

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2125)

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B. Tech 5th Semester Examination
Biomedical Engineering (OS)
EE-5004

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all selecting one question from each of the Sections A, B, C, and D and all the subparts of questions in Section E.

SECTION - A

1. (a) Describe the internal construction and general details of Internal conduction system of the human heart. (10)
- (b) A pair of biopotential electrodes is placed in a saline solution and connected to a stimulator that passes a direct current through the electrodes. It is noted that the offset potentials from the two electrodes are different. Explain why this happens during the passage of current. (10)
2. (a) Draw a basic medical instrumentation system and discuss its performance requirements. (10)
- (b) Draw the equivalent circuit diagram of electrode-skin interface and explain the significance of various parameters under dry and wet electrode-gel conditions. (10)

SECTION - B

3. (a) Discuss the sources of noise in low level measurements. (10)

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- (b) Sketch the circuit of an input amplifier for an X-Y recorder and explain its operation. (10)
4. (a) Explain the blood pressure measurement with the following methods (i) auscultation, (ii) ultrasonic and (iii) optical fiber. Comment on their performance. (10)
- (b) Discuss the general considerations for biomedical data acquisition system. (10)

SECTION - C

5. (a) Draw a block diagram of typical clinical electromyograph and explain the overall operation of the system. List and justify the technical specifications of EMG machine. (10)
- (b) Draw a typical ECG waveform over one cardiac cycle indicating the important component waves, their typical durations, and the typical intervals between them. Label each wave or interval with the corresponding cardiac event or activity. (10)
6. (a) Draw the functional block diagram of CT and explain the different blocks in it. (10)
- (b) Briefly comment on patient dose in CT scanners. (10)

SECTION - D

7. Draw a neat diagram of a X-ray tube and explain its operation. Explain the fluoroscopy, X-ray films and X-ray intensifiers methods of X-ray imaging. (20)
8. (a) Explain briefly digital radiography. (10)
- (b) Discuss briefly the working of a dental x-ray machine with the help of a block diagram and how it is different from general purpose machine. (10)

SECTION - E

9. (a) What is preamplifier?
- (b) What is Korotkoff sound?
- (c) Why resistance strain gages are used in pairs?
- (d) A strain gage has a resistance of 120Ω unstrained and gage factor is -12. What is the resistance value if the strain is 1%?
- (e) Define resting potential.
- (f) List the disadvantages of CT scan.
- (g) What is an EEG?
- (h) List the advantages offered by digital recorders over strip chart and magnetic tape recorders.
- (i) Explain the reason for use of filter, collimeter, grid and screen in an X-ray system.
- (j) Differentiate between graded potentials and action potentials. (2×10=20)