

**III B.Tech II Semester Regular Examinations, Apr/May 2006**  
**BIO-MEDICAL INSTRUMENTATION**  
**(Electronics & Instrumentation Engineering)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. (a) What are the different types of muscles? Explain the importance of motor unit in the muscular contraction.  
(b) What is meant by central nervous system? Explain the different parts of it and their activity. [8+8]
2. (a) Explain clearly the following terms:
  - i. Ventricular repolarization
  - ii. Ventricular depolarization
  - iii. Atrial repolarization
  - iv. Atrial depolarization(b) Distinguish between the functioning of SA mode and AV mode. [8+8]
3. (a) What are the different interfaces established when a surface electrode is used. Explain?  
(b) What is a Biochemical Transducer. Explain? [10+6]
4. (a) Discuss the physiological phenomena responsible for the generation of EMG signal.  
(b) Give the normal amplitude and frequency range of the EMG signal . [10+6]
5. (a) Explain the Frank lead system.  
(b) Explain how this Frank lead system is different from the other lead systems? [8+8]
6. (a) List out typical EEG recording artifacts.  
(b) With a neat block diagram explain the principle of operation of an EEG telemetry system. [6+10]
7. (a) Explain the fibrillation and defibrillation in the heart and hence explain the need for defibrillation with neat circuit diagrams.  
(b) Discuss the computer analysis of ECG. [10+6]
8. (a) Explain the single channel telemetry system.  
(b) Describe the working of FM Telemetry transmitter used in medical field. [8+8]

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1. (a) What is meant by central neurons system? Explain the different parts of it and their activity.  
(b) What are bioelectric potentials? Discuss the frequency and voltage range of ECG, EEG, EMG and ERG signals. [6+10]
2. (a) With the help of a neat sketch explain the functioning of the heart.  
(b) With the help of a neat diagram explain the working principle of heart lung machine. [8+8]
3. (a) Give the basic classification of electrodes used to measure bio electric events.  
(b) Discuss in detail the electrode used to measure ECG and EMG. [8+8]
4. (a) Draw the block diagram and explain the recording set-up for EMG recording.  
(b) Discuss about the use of integrators in EMG. [10+6]
5. (a) Explain the lead configuration in ECG with neat sketches  
(b) Draw the basic building blocks of electro cardiograph and explain. [8+8]
6. (a) List out typical EEG recording artifacts.  
(b) With a neat block diagram explain the principle of operation of an EEG telemetry system. [6+10]
7. Explain the following with neat block diagrams:  
(a) Ventricular synchronous demand pacemaker.  
(b) Atrial triggered pacemaker. [8+8]
8. (a) Describe a digital computer along with its biomedical applications.  
(b) Describe any one of the biomedical equipment controlled by a microprocessor. [8+8]

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1. (a) Give the names of the different systems in our body. Explain in detail regarding their function and constituents.  
(b) Discuss the frequency and voltage range of ECG, EMG and EEG. [10+6]
2. (a) With the help of a neat sketch explain the functioning of the heart.  
(b) With the help of a neat diagram explain the working principle of heart lung machine. [8+8]
3. (a) Differentiate between surface electrodes and embedded electrodes with suitable examples?  
(b) With a schematic diagram explain a self balancing potentiometer recorders. [8+8]
4. (a) Discuss the physiological phenomena responsible for the generation of EMG signal.  
(b) Give the normal amplitude and frequency range of the EMG signal . [10+6]
5. (a) Discuss the various lead configurations of ECG recording.  
(b) Give the six positions of the chest electrodes used in the precordial lead system. [10+6]
6. (a) Discuss in detail about the various types of electrodes used in EEG measurements.  
(b) Discuss in detail about the standard amplitudes and frequency bands of EEG signals. [8+8]
7. (a) What are the different modes of triggering in a Pacemaker ?  
(b) Explain with a block diagram, the asychromous pacemaker. [8+8]
8. Write short notes on:  
(a) Displays used in patient monitoring system.  
(b) Calibration and repeatability of patient monitoring equipment. [8+8]

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1. (a) With neat diagrams explain the terms Resting Potential and Active potential . How are these generated in Muscles?  
(b) With the help of sketches explain about polarized cell and depolarized cell.  
[8+8]
2. (a) With the help of a neat sketch explain about the physiology of the heart.  
(b) What are the different parts and how bioelectrical potentials are generated within it?  
[8+8]
3. (a) Differentiate between surface electrodes and embedded electrodes with suitable examples?  
(b) With a schematic diagram explain a self balancing potentiometer recorders.  
[8+8]
4. (a) Explain the stimulators used in EMG.  
(b) Explain the controlled muscular contraction with block diagram. [8+8]
5. (a) Explain in detail the genesis of the ECG signal.  
(b) Draw and explain the Einthoven triangle and prove the Einthoven triangle.  
[6+10]
6. (a) With the help of a neat block diagram explain the operation of a visual and auditory evoked potential system.  
(b) Given that EEG output is  $51\text{ mV}_{p-p}$  (to a  $100\text{ }\mu\text{V}_{p-p}$  differential EEG input) and the noise output is  $0.005\text{ mV}_{p-p}$  (to a  $100\text{ }\mu\text{V}_{p-p}$  common mode noise input). Calculate the CMRR. [10+6]
7. (a) Explain the fibrillation and defibrillation in the heart and hence explain the need for defibrillation with neat circuit diagrams.  
(b) Discuss the computer analysis of ECG. [10+6]
8. (a) Describe a digital computer along with its biomedical applications.  
(b) Describe any one of the biomedical equipment controlled by a microprocessor.  
[8+8]

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