CLASS:BE   **SEMESTER :M.Tech II Sem and PhD**
BRANCH: ECE   **SESSION: SP/22**

SUBJECT: BIOMEDICAL SIGNAL PROCESSING (EC610)

TIME:2Hrs   **FULL MARKS: 50**
INSTRUCTIONS:
1. The question paper contains 5 questions of total 50 marks.
2. All questions are compulsory.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) With the help of graph, explain briefly how action potentials are generated and propagated in human body.   [3]

Q.1(b) Explain briefly any two   [3]
    a. Floating electrodes
    b. Adhesive type elctrodes
    c. Limb Electrodes

Q.1(c) Describe briefly moving average filters.   [4]

Q.2(a) Discuss briefly limitation of short time Fourier transform in biomedical signal analysis.   [3]

Q.2(b) Considering the example of myocardial elasticity on heart sound spectra, discuss briefly how frequency domain representation helps in disease detection.   [3]

Q.2(c) Describe the delta, theta, alpha, beta and gamma bands of an EEG signal.   [4]

Q.3(a) Describe briefly autoregressive or all pole modelling technique with help of a diagram?   [3]

Q.3(b) Discuss briefly how motor unit firing pattern may be analysed as linear time invariant system?   [3]

Q.3(c) Discuss how power spectral density based analysis is applied to physiological patella-femoral crepitus (PPC) signal analysis.   [4]

Q.4(a) Discuss the steps used in Principal Component analysis (PCA).   [3]

Q.4(b) What are chaotic signals? Briefly describe a chaotic attractor used in chaotic signal analysis.   [3]

Q.4(c) Describe briefly the difference between principal component analysis (PCA) and independent component Analysis (ICA).   [4]

Q.5(a) Describe how discriminant and decision functions help us in supervised pattern recognition.   [3]

Q.5(b) Describe a simple cluster seeking algorithm for unsupervised pattern classification.   [3]

Q.5(c) With help of a diagram, describe the two layer perception in neural networks for pattern classification.   [4]

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