Total No. of Questions—8]   [Total No. of Printed Pages—3

Seat
No.   **[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 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]

                                                              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]