INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

Course Title	Game Theory		Course No	To be filled by the office		
Specialization	Electronics Engg		Structure (IPC)	3	0	3
Offered for	B. Tech. (all disciplines) DD (all disciplines) M. Des. (all disciplines)		Status	Core ☐		Elective ◼
Course Objectives	The primary goal of this course is to introduce Game Theory as a tool to solve problems in which rational agents interact and make a decision. The course aims at formulating problems as games, and explains the solution concepts like Nash equilibrium. Also, the importance of cooperation in various decision making problems is emphasized.					
Course Outcomes	At the end of the course, the students are expected to 1. Formulate various engineering problems as games 2. Analyze the strategic interactions in games 3. Design games (or mechanisms) that yield social optimal solutions 4. Use cooperative game models to solve various engineering problems 5. Analyze/apply bargaining principles to resource sharing problems					
Contents of the course	**Noncooperative Game Theory: (15)** Introduction to Game Theory, Extensive Form Games and Strategic Form Games, Dominant Strategy Equilibria, Pure Strategy Nash Equilibrium and Mixed Strategy Nash Equilibrium, Von Neumann - Morgenstern Utility Theory, Rationalizable Strategies, Sperner's Lemma, Fixed Point Theorems, and Existence of Nash Equilibrium, Computation of Nash Equilibrium, Complexity of Computing Nash Equilibrium, Matrix Games (Two Player Zero sum Games), Bayesian Games, Subgame Perfect Equilibrium **Mechanism Design: (15)** Introduction to Mechanism Design, Social Choice Functions and Mechanisms, Incentive Compatibility and Revelation Theorem, Properties of Social Choice Functions, Gibbard Satterthwaite Theorem and Arrow Impossibility Theorem, Quasilinear Mechanisms, Vickrey-Clarke-Groves Mechanisms, Bayesian Incentive Compatible Mechanisms, Revenue Equivalence Theorem, Optimal Auctions and Myerson Auction, Case Study: Sponsored Search Auctions **Cooperative Game Theory: (12)** Correlated Strategies and Correlated Equilibrium, The Two Person Bargaining Problem, Coalitional Games, The Core, The Shapley Value, Stable Sets, Bargaining Sets, Kernel, Nucleolus, Gately Point					
Textbook	1. M. J. Osborne and A. Rubinstein, "A Course in Game Theory," MIT Press, 1st Edition, 1994. 2. R. B. Myerson, "Game Theory: Analysis of Conflict," Harvard University Press, 1st Edition, 1997.					
References	1. A. Mas-Colell, M. D. Whinston, and J. R. Green, "Microeconomic Theory," Oxford University Press, 1st Edition, New York, 1995. 2. P. Klemperer, "Auctions: Theory and Practice," The Toulouse Lectures in Economics, Princeton University Press, 1st Edition, 2004.					