



17322

15162

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) List the methods of providing damping torque in indicating type instruments.
 - b) State two purpose of calibration of measuring instruments.
 - c) Define the following term.
 - i) Precision
 - ii) Accuracy
 - d) Find the M.F. of a wattmeter 1500 W, FSD, when current and voltage ratings chosen are 15 Amp and 600 volt respectively.
 - e) Write two advantages of two wattmeter method for 3-phase power measurement.
 - f) Give the rating of a typical energy meter used for domestic purpose.
 - g) State two merits of digital multimeter over analog type multimeter.
 - h) State the meaning of creeping error in energy meter and how it is prevented ?
 - i) Classify resistances according to their values.
 - j) State the use of sychronoscope.
 - k) Define instrument transformer. List two errors in instrument transformer.
 - l) Draw impedance triangle in series R-C circuit.
2. Attempt **any four** of the following : **16**
 - a) Explain common errors in analog measuring instruments and state the reason due to which these errors occur.
 - b) Draw a neat sketch and label the parts of P.M.M.C. type ammeters.
 - c) Draw constructional features of dynamometer type wattmeter for single-phase power measurement and label them.
 - d) A moving coil instrument gives a full scale deflection of 10mA when the potential difference across its terminals is 100 mV. Calculate
 - i) Shunt resistance for a full scale deflection corresponding to 100Amp.
 - ii) Series resistance for full scale reading with 1000Volt.

P.T.O.



- e) List any four errors in induction type energy meter. Give the method of compensation for each type of error.
- f) Draw neat circuit diagram and phasor diagram for measurement of reactive power in 3-phase balanced star connected load by one wattmeter method.

3. Attempt any four of the following :

16

- a) Draw a block diagram of electronic energy meter. Write function of each block.
- b) Mention the precautions to be taken while connecting CT and PT in the circuit.
- c) Explain the essential torques in analog type measuring instruments.
- d) A 50 amp, 230 volt energy meter makes 61 revolutions in 37 second. If the meter constant is 520 rev/kwh. What is the percentage error in the energy meter ?
- e) Draw a labelled block diagram of LCR meter.
- f) Draw the diagram and explain the working of ferrodynamic type frequency meter.

4. Attempt any four of the following :

16

- a) Explain the various effects of electricity utilized in measuring instruments. Write the name of instrument based on each effect.
- b) Write comparison between M.I. instrument and M. C. instruments (any four point).
- c) Draw neat sketch of attraction type moving iron instrument and label it.
- d) Explain any four errors occurring in wattmeter.
- e) Three identical coils each of $(4.2+j5.6)$ ohms are connected in star across 415 volt, 3-phase 50 Hz supply. Find
 - i) phase voltage
 - ii) phase current
 - iii) the two wattmeter readings W_1 and W_2 when they are connected to measure total power.
- f) With neat diagram explain working of megger.

5. Attempt any four of the following :

16

- a) Draw block diagram of Cathode Ray oscilloscope.
- b) Derive the relation for multiplier resistance for extension of voltmeter range.
- c) Write the concept of power factor and its significance.
- d) Draw neat circuit diagram for measurement of power by two wattmeter method in 3-phase delta connected load and write the relation for total power.
- e) Explain V-I method of measurement of medium resistance.
- f) Draw block diagram of function generator.

6. Attempt any four of the following :

16

- a) Explain absolute instruments and secondary instruments by giving one example of each.
- b) Compare analog ammeter and voltmeter on the basis of
 - i) Connection in the circuit
 - ii) Resistance value
 - iii) Circuit symbol
 - iv) Power consumption.
- c) With the help of neat diagram explain calibration of voltmeter.
- d) Explain the term reactive power. Why it is some times essential to measure reactive power ?
- e) Explain working principle of earth tester with neat diagram.
- f) Explain the construction and working of Clip-on-Ammeter.