

M.TECH. DEGREE EXAMINATIONS: ARPIL/ MAY 2010

Second Semester

BIOTECHNOLOGY

BTY559: Biomedical Engineering and Clinical Research

Time: Three Hours

Maximum Marks: 100

Answer All Questions: -

PART A (10 x 2 = 20 Marks)

1. Define the criteria for various classes of medical devices
2. Write a short note on the origin of the Rx symbol
3. What is the structural difference between a cancellous and cortical bone?
4. Draw the shear stress-strain rate for various types of fluids.
5. Draw the Einthoven triangle and label the various electrocardiographic leads
6. What is Poiseuille's law in Blood Rheology?
7. How is cardiac output measured?
8. What are the criteria for nuclei to be MRI active?
9. Name two commonly used radiotracers used for positron emission tomography?
10. Write a short note on the studies carried out in Phase 2 and Phase 3 of clinical trials?

PART B (5 x 16 = 80 Marks)

11. a) (i) Write in detail the evolution of modern health care system. (8)
(ii) Describe the role played by biomedical engineers. (8)

(OR)

- b) Explain the various types of biomaterials in detail mentioning their salient applications, advantages and disadvantages.

12. (a) (i) Draw the stress-strain diagram of a cortical and cancellous bone under Tensile and compression loading and explain the biomechanical properties of bone. (8)
(ii) Derive the Hagen-Poiseuille average velocity of flow of blood in a blood vessel. (8)

(OR)

- (b) (i) Discuss the various types of skin substitutes and soft tissue replacements.

13. (a) Explain in detail the instrumentation and working of ECG. Explain the normal and abnormal electrocardiograms.

(OR)

- (b) (i) Explain in detail the uses, instrumentation and working of the Heart Lung machine. (8)
(ii) Write in detail the principle, instrumentation and applications of pacemakers and defibrillators. (8)

14. a) Describe in detail the principle and working of MRI. Describe its medical applications.

(OR)

- b) (i) Describe in detail the principle and working of CT scan. Describe its medical applications. (8)
(ii) Describe the working principle of PET scan. Explain the limitations of PET. (8)

15. a) (i) Explain in detail the various models of clinical trial design. (10)
(ii) Explain the various quality control procedures during clinical trials. (6)

(OR)

- (b) (i) Enumerate the ethical guidelines to be followed in clinical research. (10)
(ii) Explain the procedures involved in clinical data management. (6)
