

GUJARAT TECHNOLOGICAL UNIVERSITY
ME – SEMESTER I (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2713109**Date: 18/05/2016****Subject Name: Biomedical Signal Processing****Time: 02:30 pm to 05:00 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) Explain designing aspects of the Wiener filter. **07**
 (b) Explain steps of the Pan-Tompkins algorithm for QRS detection with necessary equations **07**
- Q.2** (a) Which types of filters are applicable when signal and noise spectrum are overlap? Explain its design aspects. **07**
 (b) Draw and explain adaptive noise canceller model. Enlist applications of adaptive filter in Biomedical Field. **07**
- OR**
- (b) A filter has transfer function $H(Z) = (1 + 2z^{-1} + z^{-2}) / (z^2 - 1)$ **07**
- Write difference equation relating the output to the input.
 - Draw signal flow diagram of a realization of the filter.
 - Draw its pole zero diagrams.
- Q.3** (a) Write a brief note on random noise, structured noise and physiological interference present in our interest Biomedical signal. **07**
 (b) Write a short note on structure of Neural Network and its Biomedical applications. **07**
- OR**
- Q.3** (a) Explain time domain technique to remove low frequency artifacts. **07**
 (b) A band stop filter required to meet following specifications. **07**
- A complete signal rejection at 50 Hz
 A 3 dB width of notch with ± 5 Hz
 Assuming sampling frequency of 500 Hz, obtain transfer function by suitably placing pole-zero.
- Q.4** (a) Explain following terms: **07**
- Zero-crossing rate,
 - Turns count and
 - Auto correlation function
- (b) Explain concept of linear curve fitting to Medical database. **07**
- OR**
- Q.4** (a) Explain role of Modeling in the field of Biomedical. Draw flow diagram of AR (Auto regressive) Model. **07**
 (b) Explain supervised Pattern classification concept with necessary schematic. **07**
- Q.5** (a) Explain frequency domain characterization of biomedical signals. **07**
 (b) Explain the design concept of Butterworth filter. **07**
- OR**
- Q.5** (a) Write a short note on morphological analysis of ECG waves. **07**
 (b) Write a short note on Logistic Regression Analysis. **07**
