Reg. No.												

Question Paper Code	12427

B.E. / B.Tech - DEGREE EXAMINATIONS, NOV / DEC 2023

Fourth Semester

Artificial Intelligence and Data Science

20AIPC402 - BIOMEDICAL SIGNAL AND IMAGE PROCESSING

(Regulations 2020)

Duration: 3 Hours Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	Find the periodicity of the signal $e^{j\pi n}$.	*2,K1,CO1*
2.	Define energy signal.	*2,K1,CO1*
3.	List the lead systems used in ECG recording.	*2,K1,CO2*
4.	State the importance of PCG signals.	*2,K1,CO2*
5.	State the principle of directional smoothing.	*2,K1,CO3*
6.	Define - Spatial Filtering.	*2,K1,CO3*
7.	What is image negative?	*2,K1,CO4*
8.	Define - Geometric Transformation.	*2,K1,CO4*
9.	Define – Luminance.	*2,K1,CO5*
10.	Write the expression for finding the number of bits required to store a digital image.	*2,K1,CO5*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Calculate the power and energy of the signal *13,K2,CO1*
    (i) $x[n]=e^{j((\pi n/2)+\pi/8)}$
    (ii) $x[n]=\cos(\pi n/4)$

OR

b) Given the signal x[n] = [-3,2,0,1,4,5] *13,K2,CO1*
Draw the following signals.
    (i) 2x[n+2]
    (ii) x[n-2]+x[n+3]
    (iii) x[n/2+3]
    (iv) x[(n+2)/3]

12. a) Explain the different types of electrodes used in measurement of biomedical signals. *13,K2,CO2*

OR

b) Draw the curves of ECG and diagnose any form of disturbance in heart rhythm. *13,K2,CO2*

13. a) Show the various techniques in frequency domain to enhance an image with necessary examples. *13,K2,CO3*

OR

b) (i) Point out the comparison between smoothing & sharpening in frequency domain. *6 K2,CO3*

(ii) Analyze the performance of following smoothing filters Ideal Low Pass Filter, Butterworth Low Pass Filter, Gaussian Low Pass Filter. *7,K2,CO3*

14. a) Explain degradation model in detail. *13,K2,CO4*

OR

b) Derive a wiener filter for image restoration and specify its advantages over inverse filter. *13,K2,CO4*

15. a) Describe the elements of visual perception. *13,K2,CO5*

OR

b) Explain Image fidelity criteria with an example. *13,K2,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) Draw the block diagram of an EEG unit and explain the different parts in it. *15,K2,CO6*

OR

b) Draw and explain the working principle of 3D ultrasound imaging technique. *15,K2,CO6*