53 (IE 801) BMIN

2018

BIOMEDICAL INSTRUMENTATION

Paper : IE 801

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions out of **seven**.*

1. *(a)* With a neat diagram, explain nerve cell. 4

   (b) Explain cell action potential. 6

   (c) Explain biopotential electrodes. 10

2. *(a)* Explain isolation amplifier. 4

(b) Design amplifiers for the following output voltages : 16

(i) $V_0 = 10(V_1 - V_2)$

(ii) $V_0 = 1000(V_2 - V_1)$

3. (a) Explain unipolar limb lead configurations in ECG measurement. 10

(b) With a neat circuit diagram, explain the working of DC defibrillator. 10

4. (a) Explain the construction and working of Wedge Spirometer. 8

(b) A patient has undergone spirometric test and in the test, the technician has instructed patient to breath in the following sequence ; rest for one respiratory cycle, forcefully exhale for one respiratory cycle, rest for one respiratory cycle and forcefully inhale for one respiratory cycle. Draw the patient spirogram and label the lung volumes and capacities. 7

(c) The patient mentioned in 4. (b) question has IC = 2800*mL*, FRC = 2250*mL* and ERV = 1050*mL*. Find TLC and VC of the patient. 5

5. (a) With a neat diagram, explain an audiometer. 7

(b) Explain the human blood pressure measurement using sphygmomanometer. 7

(c) Explain A-scan and B-scan modes in ultrasound imaging. 6

6. (a) With a neat diagram, explain the working of human heart and also the generation of ECG. 10

(b) Explain pacemaker and its types. 10

7. Write short notes on : 4×5=20

(i) Ultrasound transmission modes

(ii) Blood pH

(iii) Differential Amplifier

(iv) Biotelemetry.
