

Registration No. :

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Total number of printed pages – 2

B. Tech
PEEC 5416

Seventh Semester (Special) Examination – 2013

BIOMEDICAL INSTRUMENTATION

BRANCH : BIOTECH, CSE, IT

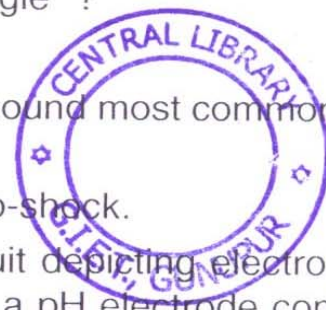
QUESTION CODE : D 461

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any **five** from the rest.
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10
 - (a) What is half-cell potential ?
 - (b) Distinguish between active and passive transducers.
 - (c) Why the amplitude (not the frequency) of ECG signal and frequency (not the amplitude) of the EEG signal are important ?
 - (d) Why and under which mode the instrumentation amplifiers are been designed for biomedical signal processing ?
 - (e) What does a signal conditioner do in biomedical instrumentation system ?
 - (f) What is the role of signal delay and trigger unit in EMG ?
 - (g) What is the importance of "Einthoven Triangle" ?
 - (h) Mention the origin of Korotkoff sounds.
 - (i) List different modes of transmission of ultrasound most commonly used in diagnostic medical applications.
 - (j) Distinguish between micro-shock and macro-shock.
2.
 - (a) Draw and explain electrical equivalent circuit depicting electrode-skin interface. Brief the principles and design of a pH electrode comprising Ag/AgCl. 5
 - (b) What is skin contact impedance ? How is it affected by motion artifact ? 5



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3. (a) Classify the transducers with biomedical applications. Discuss the principles of any one of the following photoelectric transducers : 5
- (i) Photoemissive
- (ii) Photovoltaic and
- (iii) Photoconductive.
- (b) How a thermistor can be linearized over a limited temperature range ? Explain. 5
4. What is ECG ? Describe its principles, method of recording. Draw the waveform of an ECG. Indicate the intervals and segments of diagnostic interest in the waveform. What may be the indications of abnormality, if (i) the duration of the P-R interval is greater than the normal value and (ii) one or more basic features of ECG are missing ? 10
5. (a) What is the difference between phonocardiogram and phonocardiograph ? Discuss the measurement of heart sound by stethoscope and draw its frequency spectrum. 5
- (b) Explain the principle of operation and derive an expression for the velocity of blood in ultrasonic Doppler shift blood flow meter. 5
6. (a) List the various modes of operation of a digital recorder. State the advantages and disadvantages of digital recording. 5
- (b) Explain the functioning of an Instantaneous Heart Rate Meter. 5
7. (a) List the factors to be considered while selecting a transducer. Explain the operation of a resistive pressure transducer with the help of a neat diagram. 5
- (b) What is leakage current ? What kind of precautions should be taken in patient monitoring to minimize electric shock hazards ? 5
8. Write short notes on any **two** of the following 5×2
- (a) Intelligent Medical Instrumentation Systems
- (b) Measurement of Respiration Rate
- (c) Safety Codes for Biomedical Equipment
- (d) Smart Sensors.

