

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-III Examination December 2009****Subject code: 130903****Subject Name: Electrical and Electronics Measuring Instruments****Date: 29 / 12 / 2009****Time: 11.00 am -1.30 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) Classify various measuring instruments and discuss Null type and deflection type instruments. **05**
- (b) What is sensitivity? A voltmeter is having sensitivity of 0.3 V/mm. If it is connected to measure voltage of 30 V, how much will be deflection of the pointer? **05**
- (c) Explain the terms: True value , Accuracy **04**

- Q.2** (a) What is meant by PMMC instruments? Discuss in detail the construction of PMMC instrument. **07**
- (b) Discuss various effects which can be used for deflecting system of an instrument. **07**

OR

- (b) The inductance of a moving iron ammeter is given by the expression : **07**
- $$L = (10 + 5\theta - 2\theta^2) \mu\text{H}$$
- Where θ is the angular deflection in radians from zero position. If the deflection for a current of 5A is 30° , find the angular deflection in radians for a current of 10 A. Also determine the spring constant.

- Q.3** (a) What is a galvanometer? Derive torque equation of a d'Arsonval galvanometer. **05**
- (b) What is an 'ammeter shunt'? Explain how it is used in case of ammeters. **05**
- (c) A 1mA meter d'Arsonval movement with an internal resistance of 100Ω is to be converted into 0-100 mA ammeter. Calculate the shunt resistance required. What will be the range of ammeter if shunt resistance is doubled? **04**

OR

- Q.3** (a) Derive torque equation for an electro-dynamometer type instrument used as wattmeter. **05**
- (b) A 3-Phase, 20KVA load has p.f. of 0.866 lag. The power is measured by two wattmeter method. Find reading of each wattmeter and reactive power consumed by the load. **05**
- (c) Show practical wattmeter connections and give expression of power measured by wattmeter in terms of quantities measured by current coil and pressure coil. **04**

- Q.4** (a) What is energy? Discuss construction of induction type single phase energy meter. **05**

- (b) List various errors and compensations in single phase induction type energy meter. Discuss any two compensations. 05
- (c) An energy meter is having meter constant of 750 revolutions / KWh. It makes 15 revolutions in 30 seconds. Determine the load in KW. If 5 KW load is connected for 10 seconds through the same energy meter, how many revolutions will the meter make? 04

OR

- Q.4**
- (a) What is an Electronic voltmeter? Discuss advantages of electronic voltmeter. 05
 - (b) Discuss True RMS responding voltmeter. 05
 - (c) Write a short note on digital tachometer. 04

- Q.5**
- (a) What is a potentiometer? Discuss principle of potentiometer. 05
 - (b) Discuss application of d.c. potentiometer for calibration of voltmeter. 05
 - (c) Explain 'Standardization' of potentiometers. 04

OR

- Q.5**
- (a) Discuss Drysdale –Tinsley polar type AC potentiometers. 05
 - (b) Explain Moving Iron type single phase power factor meter. 05
 - (c) What is a synchroscope? Explain how it used for synchronization of two alternators 04
