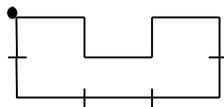


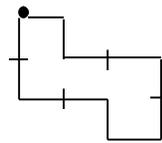
GUJARAT TECHNOLOGICAL UNIVERSITY**ME - SEMESTER-IV • EXAMINATION – SUMMER 2015****Subject Code: 744101****Date: 01/05/2015****Subject Name: Advanced Topics in Signal and Image Processing****Time: 2:30 pm to 5:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What is power spectrum of a signal? How can one obtain estimate of the same? **07**
 (b) Explain about Principal Component Analysis for signal and image processing. **07**
- Q.2** (a) Explain about Independent Component Analysis in signal and image processing. **07**
 (b) Explain about multiresolution compatibility and orthogonality of wavelet. **07**
OR
 (b) What is singular value decomposition method ? Explain its use in signal and image processing **07**
- Q.3** (a) Explain about periodogram of white noise. **07**
 (b) What is the quality of power spectrum estimates ? Explain computational requirement for Bartlett and Welch power spectrum estimate. **07**
OR
- Q.3** (a) Explain in brief about STFT and mention its drawback and Compare Continuous Wavelet Transform with Discrete Wavelet Transform. **07**
 (b) Write down expression for Harr and Morlet Wavelet. How can one use Wavelet for image processing ? **07**
- Q.4** (a) For the shapes given below find out the chain code. Explain the steps. **07**
 (Mention the directional code chosen). What is the drawback of chain code ?



(1)



(2)

- (b) Explain about shape numbers and Fourier Descriptor with suitable example. **07**

OR

- Q.4** (a) What are the different representation for pattern class ? Explain about Bayesian classifier giving suitable example. **07**
 (b) Obtain signature of circular, square and triangular shape object. **07**
- Q.5** (a) Explain about autoregressive spectrum estimation method. **07**
 (b) Explain about Medial Axis Transform. **07**

OR

- Q.5 (a)** For first order harmonic process consisting of a single complex exponential in white noise given by $x(n) = A_1 e^{jn} + w(n)$ and with 2×2 auto-correlation matrix **07**

$$R_x = \begin{bmatrix} 3 & 2(1-j) \\ 2(1+j) & 3 \end{bmatrix}$$

Compute eigenvalues, eigenvectors, variance of the white noise and power in the complex exponential.

- (b)** Explain about hit rates, false alarms and ROC. **07**
