

17322

11718

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 :

10 × 2 = 20

- (a) State the range for low and medium resistance.
- (b) List the different methods to produce damping torque.
- (c) List any two applications of CRO.
- (d) What is meant by energy meter constant ?
- (e) Define : (i) Resolution, (ii) Calibration, with reference to electrical measuring systems.
- (f) State the function of controlling torque in electrical measuring instrument.

- (g) State various types of errors in wattmeter.
- (h) State any two disadvantages of one wattmeter method of measurement of 3 phase power.
- (i) State the significance of power factor.
- (j) Compare primary and secondary instruments (any two points).
- (k) Draw block diagram of function generator.
- (l) Define energy. Write unit of it.
- (m) List the different types of frequency meters.

**2. Attempt any FOUR :**

**4 × 4 = 16**

- (a) Draw a neat sketch of 3 $\phi$  induction type energy meter and label the parts.
- (b) Describe systematic errors in measuring instruments.
- (c) With neat diagram explain constructional details of dynamometer type wattmeter.
- (d) Describe with working of LCR meter for measurement of inductance.
- (e) How the range of voltmeter is extended using multiplier ?
- (f) If the readings on two wattmeters are 5 kW and 0.5 Kw, the latter reading being obtained after reversal of the current coil, calculate the power and power factor of the load.

**3. Attempt any FOUR :****4 × 4 = 16**

- (a) Compare PMMC and MI instruments on the following basis :
  - (i) Construction
  - (ii) Symbol
  - (iii) Working principle
  - (iv) Application
- (b) Draw and describe working of electronic energy meter.
- (c) Draw construction of Megger and write operating principle of it.
- (d) A 4 mA meter movement with an internal resistance of  $1 \Omega$  is to be converted into 0-100 mA ammeter. Calculate the value of shunt resistance.
- (e) Draw block diagram of CRO. Write the function of each block.
- (f) Explain magnetic effect employed in measuring instrument.

**4. Attempt any FOUR :****4 × 4 = 16**

- (a) Draw a neat sketch of  $1\phi$  induction type energy meter and write operating principle of it.
- (b) Describe with neat diagram phase sequence indicator.
- (c) Compare analog and digital multimeter.
- (d) With neat diagram describe gravity control method to obtain controlling torque.
- (e) Why CT is never operated with an open secondary ?
- (f) Describe with neat diagram working principle of attracted type MI instruments.

**P.T.O.**

**5. Attempt any FOUR :****4 × 4 = 16**

- (a) Draw a neat labelled diagram of PMMC type of measuring instrument.
- (b) Explain significance and purpose of electrical measurement system.
- (c) State the advantages of instrument transformer in using for extension of range of meters.
- (d) Draw earth tester. What is the necessity of measuring earth resistance ?
- (e) Derive the formula for calculating P.F. of a 3 $\phi$  star connected balanced load where power is measured by two wattmeter method.
- (f) Draw the circuit diagram of Whetstone's bridge and derive the formula for balanced load.

**6. Attempt any FOUR :****4 × 4 = 16**

- (a) What are the errors occurring in measuring devices due to stray magnetic field and temp ? Explain how to compensate them.
  - (b) Describe the following errors and their compensation :
    - (i) Phase error
    - (ii) Speed error
  - (c) Power supplied to three phase load was measured by two wattmeter method. The readings were 4 kW & -2.55 kW. The supply voltage being 400 V. Determine (i) load P.F., (ii) total power supplied.
  - (d) Explain the effect of power factor on the wattmeter measurements.
  - (e) Explain how range of ammeter is extended using shunt.
  - (f) With neat diagram, explain the working of clip-on ammeter.
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