

Total No. of Questions : 12]

SEAT No. :

**P878**

[Total No. of Pages : 2

**[4659]-335**

**B.E. (Instrumentation and Control)  
a-BIOMEDICAL INSTRUMENTATION  
(2008 Course) (Semester-I) (Elective-I)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates:*

- 1) *Answer 3 questions from Section-I and 3 questions from Section-II.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Assume suitable data, if necessary.*

**SECTION-I**

**Q1)** a) Draw the equivalent circuit for two electrodes connected to skin for biopotential measurement. What is the role of electrolyte jelly while coupling electrode with body. [8]

b) Explain the amplitude, frequency and electrodes for ECG, EMG, EEG biopotentials. Explain the various properties that bio electrode should possess. [8]

OR

**Q2)** a) Explain typical amplitude and duration of ECG wave. [8]

b) Define Ergonomics and explain ergonomic design in Operation table. [8]

**Q3)** a) Explain different chambers of heart. Explain an electrical conduction system of heart. [8]

b) Design analog heart rate meter for rate & rhythm measurement. [8]

OR

**Q4)** a) Draw and explain Einthoven triangle. [8]

b) State the specifications of ECG recorder. [8]

**Q5)** a) Design and explain Photoplethysmography. [8]

b) Explain dye dilution techniques for cardiac output measurement. [10]

OR

**Q6)** a) Describe in brief various techniques used for BP measurement. [10]

b) Explain phonocardiography. [8]

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## SECTION-II

- Q7)** a) Explain EEG amplitude and frequency bands. [8]  
b) Explain and draw 10-20 EEG electrode placement system. [8]

OR

- Q8)** a) Explain neuron membrane potential. [8]  
b) Explain block diagram of eight channel EEG system. [8]

- Q9)** a) Enlist various ophthalmic Instruments. [8]  
b) Design instrument used for measurement of loss in the peripheral vision of the subject. [8]

OR

- Q10)**a) What are three main sections of Human auditory system? Explain the impedance matching in human hearing phenomenon. [10]  
b) Explain pure tone audiometer. [6]

- Q11)**a) Explain various types of flow Spirometer. [10]  
b) Explain the following terms with respect to respiratory measurement. [8]  
i) RV  
ii) ERV  
iii) TLC  
iv) TV

OR

- Q12)**a) Explain safety codes and standards. [10]  
b) Define let-go-current and hold-on current and discuss precautions to minimize shock hazards. [8]

