



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech(ECE)/SEM-8/EC-804B/2012**

**2012**

**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 the following :

10 × 1 = 10

i) Which device measure blood pressure ?

- a) Ultrasonography      b) Stethoscope  
c) Sphygmomanometer      d) None of these.

ii) Which one is the piezo-electrical substance ?

- a) Nickel      b) Chromium  
c) Quartz      d) Phosphorous.

iii) Which one can measure temperature ?

- a) LVDT      b) Thermistor  
c) Strain gauge      d) None of these.



- iv) EMG is an instrument used for measuring electrical activity of
- a) Muscles
  - b) Brain
  - c) Skin
  - d) Heart.
- v) 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.
- vi) EEG machines have notch filters to eliminate
- a) Noise
  - b) Undamped oscillations
  - c) Frequency interference
  - d) Muscle artifacts.
- vii) The appropriate diagnostic investigation in a patient presenting with chest pain is
- a) blood pressure measurements
  - b) lateral chest x-ray
  - c) CT scan
  - d) ECG.
- viii) 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)  $\Delta f = \lambda/V$ .



ix) The heart sounds are recorded by

- a) Electro cardiograph      b) Endoscope  
c) Phono cardiograph      d) Angio cardiograph.

x) EMG waveform appears very much like

- a) Triangular wave      b) Random noise signal  
c) Irregular wave      d) Saw tooth wave.

### GROUP - B

#### ( Short Answer Type Questions )

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

2. What do you mean by thermal sensor ? Define Thermocouple. How does RTD measure temperature ?  
 $1 + 1 + 3$
3. Explain Vitreo-retinal functions.
4. Explain the electrical system of heart.
5. Describe working function of Biopotential amplifier with proper circuit diagram.
6. How could you measure blood glucose by Doppler Ultrasonography ?

### GROUP - C

#### ( Long Answer Type Questions )

Answer any *three* of the following.       $3 \times 15 = 45$

7. What is Arrhythmia ? What are the types of Arrhythmia ? What are the causes of Arrhythmia ? List some of the symptoms of arrhythmia. Give brief description of different components of ECG cycle with proper diagram.

$1 + 2 + 2 + 2 + 8$

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8. What do you mean by image processing ? What are the advantages of MRI over CT scan ? Explain the working procedure of MRI machine.  $2 + 3 + 10$
9. Classify the Biomedical Instruments. Give basic Layout of Biomedical Instrumentation and explain it. Explain the construction and working principle of CT scan.  $2 + 5 + 8$
10. a) Describe blood glucose measurement by Doppler ultrasonography.
- b) Explain working principle of spirometer.  $10 + 5$
11. Write short notes on any *three* of the following :  $3 \times 5$
- a) Need for Medical Electronics
  - b) Electrochemical sensors
  - c) Optical sensors for blood oxygen measurement
  - d) Piezo-electric material
  - e) Working Principle of an EEG Recorder.

