GANPAT UNIVERSITY

B.Tech. Sem III (BM & I) Regular Examination NOV./DEC. -2010
BME-305 Biomedical Transducers

Max Time:3 hours   Max Marks:70

Instructions:
1. Answers to the 2 sections must be written in the separate answer books.
2. Figures to the right indicate marks.
3. Conventional terms or notations are used.

SECTION I

Q-1		**(12)**
(a)	What do you mean by error? Enlist the types of error and explain them.	(06)
(b)	Explain the Accuracy and Precision of instrument and show how accuracy and precision express in different instrument specification.	(06)

OR

Q-1		**(12)**
(a)	Give the classification of transducers. Discuss the all resistive transduction principle in detail.	(06)
(b)	How the error is expressed? Obtain the equation of absolute error, % error, relative accuracy and % accuracy. For given data calculate all four quantities. Expected value of voltage= 80 V and Measured value of voltage = 79V.	(06)

Q-2		**(12)**
(a)	Draw the equivalent circuit of a piezo electric transducer with amplifier and derive its dynamic characteristics.	(06)
(b)	How the high frequency ultrasound waves are produced? With diagram discuss the electrical; excitation mode of piezo electric ultrasound transducer.	(06)

OR

Q-2		**(12)**
(a)	Name the various piezo electric materials. Give their important and distinguishing properties by which their applications are determined.	(06)
(b)	What do you mean by near field and far field and what is a basic characteristic of both fields? Derived the expression of the average radiated power density from an ultrasound transducer.	(06)

Q-3		**(11)**
(a)	Describe the diaphragm type strain gauge transducer for pressure measurement.	(04)
(b)	Write short note on semiconductor type piezo electric materials.	(04)
(c)	Do as directed (i) Define the terms (a) Charge sensitivity (b) measurand (ii) Write the conditions that are necessary for maximum transfer and minimum reflection of ultrasound energy.	(03)

SECTION-II

Q-4 **(12)**

(a) Mention advantages and disadvantages of RTD **(06)**

(b) A strain gauge is bonded to a beam of 10cm long and has cross-sectional area of 4 cm². The strain gauge has unstrained resistance of 350 ohm and GF =2.1.when the beam is loaded, the gauge resistance changes by 0.025 ohm. Calculate the change in beam length and the magnitude of the force applied. Given Young's modulus for beam material $207 \times 10^9 \, N/m^2$ **(06)**

OR

Q-4 **(12)**

(a) Draw neat diagrams of various forms of thermistors. **(06)**

(b) How a potentiometer can be used for the measurement of displacement? **(06)**

Q-5 **(12)**

(a) Explain the principle, characteristic, advantages and disadvantages of LVDT. **(06)**

(b) Describe various ECG electrodes. **(06)**

OR

Q-5 **(12)**

(a) Write short note on metal foil strain gauge. **(06)**

(b) Discuss the occurrence of the different types of biological pressure in the human body. **(06)**

Q-6 **(11)**

(a) Explain the principle of semiconductor strain gauges. Describe its merits and demerits. **(05)**

(b) Explain how PN junction is used as a temperature sensor? **(06)**

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