

Total No. of Questions—8]

[Total No. of Printed Pages—4

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]

$$Z_1 = 50 \angle 80^\circ \Omega, Z_2 = 125 \angle 0^\circ \Omega \text{ and } Z_3 = 200 \angle 30^\circ \Omega$$

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]