CSE3232 : Introduction to Game Theory

Programme: B.Tech (CSE/CCE) Year: 3 Semester: 6
Course: Program Elective Credits: 3 Hours: 3

Course Context and Overview:
This course introduces game theory to the students. Participants learn the fundamental concepts of game theory. Also, they learn about different games and possible strategies. They learn how to map a real life scenario on to an appropriate game and find the equilibrium.

Prerequisites Courses: Discrete Mathematical Structures

Course Outcomes (COs):

On completion of this course, the students will have the ability to:
CO1: Understand what are game, strategy and equilibrium.
CO2: Understand different strategies
CO3: Understand well-known games and their Nash equilibria.
CO4: Apply game theory on real life problems.

Course Topics:

Topics	Number of hours
UNIT – I Introduction	
1.1 What is game theory? 1.2 An outline of the history of game theory 1.3 John von Neumann and the theory of rational choice 1.4 Repeated and non-repeated games 1.5 Strategic games, 1.6 Different types of strategies – maxmin strategy, social welfare strategy, dominant strategy, Pareto optimal strategy	8
Unit-II Nash Equilibrium: Theory A	
2.1 the Prisoner's Dilemma, Example: Arms Race 2.2 Bach or Stravinsky? 2.3 Matching Pennies 2.4 the Stag Hunt	10

2.5 Nash equilibrium 2.6 Studying Nash equilibrium experimentally	
Unit-III Nash Equilibrium: Theory B	
3.1 Examples of Nash equilibrium 3.2 Experimental evidence on the Prisoner's Dilemma 3.3 Focal points 3.4 Best response functions 3.5 Dominated actions 3.6 Equilibrium in a single population: symmetric games and symmetric equilibria	10
Unit- IV Nash Equilibrium: Illustration	
3.1 Cournot's model of oligopoly 3.2 Bertrand's model of oligopoly 3.3 Electoral competition 3.4 The War of Attrition 3.5 Auctions - Auctions from Babylonia to eBay 3.6 Accident law 3.7 Evolutionary games	12

Textbook references (IEEE format):

Text Book:

1. Osborne, Martin J. An introduction to game theory. Vol. 3. No. 3. New York: Oxford university press, 2004.

Reference books:

1. Rasmusen, Eric. Games and information, an introduction to game theory. Rasmusen, Erasmuse@ indiana. edu., 2005.
2. Siegfried, Tom. *A beautiful math: John Nash, game theory, and the modern quest for a code of nature*. National Academies Press, 2006.
3. Sachs, Joel L., et al. "The evolution of cooperation." *The Quarterly review of biology* 79.2 (2004): 135-160.

Evaluation Methods:

Item	Weightage
Quiz1	10
Quiz2	10
Midterm	30
Endterm	50

Prepared by: Nirmal Kumar Sivaraman
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