



B.E DEGREE EXAMINATIONS: APRIL 2015

(Regulation 2009)

Eighth Semester

MECHATRONICS ENGINEERING

MCT156 : Medical Mechatronics

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

- The cell has a slightly positive potential on inside and negative potential at the outside is called as
 - Action potential
 - Deep potential
 - Resting potential
 - Rising potential
- Electro myo graph is used for recording the electrical activity of _____.
 - Nerve
 - Brain
 - Muscles
 - Neurons
- The bio potential available near (or) within a single cell are measured using
 - Chemical electrode
 - Needle electrode
 - Surface electrode
 - Micro electrode
- To prevent accidental internal cardiac shock _____ are used.
 - Differential amplifier
 - Instrumentation amplifier
 - Isolation amplifier
 - Chopper amplifier
- Isolation amplifiers are used to increase the _____ of the monitoring system in order to isolate the patient from the biomedical instrument.
 - Output impedance
 - Voltage Gain
 - Input impedance
 - Current gain
- A brain-generated voltage signal picked up by the electrodes on the scalp requires the use of
 - Carrier amplifier
 - Differential amplifier
 - Power amplifier
 - Charge amplifier
- Plethysmograph for measuring total lung capacity is based on
 - Electromagnetic conduction
 - Boyle's law
 - Faraday's law of induced emf
 - Flemings right hand rule

8. Blood flow can be measured using the electromagnetic principle because blood has a high
 - a) Magnetic induction
 - b) Impedance
 - c) Electrical conductivity
 - d) Electrical resistivity
9. During ECG measurement, the elevation which occur in ST period causes
 - a) Widening of QRS complex
 - b) Negative T wave
 - c) Myocardial infarction
 - d) Ventricular fibrillation
10. By listening over the heart with a stethoscope and palpating the arterial pulse in the wrist of an adult, the time delay between systole and the pulse wave in the wrist is almost
 - a) 1 second
 - b) 1 minute
 - c) 0.2 second
 - d) 0.01 seconds

PART B (10 x 2 = 20 Marks)

11. State 'All or Nothing law' with respect to cell bio potential.
12. Name the electrodes used for recording EMG and EEG.
13. Give examples for bio sensors.
14. Mention the importance of biological amplifiers.
15. Differentiate XY recorder and magnetic recorder
16. What is the effect of high and low blood pressure in human body?
17. What is meant by Let-go current? Why isolation is required?
18. Give two important factors that demand internal pace maker's usage.
19. Define latency as related to EMG.
20. Differentiate time domain and frequency domain analysis.

PART C (5 x 14 = 70 Marks)

21. a) Write about standard lead system for ECG recording. Also draw a typical ECG waveform and mark the various complexes of ECG and give their durations.

(OR)

- b) Identify any three failures in ECG and EEG machine and discuss about trouble shooting the failures.
22. a) (i) Write a short note on Bio sensors in biomedical applications. (8)
 - (ii) List out the sources of Bio electric potentials and mention the type of electrodes used for their measurement. (6)

(OR)

- b) Mention the types of active and passive transducers and explain their role in biomedical instrumentation

23. a) (i) Draw the Power amplifier circuit used in ECG recorder and explain its working. (8)
(ii) What is an Operational amplifier? Perform the analysis such that the operational amplifier as a voltage source. (6)

(OR)

- b) Briefly explain the different elements involved in Bio telemetry system.

24. a) Discuss about the working principle of Heart – Lung machine with a neat block diagram.

(OR)

- b) (i) Describe the ultrasonic imaging system with a suitable diagram. (10)
(ii) What are the different artifacts produced during CT imaging. (4)

25. a) Discuss about the following data reduction techniques:
(i) Turning point algorithm (7)
(ii) AZTEC algorithm (7)

(OR)

- b) (i) Describe about any one of the bio medical equipment controlled by Microprocessor. (10)
(ii) Mention the applications of computers in Medicine. (4)
