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[4957]-1034

S.E. (Electrical) (First Sem.) 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 side 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) Describe construction and working of Permanent Magnet Moving Coil (PMMC) instrument with suitable diagram. [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 $R_2 = 400$ ohm, $R_3 = 600$ ohm, $R_4 = 1000$ ohm, $C_4 = 0.5$ microfarad.
- Calculate the values of R_1 and L_1 . Also calculate the storage factor of coil if frequency is 100 Hz. [6]

Or

2. (a) Draw circuit diagram of Kelvin's double bridge. Derive expression for unknown resistance with usual notations. [6]

P.T.O.

- (b) A milli-ammeter of 2.5 ohms resistance reads upto 100 milliamperes.

Calculate the resistance which is necessary to enable it to be used as : [6]

(i) A voltmeter reading upto 10 V

(ii) An ammeter reading upto 10 A.

Draw the connection diagram in each case.

3. (a) Explain with the help of circuit diagram how one wattmeter method is used for measurement of reactive power. [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 = 61 s. [6]

Or

4. (a) Derive torque equation of dynamometer type wattmeter. [6]

- (b) 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]

5. (a) What are different selection factors for selecting transducers ? [6]
(b) Explain measurement of voltage, current, phase angle, frequency using CRP. [7]

Or

6. (a) In an experiment, the voltage across 5 kΩ resistor is applied to C.R.O. The screen shows a sinusoidal signal of total vertical occupancy 4 cm and total horizontal occupancy of 2 cm. The front panel controls volts/div and time/div are on 5 V/div and 5 ms/div respectively. Calculate the maximum, r.m.s. values of voltage across resistance and current through resistance. Also find its frequency. [6]
(b) Explain Pirani gauge for measurement of low pressure. Also state advantages and disadvantages. [7]
7. (a) Draw and explain ultrasonic flow meter method for level measurement. [6]
(b) What are the types of strain gauge ? Explain foil strain gauge. [7]

Or

8. (a) Explain nucleonic method for level measurement with a suitable diagram. [6]
(b) Explain construction and working of RVDT with a neat diagram. [7]