Mark scored:

KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2018

Level : B.E.
Year : IV
Course : MEPP 438
Semester: II

Exam Roll No. :
Time: 30 mins.
F. M. : 20

Registration No.:
Date JUL 0 1 2018

SECTION "A"
[10 Q × 1 = 10 marks]

Choose the most appropriate answer.

1. ..... part of human brain is dedicated to eye activities.
   a) 1/2 b) 1/3 c) 1/4 d) 1/5

2. Human eye cones are concentrated on .....parts of retina.
   a) Right b) left c) center d) upper

3. If the focal length of eye is 17 mm, height of the tree is 15 mm and distance between the object and eye is 100 mm, the height of the tree in the retinal image is.....
   a) 2.55 mm b) 3.55 mm c) 1.55 mm d) 3.2 m

4. Experimental evidence indicates that .....is a logarithmic function of light intensity.
   a) brightness adaptation b) subjective brightness
   c) intensity d) reflective index

5. .....is the total amount of energy that absorber perceives from the light sources.
   a) Photon b) Luminance c) Radiance d) Brightness

6. Image .....digitizes the amplitude value.
   a) Sampling b) quantization c) reconstruction d) compression

7. The pixel resolution of an image of dimension 2500 × 3192 is .....mega pixels.
   a) 5.3 b) 6.8 c) 7.9 d) 8.5

8. .....filters are widely used in image processing for compensating the effect of non uniform illumination in an image.
   a) Ideal low pass b) Ideal High pass
   c) Homomorphic d) Butterworth low pass

9. Printer responds to.....transformation.
   a) log b) power law c) negative d) a and b

10. Visible light have a wavelength range of ..... μm.
    a) 12.5-20.5 b) 0.7-1.5 c) 1.5-12.5 d) 0.45-0.7

SECTION "B"

[5 Q × 1 = 5 marks]

Fill in the blanks.

11. Machine Vision is the system that utilizes the ..... and process it to give necessary information.

12. The lens of human eyes are made up of concentric layers of .....

13. Ideally, an image compression techniques removes redundant and or irrelevant information, and efficiently ..... what remains.

14. ..... Determines where light comes in order to illuminate the surface.

15. To create digital image we need to convert the continuous sensed data into .....

SECTION "C"

[5 Q × 1 = 5 marks]

State T for True and F for False.

16. Data is same things as information. [ ]

17. Redundant data provides additional information. [ ]

18. Zooming is done by nearest neighbor interpolation. [ ]

19. The principal advantage of piecewise function is that their specification requires considerably more user input. [ ]

20. Filtering refers to accepting or rejecting certain frequency components. [ ]

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SECTION "D"
[5 Q × 11 = 55 marks]

Attempt *ANY FIVE* questions.

1. a) Define and elaborate complete machine vision system with its workbench. [5]
   b) What is Digital Image Processing? Discuss fundamental steps in Digital Image Processing. [1+3]
   c) Differentiate machine vision and human visual perception. [2]

2. a) Define subjective brightness. Discuss different sources of lighting. [2+2]
   b) How image acquisition takes place using sensor stripe? Write a simple image formation model with illumination and reflectance as its characteristics. [2+2]
   c) Define *ANY TWO* [3]
      i. Image sampling and quantization
      ii. Distance measure
      iii. Spatial and Gray Level Resolution

3. a) Explain Aliasing and Moire pattern. [2+2]
   b) Explain Zooming in Image processing. [2]
   c) If you are given an image with aspect ratio of 6:2 of an image of pixel resolution of 480000 pixels given the image is gray scale image and you are asked to calculate two things. [3+2]
      i. Resolve pixel resolution to calculate the dimensions of image
      ii. Calculate the size of the image

4. a) Discuss Power-Law Transformations. [5]
   b) Explain Histogram equalization. [3]
   c) Obtain a correlation and convolution of a 2 –D filter with a 2-D discrete impulse. Consider a filter coefficient of [3]

1	2	3
4	5	6
7	8	9

5. a) What is image compression? Explain basic strategy in image compression. [2+3]
   b) Explain Reversible and Non-Reversible compression in image compression. [3]
   c) Perform the Run Length coding of the following: [3]

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

6. a) Explain Fourier Transformation and its application in image enhancement. [3]
   b) Explain basic steps of filtering in frequency domain. [4]
   c) Discuss common techniques in lighting process. [4]