Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH (ECE-N)/SEM-8/EC-804B/2011

2011
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 : $10 \times 1 = 10$

i) The typical signal voltage for ECG is

a) 1mV b) 10mV

c) 20mV d) 25mV.

ii) Which one is the piezo-electrical substance ?

a) Nickel b) Chromium

c) Quartz d) Phosphorus.

iii) Which one can measure temperature ?

a) LVDT b) Thermistor

c) Strain gauge d) none of these.

iv) Which one is used to measure heart sound ?

a) ECG b) MRI

c) Spirometer d) none of these.

v) Arrhythmia is a disease of

a) brain b) lung

c) nervous system d) heart.

vi) In physiotherapy treatment the method used is

a) Ultrasonic therapy b) laser therapy

c) cemo-therapy d) none of these.

vii) RTD is used to measure

a) temperature b) pressure

c) flow-measurement d) all of these.

viii) Which one of the following shows negative temperature coefficient ?

a) Cobalt b) Carbon

c) Uranium d) Manganese.

ix) 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) $\Delta f = \lambda/V$.

x) A vessel carrying blood from the heart in known as

a) alveolus b) artery

c) aorta d) anterior.

xi) A membranous sac surrounding the heart is

a) pericardium b) myocardium

c) lumen d) scalp.

GROUP – B

(Short Answer Type Questions)

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

2. What are the basic purposes of the safety measures used with electrically susceptible patients ? 5

3. Distinguish between sensor and transducer. Make a comparison between thermocouple & thermistor. 3 + 2

4. Explain vitreo-retinal function. 5

5. Define cardiac output measurement. Give the reason for decreasing the cardiac output. 2 + 3

6. Define – TLC, VC, RV, IC and FRC. 5

GROUP – C

(Long Answer Type Questions)

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

7. a) Draw the waveform of the Action Potential and explain the following :
   - i) Action potential
   - ii) Resting potential
   - iii) Absolute refractory period
   - iv) Relative refractory period.
   - v) Conduction velocity.

   b) Explain the various classifications of Biopotential Electrodes.

   c) Define spirometer. 8 + 5 + 2

8. a) What is the need of compensation techniques in medical instrumentation ?

   b) Classify and give brief descriptions of different compensation techniques.

   c) What are the generalized static characteristics of medical instrumentation system ? 2 + 8 + 5

9. a) What are the electrodes used for ECGs ?

   b) Draw the block diagram of EGC machine and explain different blocks.

   c) What are the precautions should be taken to achieve good ECG display in the presence of electrosurgery interference ?

   d) What is pacemaker ? 2 + 8 + 3 + 2

10. a) What is CT-scan ?

    b) Describe briefly on different generations of CT-scan system.

    c) Describe with block diagram, MRI-imaging system.

    2 + 6 + 7

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

    a) USG

    b) Biopotential amplifier.

    c) EEG

    d) Blood pressure measurement

    e) Biosensors for bacteria detection

    f) Electrochemical sensor.