

[6402]-14

S.E. (Electrical)

**ELECTRICAL MEASUREMENTS &
INSTRUMENTATION****(2019 Pattern) (Semester - III) (203144)**

Time : 2½ Hours]

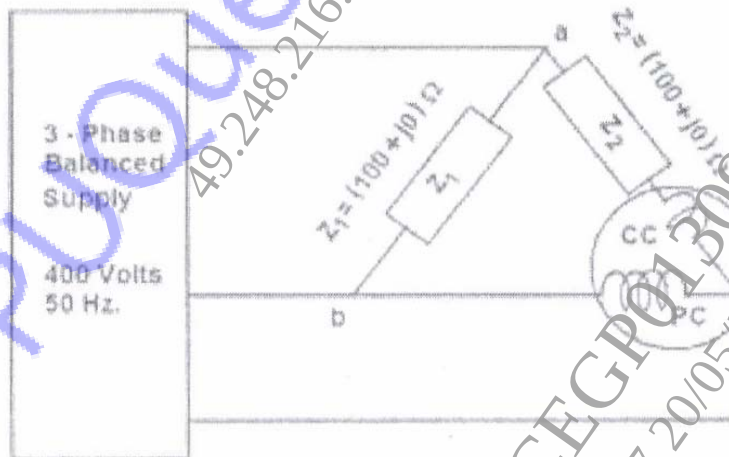
[Max. Marks : 70

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 indicate full marks.
- 4) Assume suitable data, if necessary.

Q1) a) Draw neat circuit diagram for measurement of power in three phase circuit using two wattmeter method with star connected R-L series load [4]

- b) The figure shows a three-phase delta connected load supplied from a 400V, 50Hz, 3-phase balanced source. The pressure coil(PC) and current coil(CC) of a wattmeter are connected to the load as shown, with the coil polarities suitably selected to ensure a positive deflection. The wattmeter reading will be [8]



- c) Explain various errors produced in wattmeter

[6]

OR

P.T.O.

Q2) a) Draw neat circuit diagram for measurement of power in three phase circuit using one wattmeter method with two-way switch for star connected R-L series load [4]

b) Explain working of 3 phase 3 element wattmeter. [8]

c) In an experiment for measurement of power by two wattmeter method for a load of 415V, 20 A, one wattmeter reads 100 kW and other reads 80 kW. Calculate power factor of the load, total active and reactive power consumed [6]

Q3) a) State following statements are true or False : [3]

i) Energy meter is indicating type of instrument.

ii) In induction type energy meter, driving torque produced is proportional to power consumed.

iii) Recorded energy can be calculated from energy meter constant.

b) A 230 V, single phase, energy meter has constant load of 5 A passing through it for 6 hours at unity power factor. If the meter disc makes 2760 revolutions during this period, what is meter constant in revolutions per kWh. Also calculate power factor of the load if the number of revolutions made by the meter are 1800 when operating at 230 V and 6 A for 4 hours [6]

c) Derive the torque equation of single phase induction type energy meter. [8]

OR

Q4) a) Draw the block diagram of electronic energy meter. [3]

b) A 230 V, 50 Hz, 1 ph energy meter has a constant of 200 rev/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]

c) With neat circuit diagram and necessary phasor diagram, explain how 1 phase static energy meter can be calibrated at 0.5 lagging power factor by use of resistive load, three phase supply and two way switches. [8]

- Q5) a)** Give 2 examples of each of following types transducers. [4]
- i) Active transducers
 - ii) Passive transducers
 - iii) Primary transducers
 - iv) Secondary transducers
- b) With neat diagram, Explain Cathode Ray Oscilloscope. [6]
- c) Explain detailed classification of pressure. [8]

OR

- Q6) a)** Give any four differences between CRO and DSO. [4]
- b) With neat diagram, explain working of Mcleod gauge. [6]
- c) Explain various front panel controls of CRO. [8]

- Q7) a)** Draw and explain following methods of level measurement, state any 1 application of the same
- i) Sight glass method
 - ii) Float gauge method [8]
- b) With neat diagram, explain working of RVDT. [6]
- c) List applications of level measurement in electrical engineering [3]

OR

- Q8) a)** Explain with neat diagram, bonded and unbonded strain gauge. [8]
- b) With neat diagram, explain hydraulic method of level measurement. [6]
- c) Define strain hence state importance of displacement measurement. [3]

