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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M.TECH DEGREE EXAMINATION, DECEMBER 2018

Branch:

Electronics and Communication Engineering

Streams:

1. Signal Processing

2. Translational Engineering

01EC6315: BIOMEDICAL SIGNAL PROCESSING

Answer *any two full* questions from *each* part

Limit answers to the required points.

Max. Marks: 60 Duration: 3 hours

PART A

1.	a.	Discuss about the origin of bio potentials with example.	2
	b.	Explain objectives of biomedical signal analysis.	2
	c.	Identify and design a filter to remove noise from a signal when no cut off frequencies are given. Illustrate with an application.	5
2.	a.	Design a filter with two zeroes to remove the interference for a biomedical signal sampled at 500 Hz was found to have a significant amount of 60Hz interference.	4
	b.	Explain the pros and cons of synchronized averaging.	3
	c.	Explain about the difficulties encountered in biomedical signal acquisition and analysis.	2
3.	a.	Atypical biomedical signal analysis of asubject shows that theacquired signal is affectedbyhighfrequencynoise. Design afrequency-domainfilterwhich hasminimum computationalcomplexity toremove thisnoise withminimal lossofsignalcomponents inthespecified passband givenbelow. fc=40Hz, fs=200Hz.Choose theorderofthe filtertobeN=4.Assumethedatawhicharenotgiven.	6
	b.	Explain the electrical system of the heart and how ECG signal is acquired.	3

PART B

4.	a.	Demonstrate howPanTompkins algorithmscanbeusedforrealtimeQRSdetection with an application.	5
	b.	Explain how muscle noise encountered during ECG acquisition can be rectified using signal processing technique.	2
	c.	Write notes on EEG rhythms and waveforms	2

5.	a.	Explain how baseline wandering problem in ECG signal can be removed (any two methods).	6
	b.	What do you meant by evoked response? How visual evoked potential is recorded?	3
6.	a.	Develop any two methods for removing power line interference in an ECG signal which is less sensitive to noise	5
	b.	Devise a method for the detection of epileptic seizures in EEG signals	2
	c.	Explain how EEG signals are recorded.	2

PART C

7.	a.	Discuss on amplitude and power estimation of EMG signals	8
	b.	Write notes on various artifacts in EEG.	4
8.	a.	Why are model based approaches preferred in EEG analysis?	3
	b.	How signal processing techniques helps in EMG waveform decomposition.	6
	c.	Explain generation of electrical changes during muscle contraction.	3
9.	a.	Explain any two method used for the analysis of EEG signals using Joint time frequency.	6
	b.	Discuss on any two methods used for artifact cancellation in EEG signals.	4
	c.	Explain EMG applications.	2