

30/11/19 M

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 7570

J

Unique Paper Code : 32223904

Name of the Paper : Basic Instrumentation Skills

Name of the Course : B.Sc. (Hons.) / B.Sc. (Prog.) :
SEC

Semester : III

Duration : 3 Hours

Maximum Marks : 50

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all.
3. Question No. **1** is compulsory.

1. Attempt any five of the following :- (5×2=10)

(a) Make the block diagrams of basic dc-voltmeter & dc-ammeter using PMMC meter.

(b) What is the harmonic distortion?

(c) Draw the blockdiagram of an AC millivoltmeter.

P.T.O.

(d) How many significant figures are there in the following numbers?

(i) 864.39

(ii) 0.00015

(e) What is automatic polarity indication in DVM?

(f) What are the Lissajous figures?

(g) What are the main physical quantities measured with the following bridges?

(i) Maxwell Bridge

(ii) Hay Bridge

(iii) Schering Bridge

(iv) Wien Bridge

2. (a) Determine the expression for the log error in the calculation of η using the formula

$$\eta = \frac{\pi P r^4 t}{8 l V}$$

Where symbols have their usual meanings.

(b) The expected value of the voltage across a resistor is 80 V. However, the measurement gives a value of 79 V. Calculate

(i) Absolute error

(ii) % error

(iii) Relative accuracy

(iv) % accuracy

(v) % error expressed as percentage of full scale reading. (5,5)

3. (a) Write the applications of CRO.

(b) Explain the principle of working of Digital Storage Oscilloscope. (4,6)

4. (a) Explain the pulse characteristics with terminology.

(b) Explain the working of Sine Wave generator with help of a block diagram. (3,7)

5. (a) Compare between analog multimeter and digital multimeter.

(b) Draw the basic circuit diagram for a Q-meter.

Explain its operation and write the equation for Q-meter. (3,7)

6. (a) In AC bridge, prove that the balance condition.

$$Z_1 Z_4 \angle \theta_1 + \theta_4 = Z_2 Z_3 \angle \theta_2 + \theta_3$$

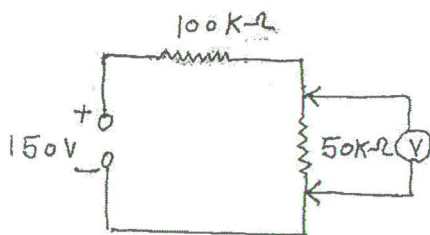
Where Z_1, Z_2, Z_3 & Z_4 are the magnitudes of complex impedances & $\theta_1, \theta_2, \theta_3$ & θ_4 are phase angles.

- (b) Discuss the principle of working of De-Sauty's bridge for the measurement of capacitance.

(6,4)

7. (a) Define voltmeter sensitivity & Discuss the Loading Effect.

- (b) It is desired to measure the voltage across the $50 \text{ K } \Omega$ resistor in the following circuit. Two voltmeters are available for this measurement: Voltmeter A with a sensitivity $1,000 \text{ } \Omega/\text{V}$ and Voltmeter B with a sensitivity of $20,000 \text{ } \Omega/\text{V}$. Both meters are used on their 50-V range. Calculate the reading of each meter :



(5,5)

(1200)