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EE/EX–303

B. E. (Third Semester) EXAMINATION, June, 2009

(New Scheme)

(Common for EE & EX Engg.)

ELECTRICAL INSTRUMENTATION

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all the *five* questions.

Unit – I

1. (a) Give classification of analog instruments. Discuss briefly operating principle, damping and controlling of each instrument. 10

   (b) A voltmeter and ammeter are used to determine the power dissipated in a resistor. Both the instruments are guaranteed to be accurate with ± 1% at full scale. If voltmeter reads 80 V on its 150 V range and ammeter reads 70 mA on 100 mA range, determine the limiting error for power calculation. 10

Or

2. (a) Define the following terms in reference to galvanometer : 10

   (i) Current sensitivity

P. T. O.

(ii) Voltage sensitivity

(iii) Megaohm sensitivity

(b) Explain the constructional features of flux meter. Also show that flux meter has no control torque. 10

Unit – II

3. (a) With the help of neat labelled diagrams explain briefly the construction and principle of operation of PMMC type meter. 10

(b) A 1 mA full scale permanent magnet moving coil meter with a coil resistance of 100 Ω is to be converted into (i) 0 – 1 A d.c. ammeter and 0·30 V d.c. voltmeter by connecting external series/parallel resistances. Show the connections and find out the values of external resistance. 10

Or

4. (a) Describe the construction and working of vibration galvanometer. 10

(b) Draw an illustrative diagram and explain the working of hot wire instrument. Why it is not normally used as a standard meter ? 10

Unit – III

5. (a) Describe any *one* method for testing of potential transformer. 10

(b) A current transformer having a single turn primary is rated at 500/5 A, 50 Hz with an output of 15 VA. At rated load with non-inductive burden, the in phase and quadrature components of the exciting mmf are 8 and 10 A respectively. The number of turns in the secondary is 98 and the resistance and leakage

reactance of the secondary winding are 0·35 Ω and 0·3 Ω respectively. Calculate the ratio and phase angle error. 10

Or

6. (a) Explain the construction and working of an electrodynamometer type of wattmeter. 10

(b) Prove that two wattmeters are sufficient for measurement of balanced by unbalanced load. 10

Unit – IV

7. (a) Describe in detail the working of a Trivector Meter. 10

(b) Explain the sources of errors and their compensation in single phase induction type energy meter. 10

Or

8. (a) Describe the construction and working of a co-ordinate type a. c. potentiometer. Explain how an unknown voltage can be measured with it. 10

(b) A standard cell of 1·0185 V is used with a simple potentiometer balance at 50 cm. Calculate : 10

(i) e. m. f. of the cell that balances at 72 cm.

(ii) the % error in voltmeter which balances at 64·5 cm when reading is 1·33 V.

Unit – V

9. (a) Explain the method of reversal for experimental determination of hysteresis loop. 10

(b) What are the various difficulties encountered in the measurement of high resistance ? Explain loss of charge method for measurement of insulation resistance. 10

P. T. O

Or

10. (a) What are the different methods of measurement of frequency in the power frequency range ? Explain the working of a mechanical resonance type frequency meter. 10

(b) Describe the constructional detail and working of a single phase electrodynamometer type of power factor meter. 10