

B.Sc.- I (NEP) Semester-I
SEC14 / STUG01PHY004 - Physics - Laboratory and Techniques

P. Pages : 3

Time : Two Hours



GUG/S/25/15898

Max. Marks : 40

Either:

1. A) i) Why are safety protocols essential in a laboratory environment? Explain importance of Personal Protective Equipment (PPE). 3
- ii) What is the difference between precision and accuracy in experimental measurements. 2
- iii) Write short note on Vernier Caliper and oscilloscope with neat diagram. 3

OR

- B) a) How does safety protocols minimize risk in research laboratories? 2
- b) What are the primary sources of error that can affect the precision of a measurement? 2
- c) What steps can be taken to improve the accuracy of experimental results? 2
- d) Write notes on Fire extinguisher and eyewash stations. 2

Either:

2. A) i) What is the significance of having a clear, testable hypothesis in experimental design? How does it guide the direction of research? 3
- ii) How do time limitations impact the design of an experiment? 2
- iii) What is calibration and why is it essential for instrument accuracy? 3

OR

- B) a) What are calibration standards? What types of standards are commonly used? 2
- b) State any four commonly used experiment to do in physics laboratory with their used. 2
- c) What are the primary functions of common laboratory instruments used in physics experiments? 2
- d) Why is calibration important before using an instrument? 2

Either:

3. A) i) Define direct and indirect measurement. Explain with examples where direct and indirect measurements are commonly used. 4
- ii) What are the main characteristics that define sensor performance? How do these characteristics affect the selection of a sensor for a specific application? 4

OR

- B) a) What is comparative measurement? How does it differ from direct and indirect measurement? 2
- b) What is the difference between systematic and random errors? 2
- c) Discuss random error in measurement. 2
- d) How can practical exercises enhance understanding of error analysis in measurements? 2

Either:

4. A) i) What are the main statistical techniques used for analyzing experimental data? Why is it important to apply both descriptive and inferential statistics in experimental data analysis? 5
- ii) How can histograms be used to compare different datasets? What are limitations of histograms in data visualization? 3

OR

- B) a) What controls and statistical tests might be employed to demonstrate causality? 2
- b) How do different types of data influence the choice of visualization technique? 2
- c) How do correlation and regression differ in their approaches to analyzing relationships between variables? 2
- d) How does one evaluate the accuracy, precision and validity of a dataset? 2

5. Attempt **any eight** questions from following.

- a) Which of the following is not considered Personal Protective Equipment (PPE)? 1
- i) Safety goggles ii) Lab coat
- iii) Gloves iv) Fire Extinguisher
- b) Which instrument is used to separate light into its component wavelengths in a laboratory? 1
- i) pH meter ii) Centrifuge
- iii) Spectrophotometer iv) Burette
- c) Which unit of measurement is typically used in micrometer? 1
- i) Kilograms ii) Millimeters
- iii) Meters iv) Microns (μm)
- d) What is primary purpose of calibrating an instrument? 1
- i) To make it look new
- ii) To ensure accuracy in measurements
- iii) To reduce the cost of operation
- iv) To enhance its aesthetic appeal
- e) Which of the following is a critical step before operating any laboratory instrument? 1
- i) Cleaning the instrument ii) Reading the manual
- iii) Ensuring proper calibration iv) All of the above

