

**Total No. of Pages : 02**

**Total No. of Questions : 09**

**B.Tech.(Automation & Robotics) (2011 & Onward) (Sem.-5)**  
**ELECTRONICS MEASUREMENT AND INSTRUMENTATION**

**Subject Code : BTEC-404**

**Paper ID : [A2056]**

**Time : 3 Hrs.**

**Max. Marks : 60**

**INSTRUCTIONS TO CANDIDATES :**

1. **SECTION-A** is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

## SECTION-A

**Q1 Answer briefly :**

- Compare Hay's Bridge and Maxwell's Bridge.
- Write the working principle of a non planar display device.
- For the lissajous pattern shown in Fig.1 find out the frequency of vertical signal if frequency of horizontal signal is 3 KHz.

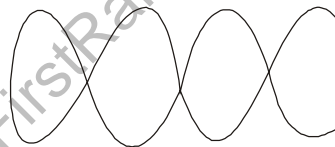


Figure - 1

- d. What will be the output on screen of CRO if a sinusoidal voltage is applied to vertical deflection plates but no voltage is applied to horizontal deflection plate?
- e. Explain the terms: Dissipation Factor and Q factor.
- f. What is the principle of harmonic distortion analyzer?
- g. What controls the frequency of the displayed signal on CRO? Explain.
- h. What are the various static and dynamic characteristics of instrumentation system?
- i. What do you understand by LVDT? Explain.
- j. Find the series equivalent inductance and resistance of the network that causes such a bridge to null with following bridge arms:  $\omega=3\text{KHz}$ , R and C in series of  $2\text{K}\Omega$  and  $1\mu\text{F}$  in one arm, two other opposite arms have  $10\text{K}\Omega$  in one and  $1\text{K}\Omega$  in other arm.

**SECTION-B**

- Q2 With the help of Block diagram and suitable waveforms explain Integrating type digital voltmeters.
- Q3 Explain the working and applications of Piezoelectric crystal.
- Q4 Explain the principle and various components used for magnetic recorders.
- Q5 How can the frequency be measured? Give its circuit and derive the relations.
- Q6 What is telemetry? Explain any two applications.

**SECTION-C**

- Q7 a) Give construction and working of PMMC instruments with torque equation. (7)
- b) A PMMC has a coil dimension of 17mm \*13mm. the flux density in the air gap is  $1.9 \times 10^{-3} \text{ Wb/m}^2$  and spring constant is  $0.17 \times 10^{-6} \text{ Nm/rad}$ . Determine the number of turns required to produce an angular deflection of  $90^\circ$  when a current of 7mA flows through the coil. (3)
- Q8 a) Explain the working of Schering bridge and derive an expression for measurement of unknown capacitance and its loss angle. Draw the phasor diagram under null conditions. (6)
- b) Determine the value of  $R_1$  and  $L_1$  of the inductor connected in Maxwell capacitance bridge circuit. One arm has  $C_4$  and  $R_4$  in parallel of  $0.5 \mu\text{F}$  and  $1 \text{ K}\Omega$ . Other two opposite arms have resistance of  $R_2 = 400\Omega$  and  $R_3 = 600\Omega$ . Also find the Q factor of the coil if  $f = 1 \text{ KHz}$ . (4)
- Q9 a) Explain the block diagram of CRO in detail. Give the application of CRO for measurement of phase and frequency. (6)
- b) The x-deflecting plates in a CRT are 15mm long and 16mm apart. The centre of the plates is 20 cm from screen. If  $E_a$  is 2500V. Find deflection sensitivity and deflection factor of CRT. (4)