14673

B. Tech 4th Semester Examination

Electrical and Electronic Measurements (O.S.)

EEE-4001

Time : 3 Hours   **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all selecting one question from each of the Sections A, B, C, and D and all the subparts of questions in Section E.

SECTION - A

1. (a) Draw a neat diagram of a moving iron ammeter and explain its operation. Comment on the resistance of this instrument. (10)

   (b) The resistance of a dc galvanometer is 20 Ω. Full scale deflection is produced by a current of 10 mA. (i) Find the value of series resistance to convert it into a voltmeter of 300 V range, (ii) Find the value of shunt resistance to convert it into an ammeter of 10 A range, (iii) Find the power required to operate the above voltmeter and ammeter. (10)

2. (a) In what ways can deflecting torque be produced for measurement? Name the instruments which are based on the different methods of producing deflecting torque. (15)

   (b) What is the purpose of damping torque in an indicating instrument? (5)

SECTION - B

3. (a) Give a neat sketch of a vibrating reed type frequency meter. Discuss its operation. (10)

   (b) The power input to a 3-ph delta connected motor is measured by two wattmeter method. The readings were 8.8 kW and 4 kW. The supply voltage is 400 V, find the power, power factor, line current and phase current. (10)

4. Describe the construction and operation of a single phase dynamometer power factor meter. In what respect is this instrument different from 3-ph meter? How would the accuracy of such an instrument be affected by frequency and waveform variation? (20)

SECTION - C

5. (a) What is meant by ratio error and phase angle error in the instrument transformer? (10)

   (b) Explain the effect of change in secondary burden and frequency in relation to a potential transformer. (10)

6. (a) Draw the equivalent circuit of a piezoelectric crystal connected to an amplifier and discuss its dynamic characteristics. (10)

   (b) Describe the working principle and use of an LVDT. (10)

SECTION - D

7. Draw the basic block diagram of a digital frequency meter, sketch the system waveforms, and carefully explain its operation. (20)

8. (a) Explain briefly vacuum tube voltmeter and compare its performance with transistor voltmeter. (10)

   (b) Discuss briefly the working of a general telemetering system, with the help of a block diagram. (10)

SECTION - E

9. (a) State the reasons why current transformer must never be operated on open circuit?

    (b) Why is the LVDT excitation frequency is kept high as compared to frequency of signal being detected?

    (c) Why resistance strain gages are used in pairs?

    (d) A strain gage has a resistance of 120 Ω unstrained and gage factor is -12. What is the resistance value if the strain is 1%?

    (e) List the advantages of electronic voltmeters over conventional type voltmeters.

    (f) Describe the noise and bandwidth restrictions in telemetry systems.

    (g) Name two types of CRT deflection systems.

    (h) Sketch circuit diagrams to show how a voltmeter and ammeter should be connected to measure a very high resistance?

    (i) How is the vars measurement different from watt measurement in a three phase circuit?

    (j) Describe the PWM and PPM terms used in telemetry systems.   (2×10=20)