IISER Pune - Course Content

Semester	AUG 2024
Open to Semester	5,7,31,33,21,22,11
Course Code	MT3154
Course title	Graph Theory
Nature of Course	LE - Lecture
Credit	4
Coordinator and participating faculty (if any)	**Dr. Soumen Maity**
Pre-requisites	Nil
Objectives	This course is an introduction to the theory of graphs intended for students of mathematics and other sciences. The course introduces in an elementary way some basic knowledge and primary methods in graph theory. We start from basic definitions and examples, but hope to move on quickly and cover a broad range of topics.
Course content	The Basics: graphs, paths and cycles, connectivity, trees and forests, bipartite graphs, diameter of a graph, Euler tours, Hamiltonian graphs. Matching and Covers: Maximum bipartite matching algorithms, Konig*s Theorem, Independent Set, Matching in general graphs. Cuts and Connectivity: 2-connected Graphs, Menger*s theorem* Network Flow: Max-flow Min-cut and the Ford-Fulkerson algorithm. Planar Graphs: drawing, Euler*s formula, Kuratowski*s theorem, plane duality. Colouring: colouring maps and planar graphs, colouring vertices, colouring edges. Additional Topics: Cayley graph, Spectrum of a graph, Perfect graphs, Turan’s Theorem, Ramsey Theorem.
Evaluation / Assessment	Mid-Semester Exam: 35% End-Semester Exam: 45% Others: 20%
Suggested readings	1. Introduction to Graph Theory: D.B. West (2001) Prentice Hall

	2. Graph Theory: F. Harary (1969) Addison-Wesley 3. Modern Graph Theory: B. Bollobas (2008) Springer 4. Graph Theory: R. Diestel (2006) Springer 5. Graphs: C. Berge (1989) North-Holland
When Next	2025
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