

20/01

Roll No. ....

Total Pages : 3

**321404**

**May 2023**

**B.Sc. (Physics) IV SEMESTER**

**Basic Instrumentation Skills (SECP-03A)**

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**

1. (a) Define the terms voltage, current and resistance. (1.5)
- (b) A boy measured the area of a rectangle plot to be 468 cm<sup>2</sup>. But the actual area of the plot has been recorded as 470 cm<sup>2</sup>. Calculate the percentage error of his measurement. (1.5)
- (c) What are the advantages of digital voltmeter over analog voltmeter? (1.5)
- (d) Define sensitivity of an instrument. Give an example. (1.5)
- (e) Define working principle of basic balancing type bridge. (1.5)
- (f) Explain briefly CRO probes. (1.5)

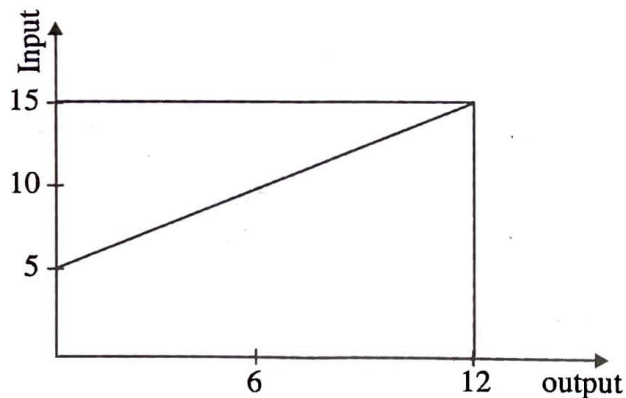
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- (g) On what factors the time of measurement of a multimeter depends? (1.5)
- (h) Define deflection sensitivity of cathode ray tube. (1.5)
- (i) Why electronic voltmeter is preferred over PMMC voltmeter? (1.5)
- (j) Define digital storage oscilloscope. (1.5)

### PART-B

2. (a) Differentiate between accuracy and precision with an example. (5)
- (b) What are instrument errors? Explain its types. Calculate linearity error for input  $x = 6$  units. Given that at  $x = 6$  units, output  $y$  is 11 units. (10)



3. (a) A general measuring system has the following errors : transducer  $\pm 2\%$ , signal conditioner  $\pm 3\%$ , recorder  $\pm 4\%$ . Calculate the maximum possible error and the probable error. (5)

- (b) What is digital multimeter and its working principle? Explain with diagram. (10)
4. What is the main difference between an AC Voltmeter and a DC Voltmeter? Explain the difference with a block diagram. Explain all three types of AC Voltmeters in detail with their circuit diagrams. (15)
5. (a) Define Q meter. Explain its working with circuit diagram. (5)
- (b) Explain with diagram how RLC bridge is used to measure unknown value of a resistance, inductance and capacitance. (10)
6. (a) Draw a block diagram of CRO. Explain the construction and working of cathode ray tube with a neat labelled diagram. (10)
- (b) The deflection sensitivity of a CRT is  $0.03 \text{ mm/V}$ . If an unknown voltage is applied to horizontal plates, the spot shifts 3 mm horizontally. Find the value of unknown voltage. (5)
7. Write short notes on the following :
- (a) Voltage and frequency measurement by CRO.
- (b) Digital Voltmeter.
- (c) Errors in measurements. (15)