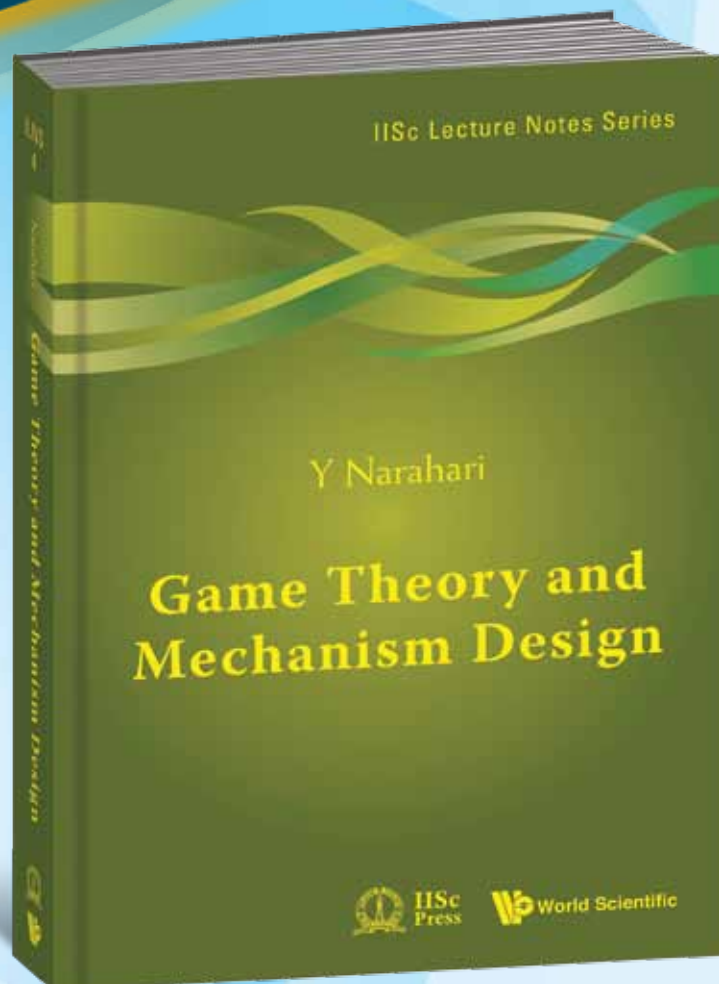


“ I am very pleased that Y. Narahari has written this lovely text, which presents the fundamentals of game theory and mechanism design clearly and concisely. In doing so, Dr. Narahari has performed a great service to students and researchers interested in the lively interface between engineering sciences and economics. ”

- Professor Eric Maskin, Harvard University
Nobel Laureate in Economic Sciences - 2007

Key Features:

- First of its kind to include a balanced treatment of non-cooperative game theory, cooperative game theory, as well as mechanism design
- Incorporates a large number of apt, illustrative examples to facilitate an immediate and comprehensive understanding of the concepts and ideas
- Examples chosen carefully from traditional and modern topics in computer science, networks, and microeconomics
- Includes biographical sketches of leading game theorists at appropriate places



IISc Lecture Notes Series - Volume 4

Game Theory and Mechanism Design

by Y Narahari (Indian Institute of Science, India)

This book offers a self-sufficient treatment of a key tool, game theory and mechanism design, to model, analyze, and solve centralized as well as decentralized design problems involving multiple autonomous agents that interact strategically in a rational and intelligent way. The contents of the book provide a sound foundation of game theory and mechanism design theory which clearly represent the “science” behind traditional as well as emerging economic applications for the society.

The importance of the discipline of game theory has been recognized through numerous Nobel prizes in economic sciences being awarded to game theorists, including the 2005, 2007, and 2012 prizes. The book distills the marvelous contributions of these and other celebrated game theorists and presents it in a way that can be easily understood even by senior undergraduate students.

A unique feature of the book is its detailed coverage of mechanism design which is the art of designing a game among strategic agents so that a social goal is realized in an equilibrium of the induced game. Another feature is a large number of illustrative examples that are representative of both classical and modern applications of game theory and mechanism design. The book also includes informative biographical sketches of game theory legends, and is specially customized to a general engineering audience.

After a thorough reading of this book, readers would be able to apply game theory and mechanism design in a principled and mature way to solve relevant problems in computer science (esp, artificial intelligence/machine learning), computer engineering, operations research, industrial engineering and microeconomics.

Contents:

Introduction.

Part 1: Non-Cooperative Game Theory: Key Notions; Extensive Form Games; Strategic Form Games; Dominant Strategy Equilibria; Pure Strategy Nash Equilibria; Mixed Strategy Nash Equilibria; Utility Theory; Matrix Games; Existence of Nash Equilibrium; Computation of Nash Equilibrium; Complexity of Computing Nash Equilibria; Bayesian Games.

Part 2: Mechanism Design: Mechanism Design Environment; Implementation of Social Choice Functions; Incentive Compatibility and Revelation Theorem; Gibbard Satterthwaite Theorem; Vickrey-Clarke-Groves Mechanisms; Quasilinear Mechanisms; Auctions; Optimal Auctions Sponsored Search Auctions; Implementation in Ex-Post Nash Equilibrium; Further Topics in Mechanism Design

Part 3: Cooperative Game Theory: Correlated Strategies and Correlated Equilibrium; Nash Bargaining Theory; Coalitional Games (TU Games); The Core; Shapley Value; Other Solution Concepts in Cooperative Game Theory; Matching Algorithms Epilogue; Mathematical Appendix

Readership: Senior undergraduate, first year master's, and first year research students, academics and industrial researchers in computer science, computer engineering, networks and communications, artificial intelligence/machine learning, networks, communications, operations research, industrial engineering, management science, and microeconomics.

