



17322

21415

3 Hours/100 Marks

Seat No.

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- Instructions :** (1) **All** questions are **compulsory**.  
(2) Answer **each** next main Question on a **new** page.  
(3) Illustrate your answers with **neat** sketches **wherever** necessary.  
(4) Figures to the **right** indicate **full** marks.  
(5) **Assume** suitable data, if **necessary**.  
(6) **Use** of Non-programmable Electronic Pocket Calculator is **permissible**.

MARKS

1. Attempt **any ten** of the following :

20

- Name any two electrical effects employed in measuring instruments.
- State the meaning of integrating instrument and give one application of it.
- State any two general requirements of ammeter shunts.
- State the meaning of 'Calibration'.
- Give two disadvantages of PMMC instrument.
- Give significance of power factor.
- Name any two methods for power measurement in 3- $\phi$  circuit.
- State the use of energy meter constant.
- Write two factors which affect earthing system.
- List any four applications of LCR meter.
- Name any two types of frequency meter.
- State function of intensity and focus control knob on front panel of CRO.

P.T.O.



MARKS

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

16

a) Define following terms related to measuring instruments :

- i) Accuracy
- ii) Reproducibility
- iii) Precision
- iv) Drift.

b) Give classification of systematic errors in instrument. Write two reasons due to which observational errors are occurred.

c) Draw neat sketch of attraction type MI instrument and label it.

d) A moving coil instrument gives FSD of 15 mA and has a resistance of  $200 \Omega$ . Calculate the value of series resistance so that it can be used as a 0-75-150 V voltmeter.

e) Write equations of all types of power. State their units, write relation between them.

f) Write any two advantages and two limitations of one wattmeter method for 3- $\phi$  power measurement.3. Attempt **any four** of the following :

16

a) Describe spring control method of producing control torque in measuring instrument. Write one advantage and one limitation of it.

b) Write any four differences between CT and PT.

c) Name any four parts of PMMC instrument and state function of each.

d) Draw only connection diagram for measurement of voltage and current using CT and PT.

e) Draw a neat sketch of dynamometer type wattmeter for measurement of 1- $\phi$  power. Label it.

f) Write any four advantages of digital energy meter over analog type.



**MARKS**

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

**16**

- a) Name two types of secondary instruments each according to
  - i) Principle of operation
  - ii) Application.
- b) Write any two advantages and two disadvantages of ammeter shunts.
- c) Compare PC and CC of wattmeter w.r.t.
  - i) Connection
  - ii) Status
  - iii) Number of turns
  - iv) Gauge of wire.
- d) State the method of compensation in wattmeters for errors due to
  - i) Eddy current
  - ii) Stray magnetic field
  - iii) Vibration of moving system
  - iv) Change in temperature.
- e) A 415V, 3 $\phi$ , star connected induction motor draws a current of 20A. The input power is 15 kW. A wattmeter with CC in line Y and PC between R and B is used. Determine wattmeter reading.
- f) State the effect of power factor on the reading of two wattmeters for 3 $\phi$  power measurement.

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

**16**

- a) State the necessity of extension of range in wattmeters. Explain any one method with neat sketch.
- b) List any four measure parts of 1- $\phi$  induction type energy meter and state function of each.
- c) Compare analog multimeter with DMM on any four points.
- d) List any four measure blocks of LCR meter and write function of each.
- e) With neat sketch explain working principle of earth tester.
- f) Draw a neat sketch of 1- $\phi$  dynamometer type power factor meter. Label it.

**MARKS**

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

**16**

- a) PMMC instruments are used only for DC measurement. Explain.
  - b) Draw a neat sketch of induction type  $3\phi$  energy meter and label it.
  - c) Explain V-I methods of medium resistance measurement with neat circuit.
  - d) With a neat diagram explain working of clip on ammeter.
  - e) Draw a labelled block diagram of sine wave generator. State function of each block.
  - f) Write applications of CRO (any eight).
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