COURSE CODE: 11B2WBT852                               MAX.MARKS: 35
COURSE NAME: Computational Biomedical Image Analysis       MAX. TIME: **2 Hrs**
COURSE CREDITS: 3

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

**Q1.** Write a short note on the following:
   **a.** Electromagnetic Energy Spectrum
   **b.** CT Scanning
   **c.** Ultrasound Imaging
                                                          (2+1.5+1.5=5)

**Q2.** With the help of the block diagram, explain computer aided design (CAD) system for assisting radiologists in diagnosing ultrasound images.                    **(5)**

**Q3.** Design a single layer perceptron (or single layer neural network) for AND function. Consider initial weights as W=[0,0,1] and learning rate as 1/3. If possible, then show atleast 3 weights adjustment steps.

                                                          **(5)**

**Q4.** Write a short note on the following:
   **a.** Supervised Learning
   **b.** Unsupervised Learning
   **c.** Learning Rate
   **d.** Activation functions used in neural network.
                                                          **(1+1+1+2=5)**

**Q5.** For the image, I given below, determine the following:
   **a.** Average Filtered Image
   **b.** First Order Statistical parameters:
      **i.** Mean
      **ii.** Standard Deviation
      **iii.** Range

$$I = \begin{bmatrix} 2 & 5 & 2 & 5 \\ 4 & 6 & 4 & 6 \\ 2 & 5 & 2 & 5 \\ 4 & 6 & 4 & 6 \end{bmatrix}$$

                                                          **(2+1+1+1)**

**Q6.** With reference to image enhancement, explain the following:
   a. Negative of an image.
   b. Threshold image.
   c. Log transformed Image.
   d. Histogram of an image.
   e. Contrast Stretching.

(5X1=5)

**Q7.** For the image, I given below, determine GLCM matrix for the image, I and evaluate its contrast and energy.

$$I = \begin{bmatrix} 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \end{bmatrix}$$

(2+1.5+1.5=5)