

2024

BIOMEDICAL INSTRUMENTATION*Full Marks: 100**Time: Three hours**The figures in the margin indicate full marks for the questions.***Answer any five questions**

1.
 - a) Specify the use and classifications of biopotential electrode. 2
 - b) Explain cell action potential. Specify the biopotential electrode used for measuring it. Explain types of that biopotential electrode. 6
 - c) Design an instrumentation amplifier for a gain of 1100. 12
2.
 - a) How many unipolar limb lead configurations are in the 12 standard lead ECG measurement? Draw all unipolar limb lead configurations. 4
 - b) A patient has undergone spirometric test and the technician has instructed the patient to do breathing in the following sequence: rest in the two respiratory cycles, forcefully inhale in the 3rd respiratory cycle, rest in the 4th respiratory cycle and forcefully exhale in the 5th respiratory cycle. Draw the patient's spirogram and label the lung volumes and capacities; if VC is 4800mL, TLC is 6000mL, IRV is 3000mL and TV is 600 mL. 6
 - c) With neat diagrams, explain two types of spirometer. 10
3.
 - a) With a neat diagram, explain an ICU monitor system. 12
 - b) Name the machine used for 2D imaging of lungs. With a neat diagram, explain its construction and working. 8
4.
 - a) With a neat diagram, explain the construction and working of Heart-Lung machine. 10
 - b) Specify the need of a defibrillator. With a neat circuit diagram, explain Low DC defibrillator. 10
5.
 - a) Explain the scanning modes in ultrasound imaging. 4
 - b) Explain a technique to measure hydrogen ion concentration in blood. 6
 - c) Name the device used to correct the problems caused by SA node failure. With block diagram, explain the device working and its types 10
6. With neat diagram, explain the device used for the following:
 - i) To look inside of the stomach 4
 - ii) To measure heart sound 4
 - iii) To measure hearing ability in a person 6
 - iv) To measure sodium in blood 6

