Register Number: ……………………..

B.E DEGREE EXAMINATIONS: APRIL/MAY 2014

(Regulation 2009)

Fifth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

ECE122**:** Medical Electronics

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The bio-electric generator of heart is situated at
   a) Aortic valve
   b) SA node
   c) AV node
   d) The brain

2. EMG deals with the study of
   a) Brain activity
   b) Myocardial activity
   c) Muscular activity
   d) Central nerve system

3. The normal pH of blood is
   a) 7
   b) 7.4
   c) 6.6
   d) 7.8

4. It is known that the mean velocity of the blood flow in the Aorta whose is about 10.5mm is about 40 cm/s. The ultrasonic velocity in the blood is 1550 m/s. When an ultrasound sound of frequency of 3MHz ,what is the order of magnitude of Doppler shift in frequency?
   a) 1550 Hz
   b) 40 Hz
   c) More than 3000 Hz
   d) Since the frequency is so high there is no reflected beam of ultrasonic's

5. The radio pill is
   a) Some kind of treatment to reduce the brain activity
   b) Bio –Telemetry transmitter
   c) Drugs to reduce ventricular fibrillation
   d) Used to cure animal cancers

6. To produce Ventricular contraction with an electric pulse, the minimum energy required is
   a) 1 J
   b) 1 mJ
   c) 100 mW
   d) 10μ J

7. During irradiation with X-rays, gamma rays and particle radiation damage is caused to living cells because of _____ of atoms and molecules
   a) Creation
   b) Destruction
   c) Scattering
   d) Ionization

8. The more noninvasive imaging systems is _____
   a) Ultrasonic imaging system
   b) CT imaging system
   c) Nuclear imaging system
   d) PET system

9. Lt-go current for men
   a) Increases with the weight
   b) Decreases with the frequency
   c) Increases with the log frequency
   d) Is constant for all frequency

10. Ground faults can be avoided by
    a) Using 3 pin plug system
    b) Using fuses in circuits
    c) Using Isolated power supply
    d) Using pure DC alone

PART B (10 x 2 = 20 Marks)

11. Write Goldman and Nernst equation for resting potential.

12. Define systole and diastole.

13. Define Residual volume.

14. A person has a total lung capacity of 5.95 liters. If the volume of air left in the lungs at the end of maximum expiration is 1.1 liters. What is his vital capacity?

15. What are the types of Defibrillators?

16. What is the need of biotelemetry systems?

17. Differentiate between radiography and Fluoroscopy.

18. State any four applications of X-Ray.

19. Name the types of lasers used in medicine.

20. Define micro shock and macro shock.

PART C (5 x 14 = 70 Marks)

21. a) (i) With neat diagram explain the various lead configuration used in ECG measurement. (10)

    (ii) Differentiate unipolar & bipolar electrodes. (4)

    (OR)

    b) What are resting and action potential? Explain the depolarization & repolarization processes with neat diagrams and explain the related terms.

22. a) Define cardiac output. With neat diagram explain how cardiac output is measured?

    (OR)

    b) (i) Explain the working principle of an Electromagnetic blood flow meter. (7)

(ii)   Explain in indirect method of blood pressure measurement.   (7)

23.   a)   What is fibrillation and defibrillation? With necessary diagrams explain DC
              defibrillator unit.

(OR)

b)   Give the differences between internal and external pacemakers. Explain Demand
        Pacemaker.

24.   a)   Describe about NMR principle? Draw the block diagram of MRI system and
              explain the image reconstruction using it.

(OR)

b)   With neat diagram explain computer axial tomography. Explain how it differs
        from X ray radiogram? Give the mathematical computation involved in the
        image reconstruction.

25.   a)   (i)   Discuss the Working of an Endoscopic unit.   (7)
           (ii)   Explain the Working principle of an Infrared Thermography unit with a neat   (7)
                  diagram.

(OR)

b)   (i)   Explain the basic principle of operation of an short wave Diathermy unit.   (7)
     (ii)   Brief about surgical simulation.   (7)

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