

17322

15116**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.
 (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**

- List any four errors in analog measuring instruments.
- Give two methods of producing control torque in measuring instrument.
- State the material used for moving coil and former for PMMC instrument.
- Name the meter used for measurement of –
 - Direct current
 - Alternating voltage
- Write any two causes of errors in C.T.
- State function of current coil in wattmeter.
- List one advantage and one disadvantage of one wattmeter method for 3- ϕ power measurement.
- State the function of break magnet used in energy meter.
- Name any two methods for measurement of high resistance.
- Write two advantages of digital multimeter over analog multimeter.
- State the use of phase sequence indicator.
- Write only the function of storage oscilloscope.

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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 50Ω 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 extension 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.

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- (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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