Seat No: _____ Enrollment No: _____

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. Winter, 2019– 20 Examination

Semester: 5 **Date: 28/11/2019**
Subject Code: 03111302 **Time:10:30am 01:00pm**
Subject Name: Biomedical Instrumentation **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Fill in the blanks, one word answer, MCQ-not more than Five in case of MCQ) (All are compulsory) (Each of one mark) **(15)**

1. The EMG measures
(A) Electrical activity of the muscle
(B) Electrical activity of the brain
(C) Electrical activity of the heart
(D) Electrical activity of the visual cortex

2. The voltage developed at an electrode-electrolyte interface is known as
(A) Resting potential (B) Electrode potential (C) Action potential (D)Polarized potential

3. The graphic record of heart sound is known as
(A) Phonocardiogram (B) Photoplethysmogram (C) Hemodialysis (D) Lithotripsy

4. _____ is an electrical pulse generator that starts or maintains the normal heart rhythm
(A) Defibrillator (B) Echocardiograph(C) Electrocardiograph (D) Pacemaker

5. For theta=45 degree, V=100mm/s , C =1500m/s, a 2MHz ultrasonic beam is shifted in frequencies by about _____.
(A) 300Hz (B) 267Hz (C)189Hz (D) 140Hz

6. Too low blood pressure is known as _____
7. EOG Stands for _____
8. What is the function of Amplifier?
9. Ultrasonic blood flow meter is based on the principle of _____
10. Which chamber is the most powerful chamber of the heart?
11. What do you understand by Blood Pressure?
12. What is the purpose of electrode paste?
13. Define In-vitro and In-vivo measurement.
14. Enlist the methods for measuring blood flow.
15. What are the average values of systolic and diastolic blood pressure in adult human being?

Q.2 Answer the following questions. (Attempt any three) **(15)**

A) Explain transit time transduction principle of ultrasonic blood flow meter with necessary diagram.

B) Calculate he voltage generated across the electrodes of an electromagnetic blood flow probe flow probe applied across a blood vessel of 1.8 cm diameter. The magnetic flux density of the probe is 1.6 $\times 10^{-5}$ wb/m^2. Assume volume flow rate of 200 cm^3/sec.

C) Explain correlation of the four heart sounds with electrical and mechanical events of the cardiac cycle.

D) In a transit time ultrasonic blood flow meter the angle of inclination of ultrasonic beam with the flow axis is 45°. The distance between transmitter and receiver is 2 cm. For the sound wave of 1570 m/sec, the transit time difference of the downstream and the upstream ultrasonic pulses is observed 1.3×10^{-9} sec. Calculate the blood velocity?

Q.3 A) Explain Doppler frequency shift blood flow meter. Discuss the effect of angle of incident ultrasonic waves on Doppler shift. **(07)**

B) What are the Sources of Biomedical signals? Explain all in detail. **(08)**

OR

B) Explain blood pressure measurement using sphygmomanometer. **(08)**

Q.4 A) Draw and Explain the phonocardiograph in detail and also explain different heart sound with its origin. **(07)**

OR

A) Draw the block diagram of an Electrocardiograph and explain each block in detail. **(07)**

B) Draw and Explain the block diagram of an Electroencephalograph in detail. **(08)**