

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-III Examination-Dec.-2011

Subject code: 130903**Date: 13/12/2011****Subject Name: Electrical & Electronics Measuring Instruments****Time: 2.30 pm -5.00 pm****Total marks: 70****Instructions:**

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

- Q.1** (a) Explain the voltage standards. **07**
 (b) Derive the dimensions of a) e.m.f., b) magnetic flux density, c) electric flux density, d) current density, e) permeability, f) permittivity, g) resistivity in L,M,T,I system of dimensions. **07**

- Q.2** (a) Differentiate between spring control and gravity control methods used to produce the controlling torque. **07**
 (b) Explain the working of attraction type and repulsion type moving iron instruments with neat diagrams. **07**

OR

- (b) Describe the constructional details and working of the electro-dynamometer type instrument. How dynamometer type instrument is used as an ammeter, voltmeter and wattmeter? **07**
- Q.3** (a) Explain the operation of a) series type ohmmeter b) shunt type ohmmeter **07**
 (b) A galvanometer has the following parameters: **07**
 $B=10 \times 10^{-3} \text{ Wb/m}^2$, $N=200$ turns,
 Length of coil=16mm, $K=12 \times 10^{-9} \text{ Nm/rad}$,
 $J=50 \times 10^{-9} \text{ kg-m}^2$, $D=5 \times 10^{-9} \text{ Nm/rad s}^{-1}$, Resistance of the coil=120Ω.
 Calculate,
 a) Deflection of the galvanometer in radians and in mm when a current of $1 \mu\text{A}$ flows through it, the scale being 1m away
 b) The current sensitivity
 c) The voltage sensitivity
 d) The megaohm sensitivity
 e) The frequency of damped oscillation
 f) The period of free oscillations
 g) The first maximum deflection
 Sketch the typical curve of the motion of the galvanometer for the above data.

OR

- Q.3** (a) Define the terms 'current sensitivity', 'voltage sensitivity' and 'Megohm sensitivity' as applied to d'Arsonval galvanometers. **07**

- (b) An electro-dynamometer wattmeter is used for measurement of power in a single phase circuit. The load voltage is 100V and the load current is 10A at a power factor of 0.2. The wattmeter voltage circuit has a resistance of 3000Ω and an inductance of 30mH. Estimate the percentage error in the wattmeter reading when pressure coil is connected i) on the supply side and ii) on the load side. The current coil has a resistance of 0.1Ω and negligible inductance. The frequency is 50Hz. **07**

- Q.4** (a) Draw and Explain the working of Merz price maximum demand indicator. **07**
(b) Explain the construction and working principle of Weston frequency meter. **07**

OR

- Q.4** (a) Derive the torque equation for induction type single phase energy meter. **07**
(b) Describe the construction and working of a ballistic galvanometer. **07**

- Q.5** (a) Explain briefly 'Rectifier type A.C. voltmeter'. **07**
(b) Draw the circuit diagram of a Crompton's potentiometer and explain its working. **07**

OR

- Q.5** (a) Write a note on phase sequence indicators. **07**
(b) Describe the working of a Brooks deflection potentiometer. Explain its circuit and its advantages. **07**
