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Seat
No.

[5152]-545

S.E. (Electrical) (I. Sem.) EXAMINATION, 2017

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

(2015 PATTERN)

Time : Two Hours   Maximum Marks : 50

N.B. :— (i) Answer Q. **1** or Q. **2**, Q. **3** or Q **4**, Q **5** or Q **6**,
Q **7** or Q **8**.

(ii) Neat diagrams must be drawn wherever necessary.

(iii) Figures to the right side indicate full marks.

(iv) Assume suitable data if necessary.

1. (a) What are shunts ? Explain working of universal shunt with
neat diagram for extension of range of instrument.   [6]

(b) With neat diagram, derive general equation for a.c. bridge
balance hence determine value of unknown impedance to balance
the bridge if three arms of bridge consist of impedances as
follows   [6]

$Z_1 = 50 \angle 80°\Omega$, $Z_2 = 125 \angle 0°\Omega$ and $Z_3 = 200 \angle 30°\Omega$

Or

2. (a) With neat diagram, explain working of Kelvin's Double Bridge
for measurement of low resistance. Derive relation for finding
unknown resistance.   [6]

P.T.O.

(*b*)   With neat diagram, explain construction and principle of attraction type moving iron instrument. [6]

3.   (*a*)   With neat circuit, explain construction and working of power analyser. [6]

     (*b*)   A 230 V, 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 instrument and state that whether energy meter is running slow or fast. [7]

Or

4.   (*a*)   In a three phase circuit, two wattmeters used to measure power indicate 1200 W and 600 W respectively. Find total active power, reactive power and power factor of circuit :

        (*i*)   When both wattmeter readings are positive

        (*ii*)   When the latter is obtained by reversing the current coil connections [7]

     (*b*)   Explain how the following adjustments are made in single phase induction type energy meter : [6]

        (*i*)   Lag adjustment

        (*ii*)   Creep.

5. (*a*) Define pressure. State the importance of pressure measurement hence classify pressure in detail. [6]

(*b*) In an experiment, the voltage across 100 W incandescent bulb is applied to CRO. The screen shows a sinusoidal signal of total vertical occupancy of 3.5 cm and horizontal occupancy of 2 cm. The front panel controls volts/div and times/div are on 20 V/div and 5 ms/div respectively. Calculate : [7]

(*i*) Maximum value of voltage across bulb

(*ii*) Maximum value of current

(*iii*) Frequency.

Or

6. (*a*) With neat diagram, explain construction and working of McLeod gauge for low pressure measurement hence derive expression for unknown pressure in terms of level difference of mercury.

[7]

(*b*) Give detail classification of transducers along with suitable examples. [6]

7. (*a*) With neat diagram explain pneumatic method for level measurement. [6]

(*b*)   Define strain. Give detailed classification of strain gauge. [6]

Or

8.   (*a*)   Explain the importance of level measurement. Explain ultrasonic method for level measurement with suitable diagram.   [6]

(*b*)   Explain construction and working of wire strain gauge and foil strain gauge with suitable diagrams.   [6]