



KINGS

COLLEGE OF ENGINEERING



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
QUESTION BANK

SUBJECT CODE & NAME : EI 1011 – BIO- MEDICAL INSTRUMENTATION

YEAR / SEM : IV / VIII

UNIT – I

PHYSIOLOGY AND TRANSDUCERS

PART – A

1. Distinguish Absolute and Refractory Period?.
2. What is the function of Cell?
3. What are resting and action potentials?.
4. What are the applications of piezo electric sensors?
5. What are the different thermal sensors?
6. Give the names of the different systems in our body.
7. State the Principle of the sodium Pump.
8. What is meant by CNS and PNS?
9. What are the different ways of transport of ions through the cell membrane?
10. Define neuron and Nerve fiber.
11. Name some transducers that can be used for blood flow measurement(Aortic and venous)
12. What are active and passive transducers?

PART – B

1. (i) With relevant graph explain the relationship between the action potential and Muscle contraction. (8)

- (ii) Explain in detail how pulsatile blood volume changes can be measured using Photoelectric type resistive transducer. (8)
2. Explain with neat sketch anatomy and conducting system of heart. Also discuss cardio vascular circulating system with block diagram. (16)
3. Explain with neat sketch anatomy and physiology of central nervous and peripheral nervous system. (16)
4. (i) Draw diagrams illustrating the process of respiration and circulation. (8)
(ii) Draw the diagram and equivalent circuit of a differential capacitance pressure transducer and briefly explain its operation. (8)
5. (i) Describe the generation and features of action potential and Resting Potential. (8)
(ii) What are the requirements of a good physiological transducer and explain the operation of any two types of physiological transducers with relevant sketches? (8)
6. Draw the structure of a living cell of our body and explain in its constituents detail. (16)
7. (i) Explain the working of Piezoelectric transducer as arterial pressure sensor. (8)
(ii) Explain how Piezo electric transducer produces Ultrasonic waves. (8)
8. Write short notes on:
(i) Strain gauge type chest transducer (8)
(ii) Transducer as respiration sensor (8)

UNIT – II

ELECTRO – PHYSIOLOGICAL MEASUREMENTS

PART – A

1. Define half cell potential.
2. What are the salient features of needle electrodes.
3. Give the origin of brain waves
4. Explain the special features of isolation amplifier.

5. Define EEG and EMG?.
6. Define ECG and ERG?
7. Define Einthoven Triangle?
8. List any four types of surface electrodes.
9. Name the different types of electrodes used for a Bio-medical instrumentation system.
10. What is the frequency range of ECG, EEG and EMG waves.
11. What are the advantages of chopper amplifier.
12. Define latency
13. Distinguish between metallic microelectrode and Non metallic microelectrode
14. State the requirements of Physiological amplifiers.
15. What are Microelectrodes.

PART - B

1. (i) How a metal micro electrode is formed? Draw its electrical equivalent circuit and explain. (8)
(ii) Draw the circuit diagram of Darlington pair isolation amplifier and explain (8)
2. (i) What is the medical use of chopper amplifier? Draw the diagram of mechanical chopper amplifier and explain its working.. (8)
(ii) Draw the ECG curves for Normal adult, Myocardial infraction, coronary insufficiency and ventricular fibrillations. (8)
3. (i) Draw the buffer amplifier circuit and explain its working (8)
(ii) Explain the working of a Chopper amplifier (8)
4. Explain the working of (i) EEG Recorder (ii) EMG System (16)
5. Describe in detail about the clinical significance ,lead configuration, recording methods and waveforms of ECG. (16)

6. Describe in detail about the basic components of a biomedical system? (16)
7. What are the electrodes used in biomedical and explain the types of electrodes in detail with diagrams (16)
8. (i) Explain any four types of surface electrodes in detail (8)
(ii) Describe in detail the needle-electrodes and its types (8)

UNIT – III
NON-ELECTRICAL PARAMETER MEASUREMENTS
PART – A

1. Define GSR Measurement.
2. Define BSR Measurement.
3. How is the blood pressure measured in the indirect method.
4. Briefly mention the uses of gas analyzers.
5. What is called Respiratory rate?
6. What is called Cardiac Output?
7. Explain the principle of sphygmomanometer
8. What are the methods involved in direct blood pressure measurement?
9. What is pH Value of Arterial blood and Venous blood?
10. Define Apnoea.
11. What is the principle of working of Electromagnetic blood flow meter?
12. What is Spiro meter?
13. Define MVV, FVC, and FRC?
14. What are the different sounds made by the heart?

PART – B

1. Draw the block diagram of automated electro sphygmomanometer for blood pressure measurement and explain its operation? (16)
2. Explain with relevant equations the working and measurement produce of Plethysmograph?. (16)

3. With suitable figures explain How pH ,Pco₂ ,and Po₂ are measured? (16)
4. i) Explain any one method of measuring blood pressure. (8)
ii) Explain about ESR and GSR measurements (8)
5. Describe in detail a method to determine Total Lung capacity (16)
6. Draw a circuit diagram of a pH meter and explain its working details. (16)
7. i) Explain the Working principle of a electromagnetic type blood flow meter. (8)
ii) Define Cardiac output.Discuss a technique to determine Cardiac output (8)
8. i) Explain the Principle of operation of an Ultrasonic blood flow meter (8)
ii) Expl;ain the origin of different heart sounds. (8)

UNIT – IV

MEDICAL IMAGING AND PMS

PART – A

1. Define Micro shock.
2. Define Macro shock.
3. Which are the elements of bio-telemetry system?
4. What is the principle of X-ray machine? Give the characteristics of X- Ray radiation ?
5. What is the principle of Endoscopy?
6. Name the different types of bio-telemetry system.
7. Distinguish between Fluoroscopy and Radiography.
8. Mention different methods of Reconstruction techniques in CT?
9. Mention the classifications of Artifact
10. What are the types of Thermography?

PART – B

1. Draw the block diagram of Computer tomography scanner and explain its operation with emphasis on image reconstruction. (16)

2. What is an Endoscope? List the types of commonly available endoscopes. with schematic diagram explain the working of endoscopic laser coagulator (16)
3. Explain the working of X ray Machine? (16)
4. (i) Explain the different elements involved in Biotelemetry circuits. (8)
(ii) Explain about Patient Monitoring system (8)
5. Explain in detail about the basic principle of Thermography. With neat diagram explain the different parts of the Thermal Imaging system. (16)
6. (i) Write the principle of NMR? (4)
(ii) Explain with block diagram the MRI (8)
(iii) Applications of MRI (4)
7. Explain the concepts of Ultrasonography and mention its types. (16)

UNIT – V

ASSISTING AND THERAPEUTIC EQUIPMENTS

PART – A

1. What is the use of Biphasic D.C. defibrillators?
2. What is the principle of bubble oxygenators.
3. Why do use heart – lung machine?
4. What is the purpose of Audiometer?
5. What is a pacemaker? What are the different modes of operation of Cardiac pacemakers?
6. What are the differences between Hemodialysis and Peritoneal dialysis?
7. What are the requirements for a blood pump?
8. What is meant by dialysis?
9. What is ventilator?
10. What are the drawbacks of a.c. defibrillators?

PART – B

1. (i) Give the difference between internal and external pacemaker (8)
(ii) Give short note on Double square pulse defibrillator. (8)
2. Why do we require Heart-lung machine? Draw a block diagram of it and explain its working. (16)
3. Draw the block diagram of synchronized D.C. defibrillator and explain its working. (16)
4. List the different types of waveforms used for stimulation of Muscle and nerves? Draw the block diagram of a typical Electrotherapeutic stimulator and explain. (16)
5. Write short notes on:
 - i) Short wave diathermy
 - ii) Microwave diathermy. (16)
6. Discuss different types of defibrillators with a neat sketch. (16)
7. Explain the process of dialysis with diagrams. How does this technique play a useful role in medical field? Give a few examples and state the limitations of this technique. (16)
8. Draw a circuit diagram of a Peripheral nerve stimulator and explain it and also discuss the different types of stimulator waveforms. (16)
9. i) Explain the principle of working of Ventilators. (8)
ii) Explain about audiometers in bio-medical instrumentation. (8)