*Name* : .....

*Roll No.* : .....

*Invigilator's Signature* : .....

**CS/B.Tech/ECE/SEM-8/EC-804B/2013**

**2013**

# MEDICAL ELECTRONICS

*Time Allotted* : 3 Hours *Full Marks* : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

## GROUP – A
## ( Multiple Choice Type Questions )

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

i) The *T* wave in ECG represents

a) repolarization of right ventricle

b) polarization of left ventricle

c) repolarization of left ventricle

d) repolarization of both ventricles.

ii) The band of theta ( θ ) frequency of EEG range is

a) 0·5-4 Hz b) 4-8 Hz

c) 8-13 Hz d) none of these.

iii) A record of contraction of the skeletal muscles is known as

a) EEG b) EMG

c) ERG d) EOG.

iv) The direct blood pressure measurement is done by

a) percutaneous insertion method

b) catheterization method

c) both (a) and (b)

d) none of these.

v) The volume of a gas inspired or expired during each normal quite respiration cycle is

a) tidal volume

b) expiratory reserve volume

c) residual volume

d) inspiratory reserve volume.

vi) Which device measures blood pressure ?

a) Ultrasonography b) Stethoscope

c) Sphygmomanometer d) None of these.

vii) A typical EMG signal ranges from

a) 0·1 to 0·5 mV b) 0·1 to 5 mV

c) 1 to 5 mV d) 1 to 0·5 mV.

viii) The heart sounds are recorded by

a) electrocardiograph b) endoscope

c) phonocardiograph d) angiocardiograph.

ix) EMG is an instrument used for measuring electrical activity of

a) muscles b) brain

c) skin d) heart.

x) In Doppler effect the shifted frequency is expressed as

a) $\Delta f = 2V/\lambda$ b) $\Delta f = V/2\lambda$

c) $\Delta f = 2\lambda/V$ d) $\Delta f = \lambda/V$.

xi) The period of Dilation of the heart cavities as they filled with blood is known as

a) diastole b) systole

c) both (a) and (b) d) none of these.

xii) The normal value of blood pressure is

a) 120/80 b) 120/70

c) 140/80 d) 140/70.

## GROUP – B
## ( Short Answer Type Questions )

Answer any *three* of the following. $3 \times 5 = 15$

2. Describe and explain schock hazards for electrical equipment in medical electronics and prevention against them. 3 + 2

3. Explain the method of blood pressure measurement.

4. Explain the ultrasonic blood flow measurement.

5. Define bioelectric potential. What is resting potential ? When is a cell polarized ? 2 + 2 + 1

6. Explain the electrical system of heart.

## GROUP – C
## ( Long Answer Type Questions )

Answer any *three* of the following. 3 × 15 = 45

7. What is ECG ? With the help of neat sketches analyse the ECG waveform. Describe ECG amplifier and electrodes. 2 + 8 + 5

8. Explain the working principle of EEG. Draw a block diagram of EEG and EEG electrode. 10 + 5

9. Explain the working principle of CT scan with block diagram.

10. Explain the working principle of MRI with block diagram.

11. Write short notes on any *three* of the following : 3 × 5

    a) Need of medical electronics

    b) Thermal sensor

    c) Vitreo-retinal functions

    d) Blood glucose measurement by Doppler ultrasonography

    e) USG.