

B.TECH DEGREE EXAMINATIONS: JUNE/JULY 2013

Seventh Semester

BIOTECHNOLOGY

EIE133: Biomedical Instrumentation

Time: Three Hours

Maximum Marks: 100

**Answer all the Questions:-
PART A (10 x 1 = 10 Marks)**

1. _____ is not a force sensor:
 - a) Vertical spring
 - b) cantilever spring
 - c) spiral spring
 - d) torsion bar
2. Characteristics of Resistance temperature detectors are:
 - a) low cost low sensitivity
 - b) low cost high sensitivity
 - c) unstable and non linear
 - d) high cost low sensitivity
3. Reference lead is always connected to the _____ in 12 electrode ECG:
 - a) RL
 - b) RA
 - c) LL
 - d) LA
4. Which condition cannot be conclusively diagnosed using ECG
 - a) blood volume
 - b) 2nd degree block
 - c) arrhythmia
 - d) 1st degree block
5. Beta brain waves are associated with:
 - a) sleep
 - b) REM state
 - c) wakeful state
 - d) stress
6. In centrifugal analyzers the samples and reagents are mixed
 - a) Prior to centrifugation
 - b) During centrifugation
 - c) After centrifugation
 - d) Are independently mixed
7. Radio opaque dyes are used as tracers in
 - a) PET
 - b) CT-Scan
 - c) NMR
 - d) Ultrasound
8. _____ objects should be avoided in/on the person while an MRI examination
 - a) metal
 - b) ceramic
 - c) plastic
 - d) paramagnetic
9. Which of the following is an NMR active nuclei
 - a) ^2He
 - b) ^{13}C
 - c) ^{11}Na
 - d) ^7N

10. Audiometers are used to
- | | |
|---------------------------|----------------------------|
| a) Diagnose hearing range | b) Treat hearing disorders |
| c) Supplement hearing | d) Replace ear function |

PART B (10 x 2 = 20 Marks)

11. What is a measurand? Give examples for the important types of biological measurands.
12. Name some types of transducers/sensors used in determining blood flow.
13. What are brain waves and write a short note on its characteristics?
14. Write a short note on plethysmography.
15. What are GSR measurements used for?
16. Explain the function of blood oximeters.
17. Differentiate A, B, and M scan methods of ultrasonography
18. What is a CT scan?
19. Draw the circuit of a short wave diathermy unit.
20. Explain the difference between pacemaker and defibrillator.

PART C (5 x 14 = 70 Marks)

21. a) Describe with suitable diagrams and equations the various types of transducers used in biochemical instrumentation.

(OR)

- b) Describe in detail origin of bioelectric signals. Explain the types and design of bioelectrodes.

22. a) Explain how ECG waveforms are generated. Describe the ECG amplifier and recorder system. Using the ECG pattern, explain how any four disorders of heart function can be diagnosed.

(OR)

- b) Elaborate in detail the various methods adopted for the measurement of cardiac output and blood pressure.

23. a) Explain in detail the measurement of blood pH, PO₂ and PCO₂.

(OR)

- b) (i) Give a brief note on the basic instrumentation of spectrophotometry in routine clinical diagnosis.

(ii) Write a short note on automated chemical analysis.

24. a) Explain in detail the biotelemetric instrumentation for patient monitoring.

(OR)

b) Explain the various modes of ultrasonography and the corresponding instrumentation.

25. a) Explain the principle and working of Heart-Lung machine. Name some medical conditions that require use of the instrument.

(OR)

b) Explain the instrumentation of (a) audiometers (b) dialysers
