

16117

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
  - (2) Illustrate your answers with neat sketches wherever necessary.
  - (3) Figures to the right indicate full marks.
  - (4) Assume suitable data, if necessary.
  - (5) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any TEN of the following :

20

- (a) Define following terms related to measuring instruments :
  - (i) Sensitivity
  - (ii) Selectivity
- (b) State the significance of term measurement.
- (c) State the function of former and control spring in PMMC instrument.
- (d) Identify the instrument transformer of Fig. 1(a) and Fig. 1 (b).

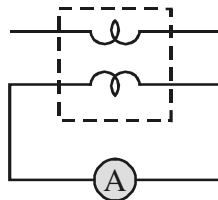


Fig. 1 (a)

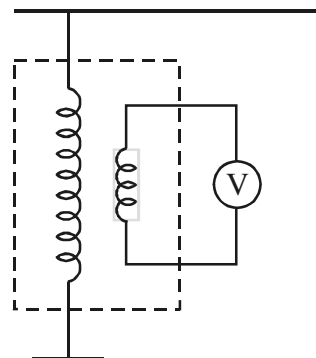


Fig. 1 (b)

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P.T.O.

- (e) Write any two disadvantages of ammeter shunts.
- (f) State any four errors that occur in dynamometer type wattmeter.
- (g) Write the expression for pf by two wattmeter method. State meaning of each term.
- (h) State any two advantages of digital energy meter over analog energy meter.
- (i) Write the Ohmic range for low and high resistance.
- (j) State working principle of earth tester.
- (k) List any four major knobs on front panel of CRO.
- (l) List any four applications of function generator.

**2. Attempt any FOUR of the following :**

**16**

- (a) State the meaning of secondary instrument. Classify secondary instruments.
- (b) List three types of errors in measuring instruments. Give reasons of occurring for any one of them.
- (c) Compare PMMC & MI instruments on following points :
  - (i) Nature of scale
  - (ii) working principle
  - (iii) damping
  - (iv) use
- (d) Draw a neat circuit for reactive power measurement by one wattmeter in star connected load. Write its equation.
- (e) Draw a neat sketch of induction type  $1\phi$  energy meter. Label the parts.
- (f) List any eight applications of digital multimeter.

**3. Attempt any FOUR of the following :**

**16**

- (a) Write one advantage and one disadvantage each for spring control method and gravity control method.

- (b) Draw neat sketch of PMMC type instrument and label it.
- (c) A moving coil instrument gives FSD of 15 mA and has a resistance of  $100 \Omega$ . Calculate the value of shunt resistance so that it can be used as 0 – 2.5 – 5 A ammeter.
- (d) Draw a power triangle. Name each side with relation and unit.
- (e) List any four errors in induction type energy meter. Give method of compensation for each.
- (f) Write any two applications each of (i) Megger (ii) Earth tester.

**4. Attempt any FOUR of the following :**

**16**

- (a) Name any four parts of MI instrument and state material for each.
- (b) Write any four advantages of instrument transformer.
- (c) State the effects of errors in dynamometer type wattmeter due to –
  - (i) pc – inductance
  - (ii) pc – capacitance
  - (iii) mutual inductance
  - (iv) connection
- (d) Show that the torque produced in a 1- $\phi$  dynamometer type wattmeter is proportional to the power to be measured.
- (e) With neat sketch explain working of Weston type synchroscope.
- (f) Draw a neat block diagram of CRO and state function of each block

**5. Attempt any FOUR of the following :**

**16**

- (a) Describe with neat sketch working of air friction damping used in instruments.
- (b) Write step by step procedure for calibration of ammeter.
- (c) State the meaning of multiplying factor. A 1- $\phi$  wattmeter rated for 500 V, 10 A have FSD of 1000 W. Calculate its multiplying factor.

**P.T.O.**

- (d) Write any four merits of two wattmeter method for 3- $\phi$  power measurement.
- (e) Draw a neat block diagram of LCR meter. Label each block
- (f) Draw a neat circuit to measure power of 3- $\phi$  balanced star connected load used one wattmeter. Explain its working.

**6. Attempt any FOUR of the following :**

**16**

- (a) Derive the relation of shunt resistance for extension of ammeter range.
  - (b) Find the total power consumed and pf of a balanced load when supplied with 400 V, 3- $\phi$ , 50 Hz supply. Two wattmeters give readings as
    - (i) both read 6 kW
    - (ii) one reads 6 kW and other reads zero.
  - (c) State the function and shape of following parts used for induction type energy meter :
    - (i) series magnet
    - (ii) shunt magnet
    - (iii) Al disc
    - (iv) break magnet
  - (d) Name two methods each for measurement of low, medium and high resistance. Give one advantage and one limitation of V-I method.
  - (e) Explain working of rotating type phase sequence indicator.
  - (f) List different types of frequency meter. Explain working of reed type frequency meter.
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