

**IV B.Tech I Semester Regular Examinations, November 2005**  
**BIO-MEDICAL INSTRUMENTATION**  
**(Instrumentation & Control Engineering)**

**Time: 3 hours**

**Max Marks: 80**

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

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1. (a) With a neat sketch explain the functioning of a human cell. What is meant by cell repolarization and depolarization.  
(b) What are resting and action potentials. [8+8]
2. (a) With the help of a neat block diagram explain the principle of operation of heart lung machine.  
(b) Explain how the ECG wave form helps in assessing the functioning of the heart. [8+8]
3. (a) Give a neat classification of various electrodes used for measuring biopotentials from heart, brain and muscles.  
(b) What are the specifications of these electrodes. [10+6]
4. (a) Describe the components of a typical EMG recording system.  
(b) What are the technical differences between the recorders used for EMG and ECG? [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) Explain the working procedure of an EEG machine with the help of a schematic block diagram.  
(b) Why EEG signals are different in sleeping state than those in awakening state.  
(c) List the frequency ranges of various waves of EEG. [6+6+4]
7. (a) What is pacemaker? Explain its principle of working and types of pace makers.  
(b) Describe with the help of a neat diagram the working of a blood flow and blood pressure monitor. [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) 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. Write notes on any two of the following:  
(a) Sources of Bioelectric potentials  
(b) Electro physical properties of muscles. [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) Explain the stimulators used in EMG.  
(b) Explain the controlled muscular contraction with block diagram. [8+8]
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) Describe various types of EEG frequency responses and explain their significance.  
(b) What is the difference between a normal and evoked response. [8+8]
7. (a) Describe the principle and working of a computer based arrhythmia monitoring system.  
(b) Explain the indirect methods of measurement of blood pressure in detail. [8+8]
8. (a) Briefly explain the different modes of ultrasonic scanning with suitable diagrams.  
(b) Describe the ultrasonic imaging systems (M-mode) with a suitable diagram. [8+8]

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1. (a) Give an account on the different chemical compositions in the intra and extra cellular fluids and their effects in the case of blood serum.  
(b) How does the blood circulate through out the body. [8+8]
2. (a) With a neat sketch explain the functioning of heart. Also explain how it pumps blood to all parts of the body.  
(b) Explain the origin of ECG from the heart muscles. [10+6]
3. (a) What are the different types of electrodes? Discuss the advantages and disadvantages of them?  
(b) What are the various errors associated with electrodes in measurement of body potential. [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) Give the types of ECG recorders. Discuss any two types of recorders in detail.  
(b) What are the needs for intensive-care monitoring system? Discuss the basis and essential components present in the cardiac-care unit. [8+8]
6. (a) What is the origin of the physiological parameter (EEG signal) measured by the EEG machine.  
(b) Give the various frequency bands usually specified for EEG signals [8+8]
7. (a) Write a note on the power sources employed in implantable pacemakers.  
(b) With a functional block diagram, explain programmable pacemaker. [8+8]
8. (a) Describe the possibilities of occurrence of electrical accidents for a patient in a hospital.  
(b) What are microshocks and macroshocks? [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 a neat sketch explain the functioning of heart. Also explain how it pumps blood to all parts of the body.  
(b) Explain the origin of ECG from the heart muscles. [10+6]
3. (a) Differentiate between surface electrodes and embedded electrodes with suitable examples?  
(b) With a schematic diagram explain a self balancing potentiometer recorder. [8+8]
4. (a) Explain the stimulators used in EMG.  
(b) Explain the controlled muscular contraction with block diagram. [8+8]
5. (a) Discuss the differences between the unipolar and bipolar types of ECG recording electrodes.  
(b) Describe the colour coding of the ECG electrodes. [10+6]
6. (a) Describe various types of EEG frequency responses and explain their significance.  
(b) What is the difference between a normal and evoked response. [8+8]
7. (a) Write a note on cardiac arrhythmias.  
(b) With a basic block diagram of arrhythmia monitor explain its principle of working. [8+8]
8. (a) With a neat block diagram explain the different elements involved in the bio-telemetry.  
(b) What are the problems associated with the implant telemetry circuits. [8+8]

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