

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

# GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: 171705

Date: 28/12/2012

Subject Name: Instrumentation for Bio Medical Application

(Department Elective-I)

Time: 10.30 am - 01.00 pm

Total Marks: 70

Instructions:

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a) I Define homeostasis. Brief blood circulatory system with necessary diagram 04  
II How action potential is generated in certain cells of human body? 03  
(b) I Explain electro-conduction system of the heart with necessary figure. 04  
II List different level of calibration standards and state their use. 03
- Q.2 (a) I Brief about various categories of measurement errors. 04  
II Discuss any two noise reduction methods. 03  
(b) I Define electrode offset potential. How its effect is reduced when biopotential is measured? 04  
II How instrumentation amplifier works? **OR** 03  
(b) I Brief any one type of isolation amplifier and state its application in medical measurement. 04  
II Draw simplified schematic for a chopper amplifier. 03
- Q.3 (a) I What is Einthoven triangle? Brief about standard ECG lead systems. 04  
II Brief about ECG recording irregularities. 03  
(b) I Describe oscillometric blood pressure measurement technique in detail. 04  
II Define cardiac output (CO). How it is measured with dilution methods? 03
- OR
- Q.3 (a) Explain right leg driven three-electrode (lead-I) circuit in detail. 07  
(b) I Explain Electromagnetic blood flow meters in detail. 05  
II What is “korotkoff” sounds? 02
- Q.4 (a) I List the organs of respiration. Brief about internal and external respiration. 04  
II Brief about Impedance pneumograph. 03  
(b) I Draw functional block diagram of IPPB respirator. Also draw a structure of Benette valve. 04  
II Draw a block diagram of a typical central monitoring system used in ICCU. 03
- OR
- Q.4 (a) I Brief about parameters related with volumes and capacity of lungs. 04  
II Describe the working of bell-jar mechanical spirometer. 03
- Q.4 (b) I How respiration rate and depth are controlled in human? 04  
II Brief about equipments available in all operating rooms (OR). 03
- Q.5 (a) I Draw a structure of single myelinated nerve cell. What is reflex arc? 04  
II Brief about different EEG recording modes. 03  
(b) I Describe the working of transit time blood flow measurement. 04  
II Draw a schematic of colorimeter and brief its working. 03
- OR
- Q.5 (a) I Define following terms in context of human nervous system: 04  
i. Synapse, ii. Brainstem, iii. Cerebellum, iv. Cerebrum  
II Brief about 10-20 electrode placement system. 03.  
(b) I Explain ultrasonic blood pressure measurement system with block diagram. 04  
II Draw a block diagram of hemo-dialysis machine. 03

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