

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1063

I

Unique Paper Code : 2512043501

Name of the Paper : Advanced Biomedical
Instrumentation

Name of the Course : **B.Sc. (H) Instrumentation
(CORE)**

Semester : V

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. *Use of scientific calculator is allowed.
3. Attempt **any 5** questions in all.
4. Question no. **1** is compulsory.
5. **All** questions carry equal marks.

P.T.O.

1. (a) Name the components of human whole blood which can be measured by a blood cell counter. (3)
- (b) Write down any three physiological applications of heat. (3)
- (c) Define acoustic impedance. Calculate the acoustic impedance of water if the velocity of sound in water is 1500 m/s and the density of water at body temperature is 0.99 g/cm^3 . (3)
- (d) Differentiate between PET and SPECT. (3)
2. (a) What do you mean by the term "blood count"? Describe the operation of a blood cell counter. (6)
- (b) Explain the working principle of a ventilator with the help of a suitable block diagram. (6)
3. (a) Elaborate on the operational principle and functionality of a gamma camera. (6)
- (b) Which nucleus is considered as the best candidate for Magnetic Resonance Imaging and why? Describe the instrumentation of this technique. (6)

4. (a) Explain the concept of A-scan and B-scan in ultrasound and provide two applications for each. (6)
- (b) Draw a block diagram of CT Scan and explain its principle of operation. (6)
5. (a) An ultrasound wave in human tissue has a frequency of 2,500 KHz and a wavelength of 6×10^{-4} m. Calculate its velocity of propagation. Discuss the generation of ultrasound in brief. List any two clinical uses of ultrasound. (6)
- (b) What is ELISA? State the underlying principle of an ELISA reader. What is it used for? (6)
6. (a) What are the essential components of a fibre optic endoscope? Discuss two types of endoscope. (6)
- (b) What do you mean by short wave diathermy? Describe the two application techniques of short wave diathermy with the help of neat diagrams. (6)

7. (a) Describe the components and function of an anesthesia delivery system. (6)
- (b) Outline the key elements of an autoanalyzer and explain how they function. (6)