

BE/ In Sem- 52

- Q.3) a) 1. Multiply the input image by $(-1)^{x+y}$ to centre the transform
 2. Compute $F(u, v)$, the DFT of the image from (1).
 3. Multiply $F(u, v)$ by a filter function $H(u, v)$.
 4. Compute the inverse DFT of the result in (3).
 5. Obtain the real part of the result in (4).
 6. Multiply the result in (5) by $(-1)^{x+y}$ **3 marks**

Diagram of response of Ideal low pass filter in frequency domain

$$H(u, v) = 1 \text{ if } D(u, v) \leq D_0 \text{ else } 0 \text{ if } D(u, v) > D_0$$

$$D(u, v) = [(u - M/2)^2 + (v - N/2)^2]^{1/2}.$$

..... **3 marks**

- b) 1) Gamma correction explanation **1 mark**
 Gamma correction curves **1 mark**
 2) Image negative explanation **1 mark**
 Graph **1 mark**

- Q.4) a) Definition of Histogram : **1 mark**
 Information from histogram : **1 mark**
 Applications : **2 marks** (at least 2 applications should be mentioned such as image enhancement, compression or segmentation)
 b) Colour models : **3 marks** (at least 3 models should be briefly explained)
 Comparison : **3 marks** (3 points)

- Q.5) a) $\text{fft} = 2 \ 2 \ 2 \ 2$
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Justification about multiplying with 0 and adding so that above result is obtained.
1 mark

- b) Explanation : **3 marks**
 Any two properties : **2 marks**
 Sequency : **1 mark**

- Q.6) a) Forward DCT with formulae and basis function : **4 marks**
 Energy compaction with example of $C(0,0)$ -DC coefficient : **2 marks**
 b) Any three features : **3 marks** (one for each feature) Features such as basis function is a function of input data, decorrelation and energy compaction
 Application (Ex.Face recognition) **1 mark**

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B.E (Electronics) 2012 Course

In-Semester Examination

Image Processing and Machine Vision (2012) (404204A) Semester –I

Solution and Scheme of Marking

- Q.1 a) Distance measures are used to find the distances between the pixels. In some cases they are also used to compare two images pixelwise.

1) Euclidean Distance : The Euclidean distance between p and q is defined as

$$D_e(p,q) = [(x-s)^2 + (y-t)^2]^{1/2} \quad \text{2 marks}$$

For this distance measure, the pixels having a distance less than or equal to some value r from (x,y) are the points contained in a disk of radius r centered at (x, y).

2) City block or D_4 distance : The D_4 distance (also called city-block distance) between p and q is defined

$$D_4(p,q) = |x-s| + |y-t| \quad \text{2 marks}$$

Student should explain use of it.

3) Chessboard or D_8 distance : The D_8 distance (also called chessboard distance) between p and q is defined as

$$D_8(p,q) = \max(|x-s|, |y-t|) \quad \text{2marks}$$

Student should explain use of it.

- b) Illumination : The total amount of energy that flows from the light source, and it is usually measured in watts (W). **1 mark**

Reflectance : Total amount of light reflected from the object and perceived by human eye. **1 mark**

Illumination is presented by $i(x,y)$ and reflectance by $r(x,y)$ When an image is generated from a physical process, its values are proportional to energy radiated by a physical source.

$$0 < f(x, y) < \infty$$

$$f(x,y) = i(x,y).r(x,y)$$

$$\text{where } 0 < i(x,y) < \infty \text{ and } 0 < r(x,y) < 1 \quad \text{2 marks}$$

- Q.2) a) Defination of Mean ,Standard deviation and Variance and its formulae

1 mark each

In example

Mean= 142.5

Standard deviation = 89.7

Variance = 8046.09 **1 mark each**

- b) Spatial resolution explanation **2 marks**

Different interpolation technique (at least 2) in brief such as nearest neighborhood, bilinear, bi cubic etc **1 mark each**