



# GRAPH THEORY

## **PROF. SOUMEN MAITY**

Department of Mathematics  
IISER Pune

**INTENDED AUDIENCE :** B.Sc, M.Sc, B.Tech, M.Tech students

**INDUSTRIES APPLICABLE TO :** It will be recognized by several industries & academic institutes

## **COURSE OUTLINE :**

Graph theory began in 1736 when the Swiss mathematician Euler solved Konigsberg seven-bridge problem. It has been two hundred and eighty years till now. Graph theory is the core content of Discrete Mathematics, and Discrete Mathematics is the theoretical basis of computer science and network information science. This course introduces in an elementary way some basic knowledge and the primary methods in Graph Theory.

## **ABOUT INSTRUCTOR :**

Prof. Soumen Maity is an Associate Professor of Mathematics at Indian Institute of Science Education and Research (IISER) Pune. He received a PhD from the Theoretical Statistics & Mathematics Unit at Indian Statistical Institute (ISI) Kolkata, India in 2002. He has postdoctoral experience from Lund University, Sweden; Indian Institute of Management (IIM) Kolkata, India; and University of Ottawa, Canada. Prior to joining IISER Pune in 2009, he worked as Assistant Professor at IIT Guwahati and IITKharagpur.

## **COURSE PLAN :**

**Week 1:** Paths, Cycles, Trails, Eulerian Graphs, Hamiltonian Graphs

**Week 2:** Bipartite graphs, Trees, Minimum Spanning Tree Algorithms

**Week 3:** Matching and covers

**Week 4:** Maximum matching in Bipartite Graphs

**Week 5:** Cuts and Connectivity

**Week 6:** 2-connected graphs

**Week 7:** Network flow problems, Ford-Fulkerson algorithm

**Week 8:** Planar graphs; Coloring of graphs