

B.Sc. Semester - 5 (NEP-2020) Examination**Oct/Nov - 2025****BOT: Instrumentation and Methodology (Theory) (Minor-4)****Time: 2:00 Hours****Marks:50****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

- Que.1(A) Answer in Detail (Any One) (08)
- 1) Explain the design and working procedure of a Laminar Air Flow Cabinet. What are its applications in microbiology, tissue culture, and laboratory settings?
 - 2) Describe the principle and procedure of growing microbial culture in an incubator.
- Que.1(B) Answer in Brief (Any One) (04)
- 1) Difference between Autoclave and Oven.
 - 2) Describe the design and applications of a centrifuge.
- Que.2(A) Answer in Detail (Any One) (09)
- 1) What is PCR? Explain the steps involved in the propagation of single-stranded DNA using Polymerase Chain Reaction.
 - 2) Describe the methods of pigment separation by Thin Layer Chromatography (TLC) and explain its significance.
- Que.2(B) Answer in Brief (Any One) (04)
- 1) Explain the step-by-step procedure of Agarose Gel Electrophoresis?
 - 2) Describe the block preparation and staining methods used in microtomy.
- Que.3(A) Answer in Detail (Any One) (08)
- 1) What is an E-Herbarium? How does it differ from traditional herbarium methods? What are the advantages of using an E-Herbarium?
 - 2) Write a detailed field or laboratory report on a hypothetical visit to a wetland ecosystem. Your answer should include an Introduction, the Methods followed, the Results obtained, and the Conclusion drawn from your visit.
- Que.3(B) Answer in Brief (Any One) (04)
- 1) What are four simple field equipment used in botanical studies, and what are their uses?
 - 2) Why are field studies important in ecological and environmental research?
- Que.4(A) Answer in Detail (Any One) (09)
- 1) Compute the standard deviation for the following data:
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|-----------------|-------|-------|-------|-------|-------|-------|-------|--------|
| Class Intervals | 20–30 | 30–40 | 40–50 | 50–60 | 60–70 | 70–80 | 80–90 | 90–100 |
| Frequency | 30 | 58 | 62 | 85 | 112 | 70 | 57 | 26 |
- 2) A cross between two heterozygous pea plants resulted in the production of 1600 offspring in the F₂ generation. The observed phenotypic distribution is as follows: 940 yellow round, 260 yellow wrinkled, 340 green round, and 60 green wrinkled. Using the Chi-square (χ^2) test, determine whether these observed values significantly deviate from Mendel's expected dihybrid phenotypic ratio of 9:3:3:1. (Given: Table value of χ^2 at 5% significance level = 7.81)
- Que.4(B) Answer in Brief (Any One) (04)
- 1) What are the merits and demerits of mode and standard deviation as statistical measures?
 - 2) Differentiate between mean and median.