GAME PROGRAMMING

(Program Elective – VI)

Course Code	19IT4801C	Year	IV	Semester	II
Course Category	PE	Branch	IT	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	GRAPHICS
Continuous Internal Evaluation :	30	Semester En Evaluation:	70	Total Marks:	100

	Course Outcomes	Blooms Taxonomy Level
	Upon successful completion of the course, the student will be able to	
CO1	Understand the computational issues of games	L1
CO2	Compute Nash equilibrium	L4
CO3	Analyze games where players cooperate	L4
CO4	Apply combinatorial algorithms	L3

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3	3									2	
CO2	3		3	3									2	
CO3	3		3	3									2	
CO4	3		3	3									2	

	Syllabus	
Unit No	**Contents**	**Mapped CO**
I	**Basic Solution Concepts and Computational Issues**: Games, Old and New, Games Strategies, Costs and Payoffs, Basic Solution Concepts, Finding Equilibria and Learning in Games, Refinement of Nash: Games with turns and Subgame Perfect Equilibrium; Nash Equilibrium without Full Information: Bayesian Games; Cooperative Games, Markets and Their Algorithmic Issues.	**CO1**
II	**The Complexity of Finding NASH Equilibria**: Is the NASH-Equilibrium Problem NP-Complete?; The Lemke-Howson Algorithm; The Class PPAD. Succinct Representations of Games; The Reduction; Correlated Equilibria.	**CO1, CO2**
III	**Equilibrium Computation for Two-Player Games in Strategic and Extensive Form**: Bitmatrix Games and Best Response Condition; Equilibria Via Labeled Polytopes; The Lemke-Howson Algorithm; Integer Pivoting and Degenerate Games; Extensive Games and Their Strategic Form; Sub game Perfect Equilibria; Computing Equilibria with Sequence Form.	**CO1, CO3**
IV	**Learning, Regret Minimization, and Equilibria**: Model and Preliminaries; External Regret Minimization; Regret minimization and Game Theory; Generic Reduction from External to Swap Regret; On the Convergence of Regret-Minimizing Strategies to Nash Equilibrium in Routing Games	**CO1, CO2**
V	**Combinatorial Algorithms for Market Equilibria**: Model and Preliminaries; External Regret Minimization; Regret minimization and Game Theory; Generic Reduction from External to Swap Regret; On the Convergence of Regret-Minimizing Strategies to Nash Equilibrium in Routing Games	**CO1, CO4**

Learning Resources
Text books
1. Noam Nisan, Tim Roughgarden, Eva Tardos, Vijay V. Vazirani, Algorithmic Game Theory, Cambridge University Press, 2007.
2. Ronald Cohn Jesse Russell, Algorithmic Game Theory, VSD Publishers, 2012.
References
1.Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", Prentice Hall 1stedition,2006.
2.RogerE.Pedersen,"Game Design Foundations",Edition2, Jones & Bartlett Learning,2009.
3.ScottRogers, "LevelUp!:The Guide to Great Video Game Design",Wiley,1stedition,2010.
4.AndyHarris, "Beginning Flash Game Programming For Dummies",For Dummies; Updated edition,2005.
e-Resources & other digital material
1. https://www.coursera.org/learn/game-theory-1
2. https://ocw.mit.edu/courses/6-254-game-theory-with-engineering-applications-spring-2010/