PDFZilla – Unregistered

Total No. of printed pages = 6

EC 131305

Roll No. of candidate

2017

B.Tech. 3rd Semester End-Term Examination

Electronics and Communication

ELECTRONIC MEASUREMENT AND INSTRUMENTATION

Full Marks – 100   Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer Question No. 1 and any *six* from the rest.

1. Answer *all* the questions :   (10 × 1 = 10)

   (a) Wheatstone Bridge gives significant error while measuring low resistance. (True or False)

   (b) Maxwell Bridge is used to measure

   (i)   Light intensity

   (ii) Self inductance

   (iii) Capacitance

   (iv) Resistance

(c) Operational amplifiers (OP-AMPs) enhances the performance of traditional measuring techniques. (True / False)

(d) An ideal OP AMP should have

   (i) Infinite input impedance

   (ii) Zero output impedance

   (iii) Infinite open loop gain

   (iv) Flat frequency response over a wide range of frequencies

   (v) All of the above

(e) PMMC type instruments are used to measure AC quantities. (True / False)

(f) Digital voltmeter can be used to measure both AC and DC quantities. (True / False)

(g) The horizontal sweep in any oscilloscope is measured in volts per division (V/div). (True / False)

(h) Full form of CRO is ——————.

(i) The two types of coil present in electrodynamometer are —————— and fixed coil.

(j) Q-factor of a coil is

   (i) $\dfrac{R}{L}$

   (ii) $\dfrac{R}{X_L}$

   (iii) $\dfrac{X_L}{R}$

   (iv) $\dfrac{L}{R}$

2. (a) What is an Ohm meter? Explain briefly the working principle of a typical series type ohm meter with relevant circuits. (2 + 8 = 10)

   (b) A permanent magnet moving coil instrument has dimensions 15 mm × 12 mm. The flux density in the air gap is 1.8×10^{-3} Wb/m^2 and the spring constant is 0.14×10^{-6} Nm/rad. Determine number of twins required to produce an angular deflection of 90 degrees when a current of 5 mA is flowing through the coil. (5)

3. (a) Explain the working of Hay's bridge along with the circuit diagram and phasor diagram. (8)

   (b) Mention all the advantages and disadvantages of Owen's bridge. (7)

4. (a) Explain the process of measurement of capacitance by De Sauty's bridge. Write the sequence of steps followed in the measurement.

(8)

(b) A Maxwell capacitance bridge shown in figure is used to measure an unknown inductance in comparison with capacitance. The various values at balance are, $R_2 = 400\ \Omega$, $R_3 = 600\ \Omega$, $R_4 = 1000\ \Omega$, $C_4 = 0.5\ \mu F$. Calculate the values of R_1 and L_1. Also calculate Q factor if frequency is 1000 Hz.

(7)
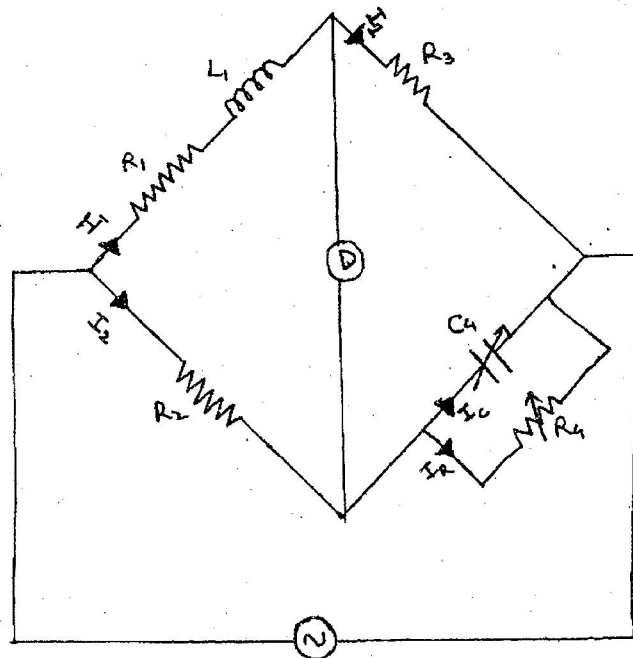
5. (a) Explain clearly how the time-base of CRO is generated. How the magnetic characteristic of a material can be displayed by CRO? Explain.

(4 + 4 = 8)

(b) List the basic components of a CRO. Describe the deflection mechanisms used in CRO.

(4 + 3 = 7)

6. (a) Define the terms :
   (i) Deflection sensitivity
   (ii) Deflection factor.
   What is the relation between the two?

(2 + 2 + 3 = 7)

(b) Draw the "Lissajous pattern" with equal frequency voltages and zero phase shift.

(8)

7. (a) Explain the operation of sample and hold circuit.

(5 + 5 + 5 = 15)

(b) Draw the circuit diagram of a typical (4×1) MUX and explain the role of SELECT line.

(c) Explain the consequence of absence of controlling torque.

8. (a) What do you mean by virtual ground of an Op-Amp? Derive the closed loop gain of an OP-AMP in non inverting mode.

(8)

(b) An OP-AMP which works in the non inverting mode has the following specifications :

(7)

Open loop gain = 200,000

Resistance at input end, $R_1 = 1\ k\Omega$

Resistance in the feedback loop, $R_f = 10\ k\Omega$

Output resistance $r_{oa} = 75\,\Omega$

Input resistance $r_{oi} = 2\,\text{M}\Omega$

Calculate the output and input resistances of the amplifier considering it as non ideal one.

9. (a) Explain the working of decade-down counter. Also show the timing diagram. (10)

(b) Draw the block diagram of a digital multimeter and write its working principle. (5)

——————