15116

3 Hours / 100 Marks   Seat No.

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.

(7) 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) List any four errors in analog measuring instruments.

(b) Give two methods of producing control torque in measuring instrument.

(c) State the material used for moving coil and former for PMMC instrument.

(d) Name the meter used for measurement of –

(i)   Direct current   (ii)   Alternating voltage

(e) Write any two causes of errors in C.T.

(f) State function of current coil in wattmeter.

(g) List one advantage and one disadvantage of one wattmeter method for 3-ϕ power measurement.

(h) State the function of break magnet used in energy meter.

(i) Name any two methods for measurement of high resistance.

(j) Write two advantages of digital multimeter over analog multimeter.

(k) State the use of phase sequence indicator.

(l) Write only the function of storage oscilloscope.

P.T.O.

2. **Attempt any FOUR of the following :** 16

    (a) List any four effects of electricity employed in measuring instrument. Identify one instrument for each effect.

    (b) Describe method of eddy current damping with neat sketch.

    (c) A moving coil instrument with FSD of 25 mA and internal resistance of 50 Ω is to be used as 0-10 A ammeter and 0-500 V voltmeter. Calculate necessary shunt/series resistances for it.

    (d) Write a step by step procedure for calibration of voltmeter.

    (e) Give function and material for each of the following wattmeter component :
    (i) P.C. (ii) C.C. (iii) Pointer (iv) Spring

    (f) Derive the expression for power factor by two wattmeter method of power measurement.

3. **Attempt any FOUR of the following :** 16

    (a) List any six desirable characteristics of measuring instruments and define any one of them.

    (b) Draw neat sketch of repulsion type MI instrument and label it.

    (c) Derive the relation for shunt resistance for extention of ammeter range.

    (d) Draw a neat sketch of dynamometer type wattmeter for 1-ϕ power measurement.

    (e) Draw a neat circuit to measure power of 3-ϕ balanced delta connected load using one wattmeter. Explain its working.

    (f) List any four errors in induction type energy meter. Give method of compensation for each.

4. **Attempt any FOUR of the following :** 16

    (a) Write any two advantages and two disadvantages of PMMC type instrument.

    (b) Draw a connection diagram of 1-ϕ wattmeter. State rating of it for measurement of 2 kW load when connected to 230 V, 50 Hz.

    (c) Write the position of two wattmeter readings in power measurement if value of p.f is – (i) 1 (ii) 0 (iii) 0.5 (iv) between 0 to 0.5.

    (d)   Draw a neat circuit of reactive power measurement by two wattmeter method and explain it.

    (e)   With neat circuit diagram explain calibration of energy meter by direct loading.

    (f)   With neat sketch explain working of megger.

5. **Attempt any FOUR of the following :**   **16**

    (a)   Give two reasons each of occurrence of following errors :

        (i)   Instrumental   (ii)   Environmental

    (b)   Write any two advantages and two disadvantages of dynamometer type wattmeter.

    (c)   Explain V-I method of measurement of medium resistance.

    (d)   Draw a labelled block diagram of LCR meter.

    (e)   Explain working of Weston type frequency meter with neat sketch.

    (f)   Draw a labelled front panel diagram of function generator.

6. **Attempt any FOUR of the following :**   **16**

    (a)   Secondary of CT is never open circuited – explain.

    (b)   Compare PMMC and MI instruments on any four points.

    (c)   Draw a neat labelled block diagram of digital energy meter.

    (d)   Explain capacitance measurement using LCR meter.

    (e)   Explain the construction of dynamometer type 3-ϕ power factor meter.

    (f)   State the function of following w.r.t. CRO :

        (i)   Vertical deflection system

        (ii)   Horizontal deflection system

        (iii)   Blanking circuit

        (iv)   Synchronization circuit

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