

Core IV

Logic and Scientific Method Introduction

This Course on Logic and Scientific Method provides students with a foundation in critical thinking, reasoning, and the scientific method. Throughout the course, students would engage in theoretical discussions on logical and scientific reasoning and how to apply them to real-world problems with examples. Assignments might include analyzing scientific articles, designing experiments, and critically evaluating research methodologies.

Course Outcomes:

- Understanding of the nature and scope of Logic.
- Knowledge of the kinds of propositions and the relationship between them.
- Ability to construct sound arguments.
- Testing validity of arguments.
- Understanding of the role of logic in scientific inquiry.

Learning Outcome:

Unit-I The learning outcomes of Unit I aim to equip students with a solid foundation in logical reasoning, critical thinking, and argumentation, providing them with essential skills for analyzing and evaluating information, constructing coherent arguments, and engaging in rational discourse across various domains.

Unit-II The learning outcomes of Unit II aim to equip students with the foundational skills necessary for logical analysis and argumentation, enabling them to identify and evaluate propositions accurately, analyze arguments effectively, and communicate ideas clearly and logically.

Unit-III The learning outcomes of Unit III aim to equip students with the skills necessary for advanced logical analysis and argumentation, enabling them to identify and evaluate deductive arguments accurately, analyze syllogisms effectively, and apply logical reasoning in various academic and professional contexts.

Unit-4 The learning outcomes of Unit IV aim to equip students with the skills necessary for effective scientific inquiry, enabling them to apply inductive reasoning methods, evaluate causal claims, and draw informed conclusions based on empirical evidence. Additionally, students should enhance their critical thinking abilities, enabling them to engage critically with scientific literature and make reasoned judgments about the validity and reliability of scientific findings.

Course Components:

Unit-I: Definition, Nature, and Scope of Logic, Laws of Thought, Deductive and Inductive Arguments, Validity & Soundness of Arguments.

Unit-II: Sentence and Proposition, Classification of Propositions (from the standpoint of Quality & Quantity), Transforming ordinary sentences to propositions, Distribution of terms, Seven-fold relation of propositions, Square of opposition of propositions,

Unit-III: Inference-Immediate Inference (Conversion and Obversion), Mediate

Inference (Syllogism): Figure & Moods, Testing of Validity of Arguments by Syllogistic Rules.

Unit-4: Inductive Reasoning & Scientific Enquiry: Causation, Mill's Five Experimental Methods.

Prescribed Book:

- ✓ *Morris R. Cohen & Ernest Nagel, Introduction to Logic & Scientific Method, Allied Publishers Ltd., New Delhi.*
- ✓ *Ganesh Prasad Das, Basics of Logic, Pt. I & Pt. II, Pancashila, Bhubaneswar, 2007.*

Reference Books:

- ✓ *Cohen Copi & Mac Mahan, Introduction to Logic (14th Edition)*
- ✓ *Alex Rosenberg, Philosophy of Science: A Contemporary Introduction.*

E-Resource:

- ✓ <https://egyankosh.ac.in/bitstream/123456789/37950/1/Unit-1.pdf>
- ✓ <https://egyankosh.ac.in/bitstream/123456789/84670/1/Unit-3.pdf>
- ✓ <https://youtu.be/4TFzqxntqv8?si=4L-gHoffnGG12eGN>
- ✓ <https://youtu.be/Wvae-B0MTSE?si=cWisIEy6mdqgNn9G>
- ✓ *Sample Questions: I for Part- I Objective; Part- II Very Short Type (in 50 Words); Par-III Short Type (in 250 Words); Par-IV Long Type (in 800 Words);*

Unit-1:

- 1- Truth is the property of a _____.
- 2- What Is the Logical Definition of a term?
- 3- What are the principles of logic?
- 4- State and explain the nature and scope of Logic.

Unit-2

- 1- According to the principle of Quality, there are _____ kinds of propositions.
- 2- What is the distribution of terms?
- 3- Discuss the seven-fold relation of propositions.
- 4- What is the square of the opposition of propositions? Discuss.

Unit -3

- 1- The Obverse of the 'E' proposition is _____.
- 2- What Is an inference?
- 3- Explain the rules of conversion.
- 4- What is a Syllogism? Explain all the Syllogistic Rules.

Unit-4

- 1 - An Inductive Argument passes from known to _____.
- 2-What is inductive reasoning?
- 3- Explain the distinction between 'The Law of Uniformity of Nature' and 'The Law of Causation'.
- 4- Explain Mill's Joint Method of Agreement and Difference.