

B.E. (EE) Part-II 4th Semester Examination, 2007

**Electrical Measurement-II**  
**(EE-401)**

Time : 3 hours

Full Marks : 70

Use separate answerscript for each half.  
Answer SIX questions, taking THREE from each half.  
Two marks are reserved for neatness in each half.

**FIRST HALF**

1. a) Define probable and random errors. What do you understand by resolution of an instrument?  
b) A set of independent 10 measurements were made to determine the weight of a lead shot. The weights in gramme were :  
1.570, 1.597, 1.591, 1.562, 1.577, 1.580, 1.564, 1.586, 1.550, 1.576  
Determine the (i) arithmetic mean, (ii) average deviation, (iii) standard deviation, (iv) probable error of one reading and (iv) probable error of the mean. [11]
2. a) What methods can be used for the measurement of frequency? Explain any one frequency meter with its advantages and disadvantages.  
b) In Grassot flux meter, prove that it has a uniform scale. [11]
3. a) Describe the expression for the deflection of Ballistic Galvanometer in terms of its physical constants. Explain these constants.  
b) The reluctance of a magnetic circuit excited by an mmf of 8000 A is 120,000 A/wb. A fluxmeter is used to measure the flux. If the fluxmeter scale has 120 divisions and the flux linkages required for a deflection of 1 division are  $0.15 \times 10^{-3}$  weber turn, calculate the resistance of the shunt required for use with the search coil. Number of turns of search coil is 1 and its resistance is 0.025 ohm. The measurement is made by switching off the excitation. [11]
4. a) Describe the different methods used for digital tape recording. Explain its advantages and disadvantages.  
b) Supposing the following readings are obtained for one month of 30 days, find out the average monthly load factor and power factor.  
kVarh (reactive) meter advance = 83,830; kWh meter indicator = 1400, demand indicator = 1400 kW. [11]

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5. Write short notes on (any four) : [11]
- a) Synchroscope
  - b) Maximum demand indicator
  - c) Hall effect
  - d) VTVM
  - e) Trivector meter.

**SECOND HALF**

6. a) How the inductance of a coil having Q value 2.5 (approx) is measured with A.C. bridge? Draw the bridge circuit and derive the necessary expressions. Draw the modified bridge circuit for the above measurement if Q value of the coil is 25. [11]
- b) Discuss the influence of frequency term present in the expression of the above measurement.
7. a) How the value of unknown capacitor (loss free) is measured with A.C. bridge when  $R_1, R_2$  are variable resistances and  $C_s$  is the standard capacitor. [Other resistances  $R_3, R_4$  etc and capacitors  $C_1, C_2$  etc may be used if necessary]
- b) AB - BC - CD - DA are the four arms of AC bridge having impedances  $Z_1, Z_2, Z_4, Z_3$  respectively at balance condition. Find the magnitude and nature of  $Z_4$  where
- $Z_1 = 100 \Omega \angle 80^\circ$  (inductive)  
 $Z_2 = 250 \Omega$  (Res only)  
 $Z_3 = 400 \Omega \angle 30^\circ$  inductive are given.
- Discuss the result if  $Z_1 = 100 \Omega \angle -80^\circ$ . [11]
8. a) Compare (i) AC potentiometer with D.C. potentiometer and (ii) polar type potentiometer with co-ordinate type potentiometer. [11]
- b) Explain the operating principle of d.c. potentiometer highlighting the necessary precautions taken. Describe Crompton Type Potentiometer.
9. a) How the frequency is measured using AC Bridge? [11]
- b) Write notes on : Lissajous figures and frequency measurement.
10. Write notes on any two : [11]
- a) Drysdale Phase Shifting Instrument
  - b) Bridge used for comparison of Dissipation factors of two capacitors
  - c) Universal bridge.

