Sl. No. of Ques. Paper : **956**   **G**

Unique Paper Code   : **251505**

Name of Paper   : **ELHT - 503 : Electronics Instrumentation**

Name of Course   : **B.Sc. (Hons.) Electronics**

Semester   : **V**

Duration :   : **3 hours**

Maximum Marks   : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt five questions in all.

Question No. 1 is compulsory.

All questions carry equal marks.

Non-programmable scientific calculators are allowed.

1. Answer any *five* in brief:

    (a) What are the advantages of using a shielded cable?

    (b) Explain the working principle of the transducer commonly used in a gas lighter.

    (c) Briefly explain short term stability errors in a frequency counter.

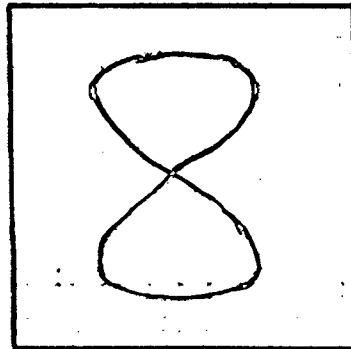   (d) Calculate the horizontal frequency from the given Lissajous patterns when the vertical frequency is 1·56 kHz.
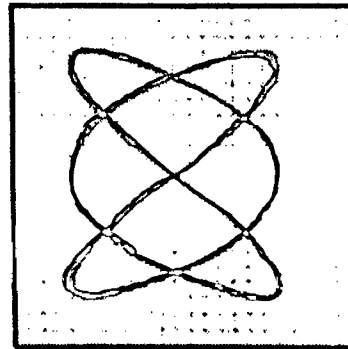

Fig. 1   Fig. 2

(e) Discuss the necessity and action of an active probe.

(f) What are limiting errors in measuring instruments? A 800 mA voltmeter is specified to be accurate with ± 1%. Calculate the limiting error when instrument is used to measure 300 mA.

                                                          3×5

2. (a) Explain, using the block diagram, the working principle of an integrating type of DVM. Also derive the mathematical relation for the voltage and time conversion.   5

(b) Design a multirange ammeter with range Of 0-1 A, 5 A and 10 A employing individual shunt in each. A D'Arsonval movement with an internal resistance of 500 Ω and a full scale deflection of 10 mA is available.   5

(c) The figure shows a simple series circuit of R_1 and R_2 connected to 100 V dc source. If the voltage across R_2 is to be measured by voltmeters having:

(i) a sensitivity of 1000 Ω/V and

(ii) a sensitivity of 20000 Ω/V,

find which voltmeter will read the accurate value of voltage across R_2 when both the meters are used on the 50 V range.   5
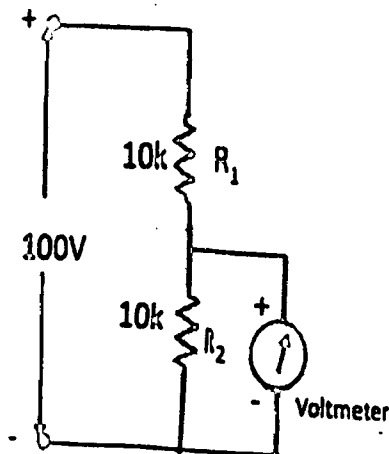
3. (a) Explain various sources of errors in frequency counter.   4

(b) Explain how Q-meter is used to measure low impedance components.   5

(c) Calculate the value of the multimeter resistor for a 50 V_{rms} ac rarge on the voltmeter as shown in the figure below: 6

$e_{in} = 50V_{rms}$ $R_s = 10k$

$I_{fsd} = 100\mu A$

$R_m = 100\Omega$
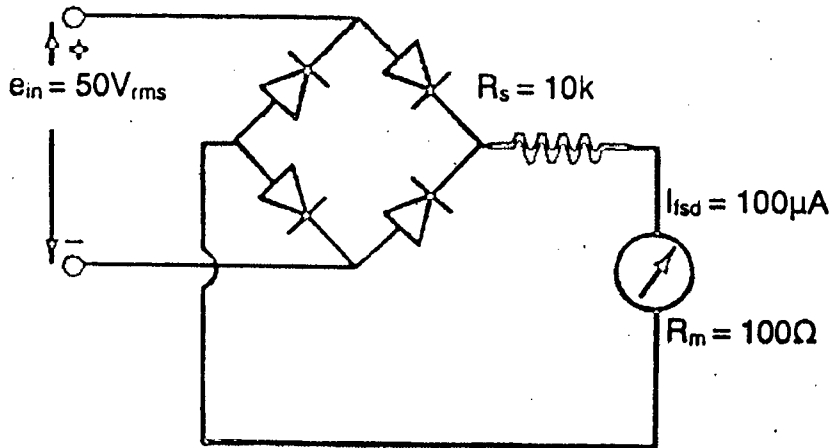
4. (a) Discuss how the preaccelerating anode, focussing anode, and accelerating anode form an electron lens in a cathode ray tube. 5

(b) Explain using block diagram the working principle and different operating modes of a Dual Trace CRO. 7

(c) Why and where are delay lines used in a CRT? 3

5. (a) Why do special probes need to be manufactured for measurement involving:

(i) High voltage

(ii) RF? 6

(b) State the working principle of a heterodyne wave analyzer. 6

(c) What is the advantage of an Electrodynamometer over a PMMC meter? 3

6. (a) Give the block diagram of lab type function generator and explain how it is used to generate different waveforms. 6

(b) Explain the working of RTD. How can RTD be used in a Wheatstone bridge to calculate an unknown impedance? 5

(c) Which sensor will you prefer to observe temperature in the range of 1000 Deg C to 1500 Deg C and why? 4

7. (a) Explain the working of bonded resistance wire strain gauge. 6

(b) A resistance strain gauge with K=2 is mounted on a steel plate under a strain of 1.0E-6. Calculate the change in resistance with the original resistance of the gauge 130Ω. 3

(c) Differentiate between a thermistor and a thermocouple. Give an application for both. 6