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[5057]-235

S.E. (Electrical) (First Semester) EXAMINATION, 2016
ELECTRICAL MEASUREMENTS AND INSTRUMENTATION
(2012 PATTERN)

Time : Two Hours**Maximum Marks : 50**

- N.B. :—** (i) Neat diagrams must be drawn wherever necessary.
(ii) Figures to the right indicate full marks.
(iii) Use of logarithmic table, slide rule, Mollier chart, electronic pocket calculator and steam table is allowed.
(iv) Assume suitable data, if necessary.

1. (a) Which three forces are required for satisfactory operation of analog indicating instruments ? State the function of each force. [6]
- (b) With a circuit diagram derive the equation for an unknown self inductance measurement using Maxwell's inductance-capacitance bridge. [6]

Or

2. (a) Explain the terms related to instrument transformers—transformation ratio, nominal ratio, Burden. [6]
- (b) A Maxwell's inductance capacitance bridge is used to measure an unknown inductance in comparison with capacitance. The various values at balance are $R_2 = 400 \text{ ohm}$, $R_3 = 600 \text{ ohm}$, $R_4 = 1000 \text{ ohm}$, $C_4 = 0.5 \text{ microfarad}$. Calculate the values of R_1 and L_1 . Also calculate the storage factor of coil if frequency is 100 Hz. [6]

P.T.O.

3. (a) State and explain errors in dynamometer type wattmeter. [6]
 (b) The constant for a three phase, 3 element integrating wattmeter is 0.12 revolution of disc per kWh. If the meter is normally used with a potential transformer of ratio 22,000/110 V and a current transformer of ratio 500/5A. Find the error expressed as a percentage of the correct reading from the following test figures for the instrument only : Line Voltage = 100 V, current = 5.25 A, power factor = 1 Time to complete 40 revolutions = 61s. [6]

Or

4. (a) A 230 volt, 50 Hz, single phase energy meter has a constant of 200 revolutions per kWh. While supplying a non inductive load of 4.4 A at normal voltage, the meter takes 3 minutes for 10 revolutions. Calculate the percentage error of the meter. [6]
 (b) With circuit diagram and phasor diagram explain one wattmeter method for measurement of reactive power in (R + L) load. [6]
5. (a) Explain capacitance pressure transducer with a neat diagram. Write a advantages and disadvantages of capacitive pressure transducer. [6]
 (b) Explain measurement of voltage, current, phase angle, frequency using CRO. [7]

Or

6. (a) Explain the following terms associated with CRO : [6]
 (i) Volts/division
 (ii) X10
 (iii) Invert.

- (b) Explain measurement of pressure using Mcleod gauge. [7]
7. (a) Draw and explain ultrasonic flow meter method for level measurement. [6]
- (b) Define strain. Explain the working principle of an electrical strain gauge. [7]

Or

8. (a) Explain hydraulic method for measurement of level. [6]
- (b) Explain construction and working of LVDT with neat diagram. [7]

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