

15 C TRIBHUVAN UNIVERSITY
 INSTITUTE OF ENGINEERING
Examination Control Division
 2075 Bhadra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BEL	Pass Marks	32
Year / Part	IV / II	Time	3 hrs.

Subject: - Biomedical Instrumentation (*Elective II*) (EX76505)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. a) Describe the scenario for protection system of hospitals and Medical equipment's. "Medical electrical equipment involves the measurement of certain leakage currents". Describe causes of leakage current and its types. [8]
- b) Differentiate Single channel telemetry and multi-channel telemetry. How can you use information and communication technology for realizing the concept of telemedicine? Explain with related diagrams. [8]
2. a) What is Defibrillator Machine? Differentiate Cardiac Pacemaker and defibrillator? Describe different types of dialyzers. [8]
- b) Describe the system components of CT-scan and MRI Machine. Explain Image detection system (NMR receiver) with its function and uses. [8]
3. a) What are the biological effects of X-Ray? Describe the principle of ultrasound. Explain Basic Pulse Echo Apparatus of ultrasound with block diagram. [8]
- b) Describe any three Muscle Related Diseases. Explain the 12 leads configuration for ECG measurement with diagram. Also describe the Rhythm and sleeping stages during EEG measurement. [8]
4. a) Define Nerst equation. Describe Polarization and Depolarization process in relation with Resting and action Potential. Describe the different types of bio- potential electrodes with related diagrams. [8]
- b) Describe the blood flow mechanism in human body. Define RBC and compute the cardiac output. Explain the Electromagnetic blood flow meter with appropriate diagram. [8]
5. Write short notes on: 4×4
 - a) MAN Instrumentation system
 - b) Active Vs Passive Transducer
 - c) X-ray Machine
 - d) ESWL Machine

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 - ✓ **All** questions carry equal marks.
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1. a) What is man-instrument system? What are the five objectives of a man-instrument system? Explain briefly. Write Ten design consideration factors.
b) Explain electrode theory. Draw an equivalent circuit of electrodes for the measurement of a cell potential. What are the differences between Electrodes and Transducers? Write their applications in medical field.
 2. a) Design a PC based ECG machine. Explain its function briefly. What are the differences between EEG and EMG potentials?
b) Draw a neat schematic diagram of blood flow instrumentation based on Doppler principle and explains its function.
 3. a) What is ultrasound? Discuss Basic Echs Apparatus of ultrasound machine with its B-mode application in medicine.
b) Explain function diagram of an X-ray machine. How its intensity is varied? What are the biological effects of X-rays?
 4. a) What is computer Tomography? Explain its scanning procedure with complete diagram. What are the differences between CT and MRI?
b) What is artificial kidney? Draw a lay-out diagram of therodialysis and explain its function.
 5. Write short notes on: (any two)
 - i) Electroencephalography
 - ii) Litho tripry
 - iii) Defibrillator machine
 - iv) Physiological effect of electricity
