

Total number of printed pages – 6

B. Tech
CPBM 8202

Fourth Semester Examination – 2008

BIOPHYSICS

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory
and any **five** from the rest.*

*The figures in the right-hand margin
indicate marks.*



1. Answer the following questions : 2×10
- (a) What is amniotic fluid ? Mention the diagnostic importance of amniotic fluid.
- (b) Define half life period of a radioisotope. What are the half life period of ^{32}P and ^{35}S ?

- (c) What do you mean by 'ultrasonic doppler shift' ?
- (d) If a scintillation counter used for counting radioisotope material is 25% efficient at detecting disintegration events, how many cpm will $1 \mu\text{Ci}$ yield ?
- (e) Differentiate between fluorescence and phosphorescence.
- (f) Define cryo-preservation. How it differs from lyophilization ?
- (g) Why is the impedance of plethysmograph some times called as pseudo-plethysmograph ?
- (h) Compute the energy per pulse when the pace maker pulse width is 0.5 millisecond and pulse voltage 3.0 volts; the circuit current drain is $0.5 \mu\text{A}$, the heart electrode

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resistance is 500 Ohms and the heart rate is 70 bpm.

- (j) What are the different electrodes used for the measurement of following bioelectric signals- EEG, ECG and EMG ?
- (j) Write down the basic principle of angioplasty.
2. (a) Write down the salient features of Helsinki declarations to guide medical doctors in biomedical research involving human subject. 5
- (b) Explain how magnetic fields are varied to obtain information from a single line of tissue in MRI scanner ? 5
3. (a) Define λ max. Briefly validate the Beer-Lamberts principle during the measurement of protein concentration using a colorimeter. 7

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- (b) The absorptivity of the copper (II)-protein complex which is formed in the biuret reaction is $0.05 \text{ cm}^2\text{mg}^{-1}$ at 545 nm. Calculate the protein concentration if the absorbance is 0.33. 3

4. (a) Compare the principle and method of visualization of Computerized Axial Tomography with Ultrasonography. 5
- (b) Briefly explain the chemical composition in the intra and extra cellular fluids and their effects in the case of blood serum. 4
5. Write short notes on : 3+3+4
- (a) BIS standard for hospital management
- (b) Biological transducer
- (c) Ultrasonic Imaging.

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6. (a) Briefly explain the Functions of cerebral cortex and hypothalamus. 4
- (b) What is a spinal reflex, and how is it related to the functions of brain? 4
- (c) If the same neuronal spike were measured intracellularly and extracellularly, what would be the differences between two measurements? 2
7. Differentiate between (any two) 5 × 2
- (a) Electro-retinography and Electro-oculography
- (b) Phono-cardiography and Ballisto-cardiography
- (c) UV radiation and Infrared radiation.
8. (a) Calculate the maximum photon energy of the radiated X-rays for tungsten anode

voltage of 100 kV. Also compute the efficiency of X-ray production and the shortest wave length of the produced X-rays. 6

- (b) What is body impedance assessment? Describe various methods used for body impedance assessment. 4