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Subject Code: NEE302/EEE302/ EE304

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B TECH
(SEM–III) THEORY EXAMINATION, 2018-19
ELECTRICAL MEASUREMENT AND MEASURING INSTRUMENTS

Time: 3 Hours

Max. Marks: 100

Note: Be precise in your answer. In case of numerical problem assume data wherever not provided

SECTION – A

1. Attempt all parts of the following. (10*2=20)

- (a) Distinguish between direct and indirect measurement.
- (b) What do you mean by sensitivity and accuracy for dynamic measurement?
- (c) Differentiate between current transformer & potential transformer.
- (d) Explain different way of classification of electrical transducers.
- (e) What are the difficulties in measurement of high resistance?
- (f) Explain the term standardization of a potentiometer.
- (g) Why Kelvin's bridge is preferred for low resistance measurement?
- (h) What are the advantages of digital indicating instruments over analog instruments?
- (i) What do you mean by lissajous pattern?
- (j) What is the principle of working of flux meter?

SECTION – B

2. Attempt any three parts of the following: (3*10=30)

- (a) Explain moving iron power factor meter its advantage and disadvantages.
- (b) Draw and explain the equivalent circuit and phasor diagram of a current transformer. Derive the relation for ratio and phase angle errors.
- (c) Explain different method of capacitive measurement in detail.
- (d) Derive the balance equation for modified De Sauty Bridge. Also explain its advantage over simple De Sauty Bridge. Also draw its phasor diagram.
- (e) Describe the construction and working of a polar type potentiometer. What are the functions of the transfer instrument and phase shifting transformer.

SECTION - C

3. Attempt any one parts of the following: 10 x 1 = 10

- (a) What are the basic blocks of generalized instrumentation system? Draw the various blocks and explain their functions.
- (b) Explain the construction and working of Ratio meter type frequency meter.

4. Attempt any one parts of the following: 10 x 1 = 10

- (a) Explain the working of Spectrum analyzer with the help of suitable block diagram.
- (b) A flow meter is calibrated from 0 to 100 m³/s. The accuracy is specified as within $\pm 0.75\%$ above 20% of scale reading. What is static error if the instrument indicates 80 m³/s?

5. Attempt any one parts of the following:

10 x 1 = 10

- (a) The four arms of a Wheatstone bridge are as follows: $AB=100\Omega$, $BC= 1000 \Omega$, $CD= 4000 \Omega$ and $DA= 400 \Omega$. The galvanometer has a resistance of 100Ω , a sensitivity of $100\text{mm}/\mu\text{A}$ and is connected across AC . A source of 4 V d.c. is connected across BD. Calculate the current through the galvanometer and its deflection if the resistance of arm DA is changed from 400Ω to 401Ω .
- (b) Explain Kelvin's double bridge method for the measurement of low resistance.

6. Attempt any one parts of the following:

10 x 1 = 10

- (a) The power is measured by with an A.C. potentiometer. The voltage across a 0.1Ω standard resistance connected in series with load is $0.35 - j0.10 \text{ V}$. The voltage across 300:1 potential divider connected to the supply is $0.8 + j0.15\text{V}$.
- (b) Determine the power consumed by the load and power factor. Give the construction and working of a flux meter.

7. Attempt any one parts of the following:

10 x 1 = 10

- (a) A cable is tested by loss of charge method using a ballistic galvanometer, with following results:
Discharged immediately after electrification, deflection 200 division. Discharge after 30 Sec. and after electrification (i) deflection 126 divisions (ii) when in parallel with a resist. of $10\text{M}\Omega$, deflection 100 division. Calculate the insulation resistance of the cable.
- (b) Describe the construction and working of Analog Storage CRO using block diagram.