Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**M. E. Sem. – II$^{nd}$ - Examination – June/July- 2011**

**Subject code: 1723103**

**Subject Name: Biomedical Image Processing and Analysis**

**Date:27/06/2011** **Time: 10:30 am – 01:00 pm**

**Total Marks: 70**

## Instructions:

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

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|---|---|---|---|
| **Q.1** | **(a)** | Explain Haar wavelet decomposition of sequence [9,7,3,5] with proper waveforms of corresponding basis. | **07** |
| | **(b)** | What is Heisenberg Principle? Explain how it is applicable to wavelet transform. | **07** |
| **Q.2** | **(a)** | Explain DICOM image standard. | **07** |
| | **(b)** | Explain basic block diagram of 'JPEG' image compression. | **07** |
| | | **OR** | |
| | **(b)** | Discuss about fidelity criteria for image compression. | **07** |
| **Q.3** | **(a)** | State mathematical definition of image morphological operations Dilation & Erosion and explain its application in brief . | **07** |
| | **(b)** | State mathematical definition of binary image morphological operations Opening & Closing and explain its application in brief. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain 'Skeletonization (thinning)' image morphological operation. | **07** |
| | **(b)** | Explain Hough transform applied for line detection in image. | **07** |
| **Q.4** | **(a)** | Which are the major parts optimization techniques?, Discuss in brief. | **07** |
| | **(b)** | Which are the advantages of genetic Algorithm. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Explain genetic operators 'Selection, Crossover & Mutation'. | **07** |
| | **(b)** | Explain basic block diagram of 'Pattern Recognition'. | **07** |
| **Q.5** | **(a)** | Explain quadtree based region splitting. | **07** |
| | **(b)** | Explain Region Growing by Pixel Aggregation. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Explain general principle of maximum likelihood estimation. | **07** |
| | **(b)** | Explain Gaussian case with unknown mean ($\mu$) and covariance matrix ($\sum$) of maximum likelihood estimation . | **07** |

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