Sr. No: 321410

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B.Sc. (H) PHYSICS SEMESTER -IV

Basic Instrumentation Skills (SECP-03)

Time: 3 Hours **Max. Marks:75**

Instructions:
1. *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
2. *Answer any four questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART -A

Q1 (a) Distinguish between precision and accuracy of an instrument? (1.5)

(b) Can a multimeter be used for measuring very low resistances? What are the limitations in such measurements? (1.5)

(c) List the advantages of digital instruments over analog instruments. (1.5)

(d) What are the advantages of an electronic voltmeter over conventional voltmeter? (1.5)

(e) What is the difference between regulated and unregulated power supply? (1.5)

(f) Calculate the value of multiple resistance on the 50 V range of a dc voltmeter that uses a 500 μA meter movement with an internal resistance of 1 kΩ (1.5)

(g) What is the role of Visual persistence in CRO? (1.5)

(h) What are the different types of AC millivoltmeter? (1.5)

(i) Draw the block diagram of a digital multimeter (1.5)

(j) Discuss the frequency ratios of two signals on the basis of the Lissajous patterns formed. (1.5)

PART -B

Q2 (a) Explain the principles of measurement of dc voltage, dc current, ac voltage, ac current and resistance by using a multimeter. (10)

(b) Discuss the loading effect of a multimeter with the help of an example. (5)

Q3 (a) Draw the block diagram of electronic voltmeter and explain its working principle. (10)

(b) Explain the working principle of digital voltmeter. (5)

Q4 (a) Explain how the frequency, voltage, and phase difference is measured using a CRO. (10)

(b) What are the Lissajous figures? Discuss how they are produced in a dual channel CRO. (5)

Q5 (a) Explain the working principle of DSO. (10)

(b) A Maxwell Bridge is used to measure inductive impedance. At balance, the bridge constants are $C_1 = 0.01$ μF, $R_1 = 470$ kΩ, $R_2 = 5.1$ kΩ, $R_3 = 100$ kΩ. Find the series equivalent of unknown impedance. (5)

Q6 (a) Draw the Circuit of Anderson's Bridge and derive the balancing conditions. (10)

(b) A De-Sauty's bridge is operating at 1 kHz frequency. The constants for the bridge are $R_1 = 4\ k\Omega$, $R_2 = 2\ k\Omega$ and $C_1 = 3\ \mu F$. Find the value of the other capacitor C_2. (5)

Q7 (a) Draw the Block diagram of a CRO. Give the specifications of CRO. Explain the functioning of its horizontal deflection system. (10)

(b) Briefly discuss the role of 'Time Base circuit' and 'synchronization circuit' in CRO. (5)

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