[Total No. of Questions - 9] [Total No. of Printed Pages - 4]
(2063)

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B.Tech 4th Semester Examination

Electrical and Electronic Measurements

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 Section E is compulsory.

SECTION - A

1. (a) Discuss the principle of operation, construction, main features and applications of a moving coil instrument. **(10)**

   (b) The coil of a moving iron instrument has a resistance of 500 Ω and an inductance of 1 H. It reads 250 V when a direct voltage of 250 V is applied. What will it read when 250 V, 50 Hz ac is applied? The series resistance is 2000 Ω. **(10)**

2. Why is a controlling torque necessary in an indicating instrument? In what ways can it be provided? Which method is commonly used and why? **(20)**

SECTION - B

3. (a) What is the function of a synchroscope? Give a neat sketch of Weston synchroscope and explain its working. **(10)**

   (b) The power input to a 3-ph motor is measured by two wattmeter method. The readings were 300 kW and 100 kW. If the line voltage is 2000 V, find power input, power factor and line current. **(10)**

4. Describe the construction of an energy meter. Show that the sum of revolutions of the disc is proportional to the energy supplied. Give the various sources of errors and their compensation. **(20)**

SECTION - C

5. (a) Derive expressions for the ratio and phase angle errors of a current transformer. **(10)**

   (b) Draw the equivalent circuit and phasor diagram of a current transformer. **(10)**

6. (a) What is a strain gauge? Briefly discuss its construction and the method of measuring strain by using this device. **(10)**

   (b) Explain how thermocouples may be used for measurement of surface temperature of bodies and indicate the characteristics of thermocouple, which makes them suitable for such measurements. **(10)**

SECTION - D

7. Sketch and explain the basic circuits for converting inductance and capacitance into voltages for digital measurements. Discuss the specification and performance of a digital LCR meter. **(20)**

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

   (b) Draw the oscilloscope that occurs with two synchronized sine waves when (i) horizontal input has a frequency twice that of the vertical; input, and (ii) the ratio of vertical input frequency f_1 to horizontal input f_2 is f_1/f_2 = 3:2. **(10)**

SECTION - E

9. (a) For a CRO, describe astigmatism control.

   (b) Comment on the suitability of piezoelectric crystal for static and dynamic measurements.

   (c) List the different types of channels used for telemetry?

   (d) How does the input voltage frequency affect the dynamic response of a LVDT?

   (e) Describe the differences between bonded and unbounded piezo-resistive strain gauges.

(f) How errors can be reduced in instrument transformers?

(g) Describe the PWM and PPM terms used in telemetry systems.

(h) Why resistance strain gauges are used in pairs?

(i) Justify that a PMMC instrument can be used for ac and dc measurements.

(j) What is the function of shading rings in a wattmeter? **(2×10=20)**