2015-2016
M.Tech. III Semester Examination
(ELECTRICAL ENGG)
EE671N: BIOSIGNAL PROCESSING AND ANALYSIS

Maximum Marks: 60  Credit:04  Duration: Three Hours

Answer any five from the following questions.
Assume any suitable data, if missing.
Notations used have their usual meanings.

Q.No.  Question  M.M.
1 (a) Let a complex multiplication takes one micro second and that the amount of
      time to compute a DFT is determined by the amount of time it takes to perform
      all of the multiplications. Determine how much time does it take to compute a
      1024 point DFT directly and also if an FFT is used?  (06)
(b) What is a Wavelet? How is wavelet transform different from Fourier transform?  (06)
2 (a) Discuss the pole-zero placement in the design of digital filters.  (06)
(b) Consider the filter $y(n) = -0.9y(n-1) + 0.1x(n)$
    (i) Determine the frequency at which $|H(\omega)| = \frac{1}{\sqrt{2}}$  (06)
    (ii) Is this filter lowpass, bandpass, or highpass if, $|H(0)| = 1$?  (06)
3 (a) What are the advantages of FIR filters over IIR filters?  (04)
    (b) Design a 2-pole bandpass filter that has the center of its passband at $\omega = \pi/2$,
        zero in its frequency response characteristic at $\omega = 0$ and $\omega = \pi$, and a
        magnitude response of $\frac{1}{\sqrt{2}}$ at $\omega = 4\pi/9$. Plot a rough sketch of the frequency
        response obtained.  (08)
4  Derive the radix 2 decimation-in-time FFT algorithm. Keep track of all the
    intermediate quantities by putting them on the diagrams.  (12)
5  Explain the 10-20 lead system for EEG recording. What are the different
    frequency bands in EEG?  (12)
6 (a) What are the common artifacts associated with ECG?  (06)
    (b) Describe the following terms: (a) tachycardia  (b) bradycardia (c) 1st degree
        AV block  (06)
7 (a) Describe in brief the commonly used parametric methods of power spectrum
    estimation.  (06)
    (b) What is baseline wandering? How do you remove it?  (06)