D (11)

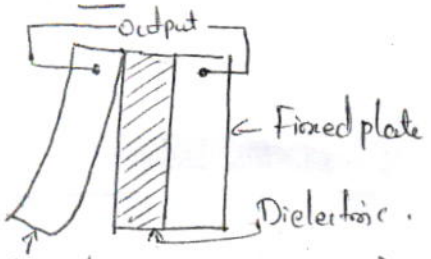
1

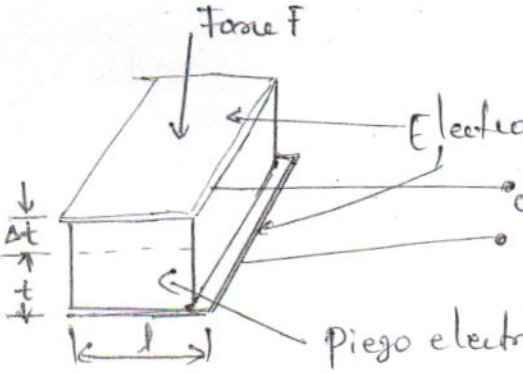
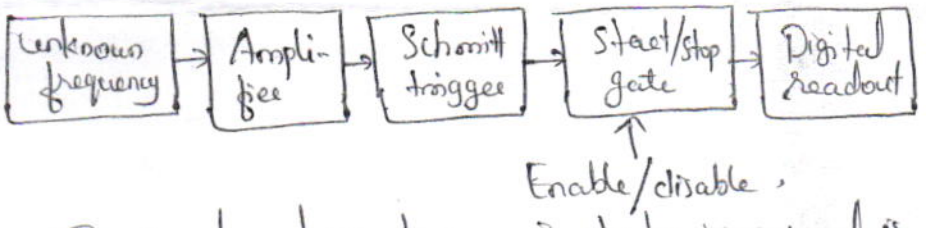
SCHEME OF VALUATION

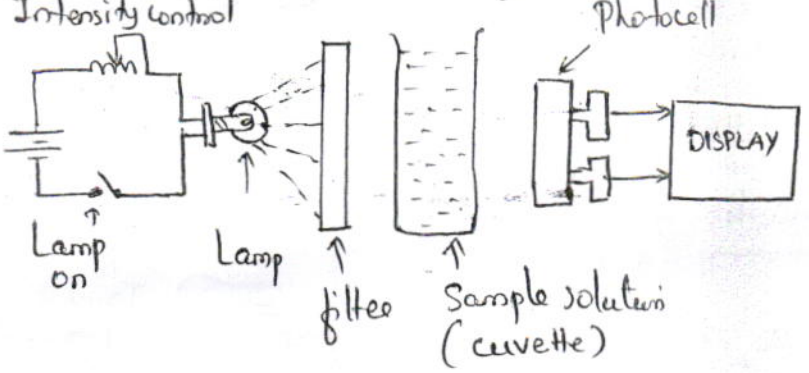
Scoring Indicators

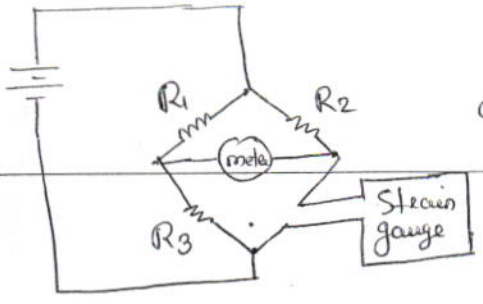
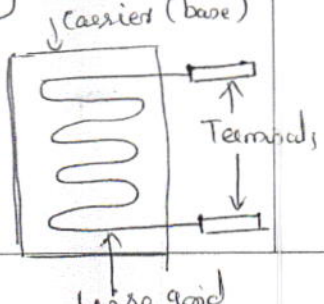
Revision: 2015 Course Code:5033

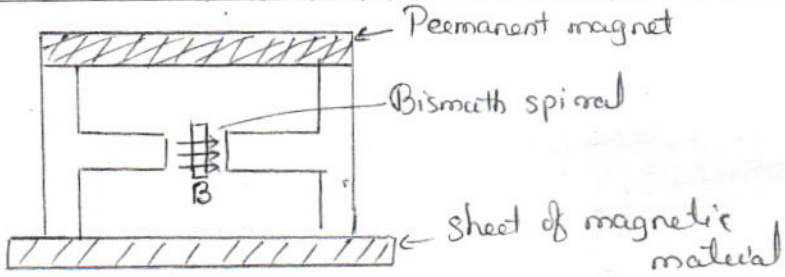
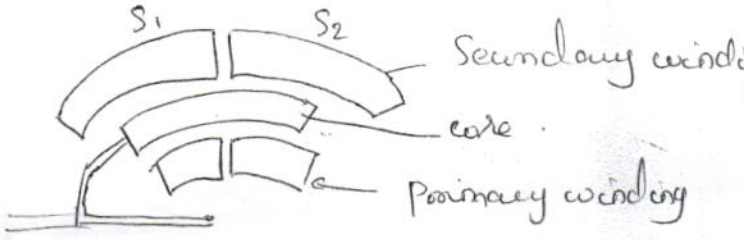
Course Title: Advanced Electrical Measurements & Instrumentation Version: A

Q. No	Scoring Indicator	Split up score	Total
	PART A ·		
1.	An electronic device that converts energy from one form to another	2	2
2	i) Metering is highly accurate. ii) more robust iii) reduce the cost of theft	Any two 1 × 2	2
3	i) Diagnostics tool for identifying neuromuscular disease ii) Research tool for studying kinesiology, and disorders of motor control	2	2
4	Manometers, Elastic type pressure gauges, Strain gauge pressure transducers, capacitance pressure transducers, potentiometric pressure transducers, Piezoelectric pressure sensor, optical pressure transducers	Any two 1 × 2	2
5	Robot arm, conveyor belts, aircraft, reading & writing from hard drives, several biological functions.	Any two 1 × 2	2
1.	PART B ·  Operating principle of capacitive transducer is based on $C = \frac{\varepsilon_0 \varepsilon_r A}{d}$. i) Any variation in 'd' causes corresponding variation in the capacitance. ii) Change in overlapping area (A) iii) Change in dielectric constant (ε)	Fig - 2 eqn - 2 Operation - 2	6

Qno	Scoring Indicator	Split up Score	Total.
2	A piezo electric material in which an electric potential appear across certain surfaces of crystal if the dimensions are changed by mechanical force. Conversely, if a varying potential is applied to proper axis of crystal, it will change the dimensions of crystal. This effect is known as piezo electric effect. piezo electric materials – Rochelle salts, ammonium dihydrogen phosphate, quartz, ceramics  	Explan-3 Fig-3	6
3	 – The signal whose freq. is to be measured is first amplified. Then schmitt trigger converts into square wave. The o/p pulses from schmitt trigger are fed to start/stop gate. When the gate is enabled, the i/p pulses passes & counts the no. of pulses. When this gate is disabled, counter stops counting. The no. of pulses counted is proportional to the unknown freq. of i/p signal.	Fig-3 Explan-3	6

Q. No	Scoring Indicator	Split up score	Total
4	Invasive (intra-arterial) blood pressure monitoring is commonly used in ICU & in operating theatre. It involves direct measurement of arterial pressure by inserting a cannula needle in suitable artery. The cannula must be connected to a sterile, fluid-filled system, which is connected to electronic patient monitor. Adv. patient's blood pressure is constantly monitored and a waveform can be displayed	6	6
5	There are three specific sites that are options for a patient, dependant upon their age and physical condition. For standard stick-type thermometer, we can choose an oral, axillary, or rectal measurement site.	6	6
6	Spectrophotometry is a method to measure how much a chemical substance absorbs light by measuring the intensity of light as a beam of light passes through sample solution. The basic principle is that each compound absorbs or transmits light over a certain range of wavelength.  	Expln-3 Fig-3	6

Q. No	Scoring Indicator	Split up score	Total
II(7)	Emissivity of the surface of a material is its effectiveness in emitting energy as thermal radiation. Emissivity is the ratio of the thermal radiation from a surface to the radiation from an ideal black surface at the same temperature as given by Stefan-Boltzmann law. Pyrometers and infrared cameras are used to measure thermal radiation.	6	6
	Part C.		
III(a)	Strain gauge is a passive transducer that converts a mechanical elongation or displacement produced due to a force into its corresponding change in resistance R, L or C. If a metal piece is subjected to a tensile stress, the metal length will increase and will increase electrical resistance of material. Similarly if the metal is subjected to compressive stress, length will change, also change resistance. Strain gauge transducer is used to measure the change in displacement occurred & converting it into its corresponding value of resistance.	expln-4 fig-4	8
	i) unbonded type ii) bonded type iii) Semiconductor type. } write any one.		
	 or 		

Q. No	Scoring Indicator	Split up score	Total
III (b)	 Small variations in the mag. flux available across an air gap can be brought about by changes in the quantity to be measured. Working principle – based on relative displacement of sensor in the gap of a magnet whose two pole pieces ~~are~~ shaped. Any change in position of the sensor in the gap will change the resistance of each arm, thereby producing an output signal from the bridge.	Fig-3 Explⁿ-4	7
IV (a)	Used for measuring angular displacement. - In null position of the core ie, in central position, output voltages induced in secondary windings S_1 and S_2 are equal & in opposition. ∴ differential o/p is zero. Angular displacement of the rotor from the null position gives differential voltage o/p which is proportional to the angular displacement. 	Explⁿ-4 Fig-4	8