C Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U4104

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2024

Professional Elective

Electronics and Communication Engineering

21ECV104 BIOMEDICAL SIGNAL AND IMAGE PROCESSING

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The resting or filling phase of a cardiac chamber is called ---------- CO1- U

   (a) diastole (b)systole (c) twitch fiber (d) large muscle

2. A random process is characterized by the -------- CO1- U

   (a) PDF (b)MA (c) LMS (d)RMS

3. The contracting or pumping phase is called ---------- CO1- U

   (a) diastole (b) systole (c) twitch fiber (d) large muscle

4. Which tomography uses the line equation? CO1- U

   (a)Attenuation (b) diffraction (c) reflection (d)Time of flight

5. ---------- simulates the muscle fiber. CO1- U

   (a) motor neuron (b) motor nerve (c) twitch fiber (d) large muscle

PART – B (5 x 3= 15Marks)

6. Find the nerve conduction velocity at wrist using surface electrodes, amplified with a gain of 2,000, and filtered to the bandwidth 10 to 10,000 Hz. CO2-App

7. Calculate the frequency response of 8 – point moving average filter. CO3-App

8. Compare normal and healthy ECG. CO1- U

9. State X –ray’s wavelength equation. CO1- U

10. Draw the model for speech production. CO1- U

PART – C (5 x 16= 80Marks)

11.	(a)	Explain the function of ECG with proper waveform.	CO1- U	(16)
		Or		
	(b)	Distinguish between spatial and temporal recruitment of motor units to obtain increasing levels of muscular activity	CO1- U	(16)
12.	(a)	Design the filter which is used to remove random noise given only one realization of the signal or event of interest.	CO2-App	(16)
		Or		
	(b)	Develop a time-domain technique to remove base-line drift in the ECG signal.	CO2-App	(16)
13.	(a)	Explain in detail about the Electric Characteristics of Cell Membrane	CO1- U	(16)
		Or		
	(b)	Draw and explain the function of Cell Membrane's Equivalent Electric Circuit.	CO1- U	(16)
14.	(a)	Explain in detail about the different types of tomography.	CO1- U	(16)
		Or		
	(b)	With suitable structure explain the characteristics of beam delivery design in the X – Ray system.	CO1- U	(16)
15.	(a)	How can we obtain an Autoregressive model when the input to the system that caused the given signal as its output is unknown?	CO1- U	(16)
		Or		
	(b)	Explore the applicability of Fourier spectral analysis methods to study heart-rate data.	CO1- U	(16)