing

Time: 3 Hours   Total Marks: 70

Instruction: 1. This Question paper has two sections. Attempt each section in separate answer book.
               2. Figures on right indicate marks.
               3. Be precise and to the point in answering the descriptive questions.

Section - I

Que.– 1   12
- (a) Why image function $f(x,y)$ is multiplied by $(-1)^{x+y}$ prior to computing   06
  Fourier transform? Explain the 2D DFT and its inverse.
- (b) What is the use of sharpening frequency domain filters? Explain ideal   06
  high pass filters and discuss the effect of D_0 on ringing effect.

OR

Que – 1   12
- (a) What is the function of smoothing filters? Enlist the types of frequency   06
  domain smoothing filters and explain any one of them.
- (b) Explain the Laplacian in frequency domain image enhancement and   06
  obtain its filter mask.

Que.– 2   11
- (a) Write the different sources of noise in image. Write all the noise   06
  probability density function and explain any three with equation and
  diagram.
- (b) Which filter is used to remove periodic noise in frequency domain?   05
  Write the expression of mask for Bandreject filter and explain it.

OR

Que.– 2   11
- (a) What is image restoration? Explain image degradation/restoration   05
  model.
- (b) What do you mean by Order-Statistics filters? Explain 0th, 50th and 100th 06
  percentile filters in detail with application.

Que.– 3   12
- (a) What is Minimum Mean Square Error (Wiener) filtering? Explain it   04
  with necessary equation.
- (b) Enlist the types of redundancies in image compression. Explain any one   04
  in detail.
- (c) While performing Low Pass Butterworth frequency domain filtering   04
  what is the effect of increasing filter order?

Section – II

Que.– 4　　　　　　　　　　　　　　　　　　　　　　　　　　　　　12

(a) Explain the process of sampling and quantization used in image processing.　　4

(b) Explain the image formation model of eye. Calculate the size of image formed on the retina if the size of the object is 15m, distance between the object and focal center is 100m.　　6

(c) Which components of the image are considered as the high frequency and low frequency components?　　2

OR

Que.– 4　　　　　　　　　　　　　　　　　　　　　　　　　　　　　12

(a) Describe the technique to detect the isolated point in the image.　　3

(b) Explain the Laplacian of Gaussian technique in detail.　　4

(c) What is the significance of Histogram?　　2

(d) Define Digital image and Calculate the no. of bits required to store RGB image of size 512*512.　　3

Que.– 5　　　　　　　　　　　　　　　　　　　　　　　　　　　　　11

(a) Define following terms:　　3
　　1. Saturation
　　2. Brightness adaption
　　3. Local thresholding

(b) Explain any 2 techniques of pseudo color image processing.　　4

(c) Explain the opening and closing of the images with example.　　4

OR

Que.– 5　　　　　　　　　　　　　　　　　　　　　　　　　　　　　11

(a) Explain the process of reflection with example.　　3

(b) Explain the steps of Canny edge detector technique.　　4

(c) Explain any two piecewise linear transformation function.　　4

Que.– 6 Write short note on following:　　12

(a) Histogram equalization.　　4

(b) Skeletonization and region filling technique.　　4

(c) Highpass filter.　　4

---- END OF PAPER ----