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**B.E / B.Tech ( Full Time ) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2013**

**ELECTRICAL AND ELECTRONICS ENGINEERING**

III Semester

**EE 9203 Measurements & Instrumentation**

(Regulation 2008)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

**PART- A (10 x 2 = 20 Marks)**

1. Define limiting errors.
2. Compare accuracy and precision.
3. For a certain thermistor  $\beta=3140K$  and the resistance at  $27^\circ C$  is known to be  $1050\Omega$ . The thermistor is used for temperature measurement and the resistance measured is as  $2330\Omega$ . Find the measured temperature.
4. For dynamic measurements using resistance strain gauges temperature component is not necessary. Why?
5. A current transformer has a rating of  $1000/5$  A. It's magnetizing and loss components of the exciting current are  $1A$  and  $0.6A$  respectively, and secondary winding burden is purely resistive. Calculate the transformation ratio at rated current?
6. List the advantages of PMMI instrument.
7. Draw the phasor diagram of Anderson Bridge.
8. The four impedances of an a.c. bridge is  $Z_1 = 400\Omega\angle 50^\circ$ ,  $Z_2 = 200\Omega\angle 40^\circ$ ,  $Z_3 = 800\Omega\angle -50^\circ$ ,  $Z_4 = 400\Omega\angle 20^\circ$ . Find out whether the bridge is balanced under those conditions or not.
9. Distinguish between absolute and relative humidity.
10. List the advantages and disadvantages of turbine flow meters.

**Part – B ( 5 x 16 = 80 marks)**

11. In a test temperature is measured 100 times with variations in apparatus and procedures. After applying the corrections, the results are

Temperature c	397	398	399	400	401	402	403	404	405
Frequency of occurrence	1	3	12	23	37	16	4	2	2

Determine the arithmetic mean, mean deviation, standard deviation, and the probable error. (8)

- ii. What is calibration of an instrument? Why you need it and explain with an example? (8)

- 12.a. Explain the construction and working principle of LVDT. Explain how the magnitude and direction of the displacement of core of an LVDT detected. (16)

(OR)

- b.i. Explain how by using a differential arrangement, a capacitive transducer which works on the principle of variation of capacitance with displacement between two plates and the response can be linear. (8)
- ii. Discuss anyone of the D/A and A/D Converter. (4+4)

- 13.a.i Explain the construction and working principle of induction type energy meter with neat sketches. (8)
- ii. Write a detailed technical note on the calibration of watt meters and energy meters. (8)

(OR)

- b.i. Explain the significance and functional operations of a PT with its equivalent circuit and phasor diagram. (8)
- ii. A relay CT has a bar primary and 200 secondary turns. The secondary burden is an ammeter of resistance  $1.2\Omega$  and reactance  $0.5\Omega$ , the secondary winding has a resistance of  $0.2\Omega$  and reactance  $0.3\Omega$ . The core requires the equivalent of an mmf of 100 A for magnetization and 50 A for core losses. Find the primary current and ratio error when the secondary ammeter indicates 5 A. (8)

- 14.a.i. Draw the circuit of a Wheatstone bridge and derive the expression for bridge sensitivity with equal arms. Find also the expression for current through the galvanometer for a small unbalance. (8)
- ii. The four arms of Hay's bridge are given in 'AD' is a coil of unknown impedance. DC is a non-inductive resistance of  $1000\Omega$ . CB is a non-inductive resistance of  $800\Omega$  in series with capacitor of  $1.4\mu\text{F}$ . BA is non-inductive resistance of  $16500\Omega$ . If supply frequency is 50Hz and bridge is balanced find the R and L of a coil. (8)

(OR)

- b.i. Draw Maxwell bridge and its phasor diagram. Derive the balance conditions. (8)
- ii. If a capacitor bridge has an arm AB as  $500\mu\text{F}$ , arm CD with non – inductive resistance of 600 ohms, arm AD with resistance in parallel to capacitive with 75 ohm and  $0.04\mu\text{F}$  respectively. The supply voltage is 50 Hz. Calculate the capacitance and dielectric loss angle ' $\delta$ ' at arm BC. (8)

- 15.a. Explain the working principle of Total radiation pyrometers and Optical pyrometers. (16)

(OR)

- b. Write notes on the following Wet and dry bulb hygrometer and functioning of gyroscope. (16)

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