

B.E.(EE) Part -II 4th Semester Examination, 2012
Electrical Measurements -II
(EE-401)

Time: 3 HRS.

Full Marks: 70

- i) Use separate Answerscript for each half.*
- ii) Answer SIX questions, taking THREE from each half.*
- iii) Two marks are reserved for neatness in each half.*

FIRST HALF

1 a) Explain the following terms:

i) instrumental error ii) limiting error iii) probable error

b) Limiting errors for a four dial resistance box are :

Unit : $\pm 0.2\%$

hundreds : $\pm 0.05\%$

Tens : $\pm 0.1\%$

thousands : $\pm 0.02\%$

If the value of resistance is set to 3425Ω , calculate the limiting error in resistance value.

[5+6]

2 (a) Draw the major blocks of an oscilloscope. Briefly explain the function of each block.

b) What is Lissajous pattern? Following Lissajous patterns are obtained on the CRO screen after applying the sinusoidal voltages across X and Y plates. If the frequency of the X-plate voltage is 50 Hz, what is the frequency of the Y -plate voltage for fig. 1(a) and fig. 1(b)?

[6+5]

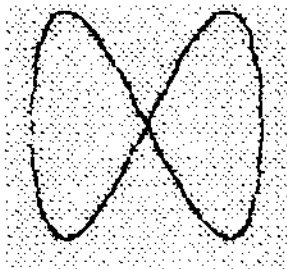


Fig. 1(a)

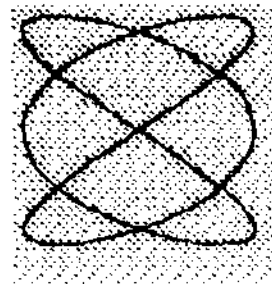


Fig. 1 (b)

- 3.a) What are the advantages of transistor voltmeter (TVM) over vacuum tube voltmeter? With neat sketch, describe the operation of FET input TVM for measurement of dc voltage.
- b) A voltage waveform as shown in fig.2 is applied to an average reading diode voltmeter having a scale calibrated in terms of rms values of a sine wave. Calculate the error in meter indication. [(2 + 4) + 5]

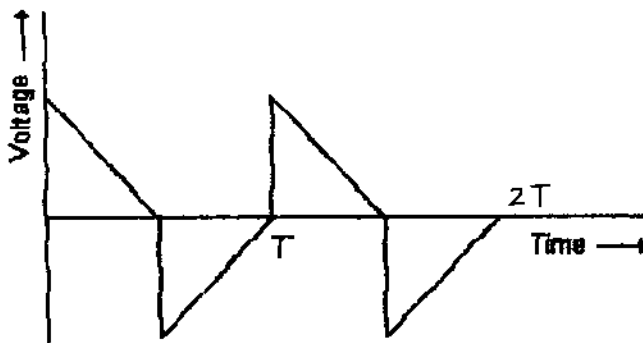


Fig. 2 : Voltage waveform

4. a) State the advantages of digital instrument over analog type instrument.
- b) Briefly describe the operating principle of a ramp type digital voltmeter.

[5 + 6]

5. Write short notes on any two of the following:

[2 × 5½]

- Electrostatic focusing of CRO
- True rms value electronic voltmeter
- Integrating type digital voltmeter

SECOND HALF

6. a) With a neat labeled sketch and phasor diagrams, explain the principle of operation of the "General Electric frequency meter".

b) Draw the schematic diagram and explain how the magnetic flux can be measured using *Ballistic Galvanometer*. [6+5]

7. a) What is Hall-effect? Prove that voltage appearing at opposite edges of the semi-conductor material is directly proportional to the flux density of the given magnetic field.

b) A flux meter is connected to a search coil of 100 turns and the mean area of the coil is $5 \times 10^{-4} \text{ m}^2$. The search coil is placed at the centre of a standard solenoid, 1 metre long, uniformly wound with 800 turns when a current of 5 amp is reversed, a deflection of 10 scale division is obtained with flux meter. Calculate the calibration constant of the instrument in wb-turns per division. [6+5]

8. a) Describe the method of measurement of the inductance of a coil having Q-factor, 0.15 (approx.) with the help of an a. c. bridge. Draw the modified diagram for the above measurement when Q-factor of the coil is 15 (approx.).

b) Discuss the effect of frequency in the above measurement. [6+5]

9. a) How the value of capacitance of an unknown loss-less capacitor is measured by a.c. bridge when R_a , R_b are the variable resistances and C_s is the value of standard capacitor, used in the bridge? [Other resistances (R_c , R_d , etc.) and capacitors (C_1 , C_2) etc. may be used if necessary].

b) Discuss how the potentiometers are classified. Explain the basic operating principle and uses of d.c. potentiometer, highlighting the necessary precautions taken. [6+5]

10. Write short notes on the following: [2 × 5^{1/2}]

a) Recorder

b) Drysdale Phase Shifting Transformer