Pokhara University

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| Level: Bachelor | Semester: Fall | Year : 2013 |
| Programme: BE | | Full Marks: 100 |
| Course: Image Processing and Pattern Recognition | | Pass Marks: 45 |
| Time : 3hrs. |

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| *Candidates are required to give their answers in their own words as far as practicable.* |
| *The figures in the margin indicate full marks.* |
| Attempt all the questions. |

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|  | 1. What is Digital Image? Explain the various applications of Digital Image Processing with suitable examples in the real field. 2. What are the properties of Hadamard transform. Find the Fourier spectrum and phase angle of the function at “1” and “3” shown below.   F(X)  4    3  2    1  X  0 1 2 3 | 8  7 |
|  | 1. Differentiate between Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT). 2. Define linear stretching. Equalize the given histogram and also draw the modification of it.  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Gray level | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | No. of pixel | 750 | 1020 | 850 | 660 | 340 | 240 | 123 | 80 | | 8  7 |
|  | 1. What is Coding Redundancy? Construct Huffman Code for each gray level.  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | R | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | NR | 50 | 180 | 200 | 45 | 125 | 120 | 210 | 20 |   Where, R = Gray level  NR = Pixels having Rth gray level  Also calculate Average Bit Length after Huffman coding.   1. What is Pattern Recognition System? Discuss the relationship between image processing and pattern recognition with suitable example. | 8  7 |
|  | 1. What is Pattern and Pattern Recognition? Explain Bayes Classifier for Pattern Classification. 2. What is the basic idea of intensity level slicing? Explain with example. | 8  7 |
|  | 1. Describe edge detection using second derivative gradient model. Also mention the 3-gradient operator mask used in first order differences. 2. What is Image segmentation? Explain segmentation by Local Thresholding in detail. | 8  7 |
|  | 1. What is the Hough transform? How it is useful in the line detection. 2. What is Neural Network? Explain Perceptron in detail. | 8  7 |
|  | Write short notes on: (Any two)   1. Chain Codes. 2. Hamming nets. 3. Histogram Processing. | 2×5 |