GAME THEORY

LA358

2024-25 M

Syllabus

- Module 1: Introduction to Game Theory- background –rational choice- basic concepts and rules
- Games with perfect Information
  - Module 2: Strategic games; Prisonners' Dilemma; Nash Equilibrium; Best response functions; dominant strategy; symmetric games and its equilibria
  - Module 3: Cournot's model of oligopoly; Bertrand's model of Oligopoly; Electoral competition; Auctions
  - Module 4:Mixed strategy equilibrium-randomized strategic games- mixed strategy Nash equilibrium-dominant actions
  - Module 5:Extensive Games - Stackleberg model of duoplply- buying votes-simultaneous moves-subgame perfect equilibria –backward induction; Coalitional Games- the core-voting -matching

Introduction to Game Theory

➢Game Theory (GT) is a study of strategic situation which consider one players action based on other players' action/ decision

➢General terms:

- Players
- Strategy/ actions
- Pay-off
- Pay-off matrix

Scope

- Examples:
  - Firms competing for business
  - Political candidates competing for votes
  - Bidders competing in auction
  - Sports-?

Scope

➢Examples:

- Firms competing for business
- Political candidates competing for votes
- Bidders competing in auction
- Sports- Chess; Penalty shootout

Scope

- Examples:
  - Firms competing for business
  - Political candidates competing for votes
  - Bidders competing in auction
  - Sports- Chess; Penalty shootout
- Applications in - Economics, Political Science, Psychology, Evolutionary biology

  Mechanism Design, Dynamic resource allocation , social and behavioural sciences

Outline of History of GT

- GT basic ideas -traced back to the 18th century
  - Economic analysis in imperfectively competitive market
  - A. Cournot (1838)- The Mathematical Principles of Theory of Wealth
  - Francis Edgeworth (1881)- advanced by Bertrand and Stackleberg
- Major theoretical development -1920s by Emile Borel and John von Neumann
- *Theory of Games and Economic behaviour* (1944) by von Neumann and Oskar Morgenstern – critical in developing GT
- 1944- Nobel Prize in economics –awarded to game theorists- J.C. Harsanyi, John F **Nash,** and R Selten

GT

- GT: It is a formal way of analysing *interactions* among a group of *rational agents* who behave *strategically*
- *Group*: One or more decision maker- each decision maker is known as 'player'

  Interaction: What any one individual player does directly affects at least one other player in the group.

  Strategic: An individual player accounts for this interdependence in deciding what action to take

  Rational: While accounting for this interdependence, each player chooses her best action.

Reference

- Martin J Osborne: An Introduction to Game Theory
- Prajit K Dutta: Strategies and Games- Theory and Practice