

17322

21314

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**
- a) Define resolution and accuracy.
 - b) List the effects of electric current used in indicating instruments.
 - c) State one example of each of indicating and integrating instruments.
 - d) Give classification of measuring instruments.
 - e) State the principle of operation of PMMC instrument.
 - f) List one method of range extension of d.c. ammeter and a.c. ammeter.

P.T.O.

- g) A single phase wattmeter rated for 500V, 10A has full scale deflection of 1250 Watt. What is the multiplying factor of wattmeter.
- h) Give the methods of measurement of active power in 3-phase circuit.
- i) State the meaning of creeping error in energy meter and how it is prevented?
- j) State the classification of resistance as per their values.
- k) State use of megger and LCR meter.
- l) State the use of storage type digital oscilloscope.

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

16

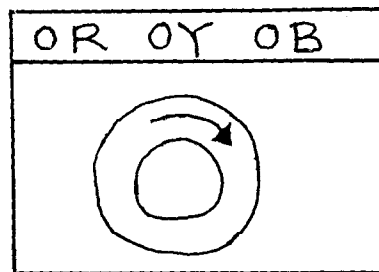
- a) List the types of systematic errors and state the reasons due to which these errors occurs.
- b) Compare PMMC and MI instrument on basis of :-
 - i) Principle of working
 - ii) Torque to weight ratio
 - iii) Nature of scale
 - iv) Use
- c) Describe how C.T. is used to extend range of ammeter with a neat circuit diagram.
- d) Draw a circuit diagram to measure power in 1-phase 230V, 50Hz a.c. circuit connected with a load of 1kW using dynamometer type wattmeter. State the wattmeter specification.
- e) What is connection error in wattmeter? Describe with neat connection diagram. State the method of compensate it.
- f) A wattmeter is rated for 600V, 5/10A with FSD of 1500W. The reading obtained when used on 10A range is 1000W. Find out the actual power consumed in load.

- 3. Attempt any FOUR of the following:** **16**
- a) Describe the production of damping torque using air friction damping method.
 - b) With neat diagram describe construction and operation of potential transformer.
 - c) A moving coil instrument gives a full scale deflection with 10mA and has a resistance of 50 ohm. Calculate the resistance necessary to be put in series/parallel with the instrument so that it may be used as -
 - i) 0-5A ammeter
 - ii) 0-250V voltmeter
 - d) Draw a neat labelled circuit diagram and phasor diagram of one wattmeter method of reactive power measurement in 3-phase balanced load.
 - e) Draw a block diagram of electronic energy meter and state function of each block.
 - f) Explain working of clip-on-ammeter with neat diagram.
- 4. Attempt any FOUR of the following:** **16**
- a) State any two advantages and disadvantages each of moving iron instruments.
 - b) A 3-phase 500V motor load has a power factor of 0.4 Two wattmeters are connected to measure input. They show the input to be 30kW. Find out reading of each wattmeter.
 - c) Draw a neat labelled diagram of 3-phase, 4 wire induction type energy meter.
 - d) Describe the method of measurement of medium resistance by using simple V-I method.
 - e) State any eight applications of digital multimeter.
 - f) With a neat circuit diagram, describe the working of dynamometer type 1-phase power factor meter.

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

16

- a) Draw a neat labelled diagram of megger showing constructional details.
- b) A single phase energy meter has a constant of 6000 rev./kwh. A test was carried out with resistive load for one minute during which meter disc makes 21 revolutions. The voltage was 110V and current 2A. Calculate the percentage meter error.
- c) Observe the following diagram Figure No. 1 and state the direction of rotation when phase sequence is
 - i) RYB
 - ii) BRY



Phase Sequence Indicator

Fig. No. 1

- d) Describe how LCR meter is used to measure capacitance.
- e) State the function and material used for following parts of Repulsion type Moving Iron instrument :-
 - i) Fixed coil
 - ii) Moving iron
 - iii) Iron ring
 - iv) Control spring

- f) State the effect of power factor on readings of two wattmeter in two wattmeter method for active power measurement in 3-phase balanced load for -
- i) p.f. = 0.5
 - ii) p.f. = 0 lag
 - iii) p.f. = 1.0
 - iv) p.f. = 0.4 lag.

6. Attempt any FOUR of the following:

16

- a) Describe the gravity control method to produce controlling torque in indicating instrument with neat diagram.
 - b) 'PMMC instrument can only measure D.C. quantities' Justify.
 - c) State the meaning of calibration of meters and explain concept of standard meters.
 - d) Draw a neat block diagram of CRO and state function of each block.
 - e) Describe working of ferrodynamic type frequency meter.
 - f) Draw a block diagram of function generator and give function of each block.
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