

**B.Sc. (Mathematics) (Part I) (Level 4.5)(Semester – II)**  
**(NEP-2020)**  
**Syllabus to be implemented from Academic Year 2024-25**

<b>Course type</b>	:	<b>DSC – IV</b>
<b>Title of course</b>	:	<b>Discrete Mathematics</b>
<b>Credit</b>	:	<b>02</b>

- Course Learning Outcomes:** Upon successful completion of the course students will able to:
- CO 1. analyze the logical structure of statements symbolically, including the proper use of logical connectives, predicates, and quantifiers.
  - CO 2. construct truth tables, prove or disprove a hypothesis, and evaluate the truth of a statement using the principles of logic.
  - CO 3. understand and apply the fundamental concepts in graph theory.
  - CO 4. acquire the basic knowledge of graphs namely vertex, edge, special types of graph, isomorphic graphs, matrix representation of graphs.

**Unit- 1 Propositional Calculus**

**(15 hrs.)**

**1.1 Revision**

- 1.1.1 Propositional Logic.
- 1.1.2 Propositional equivalence.

**1.2 Predicates and Quantifiers:**

- 1.2.1 Predicate, n-place Predicate, n-ary Predicate.
- 1.2.2 Quantification and Quantifiers, Universal Quantifier, Existential Quantifier, Quantifiers with restricted domains.
- 1.2.3 Logical Equivalence involving Quantifiers.

**1.3 Rules of Inference:**

- 1.3.1 Argument in propositional Logic.
- 1.3.2 Validity Argument (Direct and Indirect methods)
- 1.3.3 Rules of Inference for Propositional Logic.
- 1.3.4 Building Arguments

- 1.4 Numerical Problems based on 1.2 to 1.3

**Unit- 2 Graph Theory**

**(15 hrs.)**

**2.1 Graphs:**

- 2.1.1 Basic Terminology
- 2.1.2 Special types of Graphs (Complete graph, Regular graph, Bipartite and complete Bipartite graph)
- 2.1.3 Isomorphism
- 2.1.4 Adjacency and Incidence Matrix of Graph
- 2.1.5 Problems based on 2.1.2 to 2.1.4

**2.2 Operations on Graph:**

- 2.2.1 Subgraphs, vertex deletion, Edge addition.
- 2.2.2 Complement of a graph and self-complementary graphs.
- 2.2.3 Union, Intersection and Product of graphs.
- 2.2.4 Problems based on 2.1.1 to 2.1.3

**Recommended Book:**

1. Discrete Mathematics, S. R. Patil , M. D. Bhagat , R. S. Bhamare, S. M. Waingade, N. M. Phatangare and K. D. Masalkar, Nirali Prakashan, Pune.

**Reference Books:**

1. Discrete Mathematics, D. S. Malik and M. K. Sen, Cengage Learning India Pvt. Ltd, New Delhi.
2. Discrete Mathematical Structures (sixth edition), Kolman, Busby, Ross, Pearson Education (Prentice Hall).
3. Introduction to Graph Theory, Mamta Chaudhary, Vani Sharma and Pooja Yadav, Sultan Chand & Sons, Educational Publishers, New Delhi.
4. Schums Outline of Discrete Mathematics, Seymour Lipschutz, Marc Lipson, Revised Third Edition-McGraw-Hill (2009).