Total No. of Questions : 8]

SEAT No. :

PC2795

[Total No. of Pages : 3

[6352]-19

S.E. (Electrical)

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

(2019 Pattern) (Semester - III) (203144)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Describe the constructional details of an Electrodynamometer type wattmeter. **[6]**

b) Derive the torque equation for an Electrodynamometer type wattmeter. Comment on the shape of scale if spring control is used. **[6]**

c) When the power of 3 phase balanced star connected load is measured by single wattmeter with current coil in Y phase and pressure coil between Y phase and neutral, it shows 6 kW. The load current is 30 A at 400 V. What will be the reading of wattmeter if connections of current coil remain unchanged and pressure coil is connected between R and B phases. **[6]**

OR

Q2) a) With neat diagram, and necessary phasor diagram, explain one wattmeter method for measurement of reactive power. **[6]**

b) In two wattmeter method, what will be the readings of two wattmeter's, if power factor of the circuit is. **[6]**

i) Unity
ii) 0.5 lagging
iii) Zero

Write necessary equations to justify your answer.

c) 3 phase, 415 V 50 Hz AC systems supplying a balanced load. Two wattmeters are used to measure total power in the circuit reads 10 kW and 3 kW respectively. **[6]**

Calculate

i) Total active power

ii) Total reactive power

iii) Power Factor

P.T.O.

Q3) a) Derive the torque equation of single-phase induction type energy meter. **[6]**

b) A single-phase energy meter makes 625 revolutions per kWh. It makes 45 revolutions in 55 seconds at 4.6 kW load. Calculate percentage error, hence state whether meter is running slow or fast. **[5]**

c) Draw a block diagram of electronic energy meter and explain function of each block. **[6]**

OR

Q4) a) Draw neat diagram of single phase induction type energy meter, label all the parts. **[5]**

b) A 230 V, single phase energy meter has constant load of 5A passing through it for 5 hours at unity power factor. If the meter makes 2990 impulses during this period calculate **[6]**

i) Energy supplied

ii) meter constant

iii) Energy consumed when meter makes 2500 impulses

c) Explain necessity of calibration of energy meter and how electronic energy meter is calibrated. **[6]**

Q5) a) Define transducer and explain various requirements of transducers. **[6]**

b) With neat diagram, explain McLeod gauge for measurement of low pressure. **[6]**

c) In an experiment to measure various electrical quantities using CRO, volts/div knob is set at 10 V/div and times/div knob is set to 5mS/div. Waveform shows total vertical occupancy of 4.5 cm and horizontal occupancy of 5 cm. If the same signal is applied across 2.5Ω resistance, Calculate **[6]**

i) Peak to peak voltage

ii) Maximum voltage

iii) RMS voltage

iv) Current

v) Time period

vi) Frequency

OR

Q6) a) Explain how voltage, current and frequency can be measured using CRO. **[6]**

b) Explain capacitive pressure transducers. **[6]**

c) State importance of pressure measurement hence gives detailed classification of pressure. **[6]**

Q7) a) Explain construction and working of **[8]**

i) Foil strain gauge

ii) Semi conductor strain gauge

b) With neat diagram, explain Ultrasonic method for level measurement. **[6]**

c) State the applications of LVDT. **[3]**

OR

Q8) a) With neat diagram, explain any two electrical methods for level measurement. **[8]**

b) Explain construction and working of LVDT with neat diagram. **[6]**

c) Define strain and what are the types of strain gauge? **[3]**

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