

## Discrete Mathematics - Question Paper

1. Define and give an example of a set and its types.
2. Prove that the union and intersection of sets are associative and commutative.
3. What is a Cartesian product of two sets? Give an example.
4. Explain relations and functions with examples.
5. Prove that the composition of functions is associative.
6. Define a partially ordered set (poset) and give an example.
7. What are equivalence relations? Provide an example.
8. Define logical equivalence and prove De Morgan's laws using truth tables.
9. Explain the principle of mathematical induction with an example.
10. Define graphs and explain different types of graphs with examples.
11. Explain Eulerian and Hamiltonian graphs with conditions and examples.
12. Define trees and explain the properties of trees in graph theory.
13. What is a spanning tree? How is it related to a connected graph?
14. Explain the concept of Boolean algebra with its postulates and laws.
15. Design a logic circuit using AND, OR, and NOT gates for the expression  $(A + B')C$ .