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Question Paper Code : 52983

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Seventh Semester

Electronics and Instrumentation Engineering

EI 6704 – BIOMEDICAL INSTRUMENTATION

(Common to Electrical and Electronics Engineering, Instrumentation and Control Engineering)

(Regulation 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Write the Nernst equation of resting membrane potential.
2. Mention the basic components of biomedical systems.
3. Write the principle behind the photo plethysmography.
4. How will you measure the GSR from a subject?
5. Draw the lead I configuration of ECG.
6. Define leakage current.
7. Mention the applications of endoscopic technique.
8. Specify the different modes of ultrasonography.
9. Draw the circuit diagram of a DC defibrillator.
10. What are Nano robots?

PART B — ($5 \times 13 = 65$ marks)

11. (a) Explain the mechanism of generation of action potential and write the necessary equations and mention different stages of action potential.

Or

- (b) Give a brief account on the following transducers
(i) Piezo electric transducers
(ii) Ultrasonic transducers

12. (a) Illustrate the working of spirometer with the experimental set up.

Or

- (b) Explain about the measurement of PCO_2 with the neat diagram.

13. (a) Draw and explain the block diagram of single ended chopper- stabilized operational Amplifier.

Or

- (b) Describe the lead systems and recording method of ECG.

14. (a) Explain the production of X-rays and draw the block diagram of X-ray machine.

Or

- (b) Draw and explain the single channel telemetry system suitable for transmission of an ECG.

15. (a) Explain the different types of pacemaker with the neat diagram.

Or

- (b) Draw and explain the simplified circuit diagram of a microwave diathermy machine.

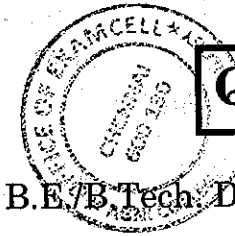
PART C — ($1 \times 15 = 15$ marks)

16. (a) Design a mutiparameter patient monitoring system used in ICCU unit.

Or

- (b) Describe the application of advanced 3D surgical techniques.

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Question Paper Code : 91518

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Seventh Semester

Electronics and Instrumentation Engineering

EI6704 – BIOMEDICAL INSTRUMENTATION

(Common to Electrical and Electronics Engineering/Instrumentation and Control Engineering)

(Regulations 2013)

(Also common to PTEI6704 – Biomedical Instrumentation for B.E. (Part-Time)

Sixth Semester – Electrical and Electronics Engineering – Regulations 2014)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. Define action and resting potential of a cell.
2. Distinguish between sensors and transducers along with its applications.
3. What is the heart rate in beats per minute of a patient with an R to R interval of 856 ms ?
4. When do you observe Korotkoff sounds ?
5. Mention the types of lead configuration in ECG.
6. Distinguish between micro shock and macro shock.
7. List down the modes of ultrasonic imaging.
8. How does the X-rays generated ?
9. Give the principle of hemodialysis.
10. List the types of electrodes used in surgical diathermy machine.

PART – B

(5×13=65 Marks)

11. a) Draw the action potential waveform and discuss about depolarization, repolarization, absolute and relative refractory periods.

(OR)

- b) With a neat sketch, explain the construction, working principle, advantages, disadvantages and application of Piezo electric transducer. Also derive the expression for charge sensitivity of the Piezo electric transducer.

12. a) Describe the procedure of sphygmomanometer method of arterial blood pressure measurement. Why it is important to measure the oxygen saturation level in human body? Describe the method to measure it.

(OR)

- b) Describe the various indirect methods of blood pressure measurement with necessary diagrams.

13. a) i) Describe an isolation amplifier? Why is it used as a bioelectric amplifier? (5)

- ii) With a neat schematic diagram, explain the operation of a Transformer coupled isolation amplifier. (8)

(OR)

- b) i) Draw the typical block diagram of an ECG recorder and explain in detail. (6)

- ii) Discuss the reasons for microshock hazards with suitable case study. (7)

14. a) Describe in detail about the pulse sequences involved in MRI with necessary diagrammatic representation.

(OR)

- b) Explain the principle of Fluoroscopic technique with a neat diagram. What is the need for interfacing image intensifier with the Fluoroscopic instrument? Explain it with suitable diagram.

15. a) With neat block diagram explain the working of a heart lung machine.

(OR)

- b) Draw the schematic of a hemodialyser and indicate the various control mechanisms incorporated it.

PART – C

(1×15=15 Marks)

16. a) You are asked to quantify the CO₂ exhaled by a patient. The CO₂ effectively absorbs 4.2 μm wavelength of light. Develop a detection and quantifying system for sensing CO₂ in the exhaled air using light.

(OR)

- b) Draw the schematic diagram of a DC defibrillator and explain how a defibrillator analyzer can be used to measure the energy content in the discharge pulse of a DC defibrillator. Calculate the energy stored in the capacitor of a D.C. defibrillator if C = 16 μF and the voltage used is 6000V.