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BTECH
(SEM III) THEORY EXAMINATION 2021-22
ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS

Time: 3 Hours **Total Marks: 100**

Notes:

- *Attempt all Sections and Assume any missing data.*
- *Appropriate marks are allotted to each question, answer accordingly.*

SECTION-A Attempt **All** of the following Questions in brief Marks **(10X2=20)**

Q1(a) Why sensitivity and accuracy for dynamic measurement is important?
Q1(b) Compare direct and indirect measurement.
Q1(c) Give two disadvantages of current transformer & potential transformer.
Q1(d) Classify electrical transducers.
Q1(e) What are the difficulties in measurement of high resistance?
Q1(f) Explain the term standardization of a potentiometer.
Q1(g) Which bridge is suitable for low resistance measurement?
Q1(h) What are the differences between analogue and digital instruments What advantages do digital instruments have over analogue ones?
Q1(i) How Lissajous patterns are displayed?
Q1(j) How is flux measured?

SECTION-B Attempt **ANY THREE** of the following Questions Marks **(3X10=30)**

Q2(a) Explain moving iron power factor meter with its advantages and disadvantages. Why is it used?
Q2(b) Draw and describe a current transformer's equivalent circuit and phasor diagram. Determine the relationship between ratio and phase angle errors.
Q2(c) Explain in detail the various capacitive measurement methods.
Q2(d) Derive the balance equation for modified De Sauty Bridge. Also explain its advantage over simple De Sauty Bridge. Also, draw its phasor diagram.
Q2(e) Describe the construction and working of a polar type of potentiometer. What are the functions of the transfer instrument and phase shifting transformer?

SECTION-C Attempt **ANY ONE** following Question Marks **(1X10=10)**

Q3(a) What are the fundamental components of a generalized instrumentation system? Draw neat and clean various blocks and describe what they do.
Q3(b) What is the construction and working principle of ratio meter type frequency meter? Which logic gate is used in ratio meter type frequency meter?

SECTION-C Attempt **ANY ONE** following Question Marks **(1X10=10)**

Q4(a) Explain the working of Spectrum analyzer with the help of suitable block diagram.
Q4(b) A flow meter is calibrated from 0 to 100 m^3/s. The accuracy is specified as within ±0.75% above 20% of scale reading. What is static error if the instrument indicates 80 m^3/s?

SECTION-C Attempt **ANY ONE** following Question Marks **(1X10=10)**

Q5(a) The four arms of a Wheatstone bridge are as follows: AB=100Ω, BC= 1000 Ω, CD= 4000 Ω and DA= 400 Ω. The galvanometer has a resistance of 100 Ω, a sensitivity of 100mm/μA 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 400 Ω to 401 Ω.
Q5(b) Discuss in detail Kelvin's double bridge method for the measurement of low resistance.

SECTION-C Attempt **ANY ONE** following Question Marks **(1X10=10)**

Q6(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 V. The voltage across 300:1 potential divider connected to the supply is 0.8 + j0.15V.
Q6(b) Determine the power consumed by the load and power factor. Give the construction and working of a flux meter

SECTION-C Attempt **ANY ONE** following Question Marks **(1X10=10)**

Q7(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 10MΩ, deflection 100 division. Calculate the insulation resistance of the cable.
Q7(b) Describe the construction and working of Analog Storage CRO using block diagram.