JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY WAKNAGHAT

MAKE-UP EXAMINATION (MAY 2016)

B.Tech 8$^{th}$ Sem. (ECE)

COURESE CODE: 16M1WEC231      MAX. MARKS: 25

COURSE NAME: Advanced Digital Image Processing

COURSE CREDITS: 3      MAX. TIME: 1 Hr.30 Min.

---

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

---

**Q1a).** What can be the possible reasons of a low contrast image? **(1)**

**Q1b).** What is *Mach Band* effect? **(1)**

**Q1c).** Define a digital image. **(1)**

**Q1d).** Define gray- level resolution of a digital image. What are the consequences of having insufficient number of gray levels? **(1+1=2)**

**Q2a).** Define subjective brightness and brightness adaptation. **(1)**

**Q2b).** Define histogram of a digital image. How will the histogram of various contrast's images like dark image, bright image, low contrast image and high contrast image be distributed? **(1+1=2)**

**Q2c).** The median of a set of numbers is such that half the values in the set are below median and the other half are above it. For example, the median of the set of values {2,3,8,20,21,25,31} is 20. Show that an operator that computes the median of a subimage area, S , is nonlinear. **(2)**

**Q3a).** How do histogram equalization and histogram matching techniques work? **(1+1=2)**

**Q3b).** Consider the image segment shown in figure below. Let V = {1,2}, compute the lengths of the shortest 4-, 8-, and m-path between *a* and *b*. If a particular path does not exist between these two points, explain why.

```
3  1  2  1 (b)
2  2  0  2
1  2  1  1
(a) 1  0  1  2
```

**(1+1+1 =3)**

**Q4a).** What is the Laplacian operator? Is it rotation invariant? Compute the filter mask for it. **(2)**

**Q4b).** Compare the performance of Ideal, Butterworth and Gaussian low pass filters in the frequency domain. **(1+1+1 =3)**

**Q5a).** Discuss the Translation property of 2-D DFT. **(1)**

*)*

**Q5b).** How does sharpening spatial filter work? Discuss the Gradient operator in the same context. **(2)**

**Q5c).** Which filtering can be used to improve the appearance of an image by simultaneous gray-level range compression and contrast enhancement? Discuss in detail. **(2)**