Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY M. E. - SEMESTER - I • EXAMINATION - WINTER • 2013

Subject code: 713104N

Date: 06-01-2014

Subject Name: Bio-Signal Processing 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.
- 0.1 (a) Explain the rubber membrane concept with LPF example and their response. 07 (b) Explain charge scaling method of Digital to Analog converter and derive the 07 output equation. 0.2 (a) Explain the basic concept of Signal averaging with the flow chart. 07 (b) Write a short note on principle noise canceler model. 07 OR (b) What is the application of integer filter? Explain basic design concept of Integer 07 filters. Q.3 (a) Give the steps of ECG interpretation. Explain ST segment analyzer. 07
 - (b) Explain the Band pass filtering techniques to detect the QRS complex of the 07 ECG.

OR

- (a) Explain the concept of Hardware design for the portable arrhythmia monitor. Q.3 07 (b) Explain real time QRS detection algorithm. 07 (a) Explain Least-square polynomial smoothing and draw the signal flow graph for **Q.4** 07 7 point filter.
 - (b) Obtain the coefficients of an FIR low pass filter to meet the following 07 specifications using window method Stop band attenuation > 50 dB

Pass band edge frequency 1.5 KHz

Transition width 0.5 KHz Sampling frequency 8KHz

OR

- (a) Draw the signal flow graphs and pole-zero diagrams for the derivative **Q.4** 07 algorithms.
 - (b) Obtain the coefficients of an FIR digital filter to meet the following 07 specifications using window method Stop band attenuation > 60 dBPass band edge frequency 150-250 Hz Transition width 50 Hz Pass band ripple 0.1 dB Sampling frequency 1KHz
- Q.5 (a) Explain any two numeric method of digital Integration.
 - 07 Determine, using BZT method, the transfer function and difference equation for **(b)** 07 the digital equivalent of the RC Low pass filter. Assume cutoff frequency 150 Hz and sampling frequency 1.28KHz. The Normalized transfer function of RC filter is H(s) = 1 / (S2 + 1.414 S+1)

OR

(a) Explain design method for two pole recursive filters. 07 0.5 (b) Prove that convolution time domain is equal to multiplication in z domain. 07 ********