

**III B.Tech II Semester Supplementary Examinations,
November/December 2005**

**BIO-MEDICAL INSTRUMENTATION
(Electronics & Instrumentation Engineering)**

Time: 3 hours

Max Marks: 80

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

1. (a) Explain in detail about the electro physical properties of different types of muscles.
(b) Explain how the action potentials are transmitted through the muscles. [8+8]
2. (a) Explain about the non -electrical systems of the heart .
(b) What are the functions of SA node and AV node? [8+8]
3. (a) Draw the electrical equivalent circuit of a microelectrode and explain its electrical nature.
(b) Discuss the different types of surface electrodes and their uses. [8+8]
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) Draw an ECG waveform and label it.
(b) Explain in detail the different waves, segments and intervals associated with the ECG waveform. Also give their normal values. [6+10]
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) 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) 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) 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 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) 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. Write short notes on
(a) Electrodes and leads in ECG
(b) Einthoven triangle. [8+8]
6. (a) Explain the working and procedure of use of an EEG machine with the help of neat diagram.
(b) Why EEG signals are different in sleeping state than those in awakening state. [8+8]
7. (a) With the help of a neat block diagram explain the working of an internal pace maker.
(b) With a neat diagram explain the operation of an Arrhythmia monitor. [8+8]
8. (a) Define bio telemetry? Explain the importance of biotelemetry in the modern world.
(b) What are the uses of biotelemetry. [8+8]

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1. (a) Draw the wave-form for the active potential and explain the same.
(b) Explain the terms relative refractory period and absolute refractory period. [6+10]
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 factors which should be taken into account during designing of a medical equipment.
(b) Draw the block diagram of a bio-medical instrument system and briefly explain its components. [8+8]
4. (a) Explain the qualitative requirements of the different blocks of a muscle stimulator.
(b) Explain the various types of stimulating and recording electrodes used in a muscle stimulator. [8+8]
5. (a) Derive the relationship between the standard limb leads and the augmented limb leads.
(b) Discuss the interpretation of any four abnormalities diagnosed using ECG, giving the waveforms in each case. [8+8]
6. (a) Explain the working and procedure of use of an EEG machine with the help of neat diagram.
(b) Why EEG signals are different in sleeping state than those in awakening state. [8+8]
7. (a) Discuss the direct methods of measurement of blood pressure in detail.
(b) Draw the general block diagram of a pace maker and explain each block in detail. [8+8]
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) 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 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) What is Metal-Electrolyte interface? Explain.
(b) Discuss the different tape recording methods used in medical systems. List its advantages and disadvantages? [6+10]
4. (a) Explain the measurement of conduction velocities in motor nerves.
(b) Discuss any two types of FM transmitters with their merits & demerits, used for the transmission of EMG signal. [6+10]
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) With neat circuit diagrams explain the principle of operation of the following EEG preamplifiers.
 - i. Single ended preamplifier
 - ii. Differential preamplifier
(b) With neat diagrams distinguish between unipolar, average and bipolar EEG recording modes. [8+8]
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]
