Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **M.Tech**
ETPE203

2nd Semester Regular/ Back Examination – 2014-15
Sub: Biomedical Instrumentation and signal processing
Specialization:- Applied electronics and Instrumentation Engineering/ Electronics and Instrumentation Engineering (M.Tech)
Time: 3 Hours
Max marks: 70
Q.Code:T517

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 (2 x 10)

a) What do you mean by bioacoustics signal?

b) State various ions present in the internal cell fluid.
.

c) State two important characteristics of physiological potentials.

d) State various bio-sensors?

e) What is EMG? How it is related with human body?

f) How stability in biomedical system is analyzed using z-transform?

g) It is observed that the shape of an square wave pulse does not changes when applied to an unit gain amplifier. Find its bandwidth with justification.

h) Write down the noise equivalent bandwidth of an ideal low pass filter..

i) List the electrode used in EEG?

j) What is repolarisation and depolarisation?

Q2 State two important characteristics of physiological potentials. Discuss how physiological potentials are generated in the human body

Q3 a) Explain the characteristics of action potential with necessary waveform? (5)

b) With a neat block diagram explain the biomedical instrumentation system.

Q4 a) Write short notes on (5)

(I) ECG
(II) EEG

b) With suitable diagram explain the principle of a displacement transducers used in biomedical signal processing. (5)

Q5 a) What is the difference between active and passive filter? Draw the circuit of a 2^{nd} order active low pass filter. Derive the expression of the transfer of the filter in terms of circuit components. (5)

b) Briefly describe various biomedical signal analysis used for writing signal waveforms on paper. (5)

Q6 a) What is noise in signal processing? Explain in brief the following noises occurred in the signal processing? (5)

(i) Thermal noise
(ii) Shot noise

b) With suitable diagram describe of blood flow measurement. (5)

Q7 a) Determine Z-transform of a discrete square wave signal of time duration $n = 5\ to\ n = 10$ with amplitude 2 volts. (5)

b) Write the various applications of short time Fourier transform in the field of biomedical signal processing. (5)

Q8 Write short notes on any two (5 x 2)

a) Properties of amplifiers used in biomedical signal processing

b) Fourier transform applicable to biomedical instrumentation

c) Wavelet transforms.