

This question paper contains 4 printed pages.

3291

Your Roll No.....

B.Tech. (Part Time) / II

J

**Paper V - ELECTRICAL MEASUREMENT
AND INSTRUMENTATION
(EEE - 205)**

Time : 3 hours

Maximum Marks : 70

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

***Attempt five questions in all.
Question No. 1 is compulsory.
All questions carry equal marks***

1. Write True or False and Justify your answers. $2 \times 7 = 14$
- (a) Dimensionally the equation $w = vit$ is correct.
 - (b) Electrodynamometer type instrument have Low Torque / weight ratio.
 - (c) D' Arsonval Galvanometer is used detector in A.C. Bridges.
 - (d) The resistance ranging from 1 to 5Ω is measured accurately by Kelvin's double bridge.
 - (e) For precise Measurement of Self Inductance over a very wide range the Max-well's bridge is suitable.
 - (f) L.V.D.T. cannot be used as a primary transducer.

P.T.O

- (g) For measurement of Mutual Inductance the Anderson's bridge is used.

- 2 (a) A plot of land has measured dimensions of 50 and 150m. The uncertainty in the 50m dimension is ± 0.01 m. Calculate the uncertainty with which the 150m dimension must be measured to ensure that the total uncertainty in the area is not greater than 150 percent of that value it would have if 150m dimension were exact. 07

- (b) In the course of calculation, the following expression was obtained :

$$I = \frac{VwM}{[(wM + R_1 R_2)^2 + (w^2 L_1 L_2 R_1^2)]^{1/2}}$$

Check whether the equation is dimensionally correct if not suggest any correction. 07

- 3 (a) What are the various methods of measurement of high resistance. Describe the Loss of charge method, for measurement of high resistance. 07
- (b) Explain the advantages and disadvantages of Schering bridge also give circuit diagram and phasor diagram with derivation of Dissipation factor in detail and applications. 07
- 4 (a) Explain construction and theory of Vibration Galvanometer. 07
- (b) A moving coil galvanometer has former of a non - conducting material. The current sensitivity of the

Instrument is $0.001 \mu\text{A/mm}$ at one meter. The time period of undamped oscillations is 6 second if the displacement constants of the Instrument is $5 \times 10^{-3} \text{ N.m/A}$, calculate

- (i) Control constant
- (ii) Inertia constant
- (iii) Total circuit resistance for Instrument to be dead beat. 07

- 5 a) Describe the operating principle, construction theory, advantages, disadvantages and application of electro-dynamometer type Instruments. 07

- b) A dynamometer ammeter is arranged so that 1% of total current pass through the moving coil and rest through fixed coil. The mutual Inductance between two coils varies with the angle of displacement of the moving coil from its zero position as follows :

Angle (degree)	0°	15	30	60	90	105	120
Mutual Inductance (μH)	-336	-275	-192	0	192	275	336

If a torque of $10.5 \times 10^{-6} \text{ Nm}$ is required to give to full scale deflection of 120° , calculate current at half and full scale deflection. 07

- 6 a) Explain the construction and working of an average reading VTVM. Describe the advantages and disadvantages of Electronic Instruments. Explain how this meter can be converted to a rms reading voltmeter. 07

- b) Describe the measurement of phase and frequency with the help of C.R.O. Also describe electrostatic deflection of C.R.O. 07
- 7 a) Describe the various types of transducers and explain the principle of working of strain gauge. 07
- b) Explain the methods of measurement of following :
- (i) Humidity and pH value.
 - (ii) Velocity and acceleration.
 - (iii) displacement and pressure. 07
- 8 Write short notes on any Four.
- (i) Electronic D/A and A/D converters
 - (ii) Electronic multimeter
 - (iii) L.V.D.T
 - (iv) D.C. Tachometer
 - (v) Applications of A.C. Potentiometers. 3.5x4=14