G.R. No.

Paper Code} P119-143 (ESE)

DECEMBER 2019 / ENDSEM
F. Y. M. TECH. (Electronics and Telecommunication Engineering) (SEMESTER - I)
COURSE NAME: BIOMEDICAL SIGNAL PROCESSING
COURSE CODE: ETPA11183C
(PATTERN 2018:R1)

Time: [3 Hour]

[Max. Marks: 50]

(*) Instructions to candidates:
1) Answer Q.1, Q.2, Q.3, Q.4 OR Q.5, Q.6 OR Q.7, Q.8 OR Q.9
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed
4) Use suitable data where ever required

Q.1) a) State the artifacts that contaminate ECG and EEG signals.   [3 marks]

OR

b) Name the electrodes used for acquisition of ECG, EEG and EMG.   [3 marks]

Q.2) a) Discuss any 3 factors to be considered in the design of medical

Instrumentation.   [3 marks]

OR

b) Explain the significance of grounding and shielding in biosignal acquisition systems.
                                                                      [3 marks]

Q.3) a) State the mathematical expression for STFT with one advantage and disadvantage.

                                                                      [2 marks]
OR

b) State the mathematical expression for WVD with one advantage and disadvantage.

                                                                      [2 marks]

Q.4) a) Explain Schematic representation of model-based methods of spectral estimation.

                                                                      [6 marks]

b) Propose an adaptive noise cancellation filter to remove the maternal ECG signal from the abdominal-lead ECG.   [8 marks]

OR

Q.5) a) Mention the guiding principles for the following models to determine which of the filters the best for a given application

    a. Synchronized or ensemble averaging
    b. Temporal MA filtering
    c. Frequency-domain fixed filtering
    d. Optimal Wiener filter
    e. Adaptive filtering

[10 marks]

    b) State Weiner Hopf equation with its significance   [4 marks]

Q. 6) a) State the steps involved in Principal component analysis   [10 marks]
    b) Differentiate between Singular value decomposition and PCA   [4 marks]

OR

Q.7) a) Compare and contrast PCA, ICA and SVD for signal analysis   [10 marks]
    b) Explain why ICA is more suitable for ECG signal processing   [4 marks]

Q.8) a) Explain the algorithm for classification of normal and abnormal ECG beats using   MLP   [10 marks]
    b) Differentiate between supervised and unsupervised neural networks [4 marks]

OR

Q.9) a) State the role of Support Vectors in SVM   [8 marks]
    b) Differentiate between Linear SVM and nonlinear SVM.   [6 marks]

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