Time: 3 hours **Max. Marks: 80**

N.B. (1) Question No. 1 is compulsory.
(2) Attempt any three questions from remaining five questions.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

Q1. Attempt **any four.** **(20)**

a. Explain the difference between strategies, preferences and payoffs in game theory.

b. What is a Bayesian game? Illustrate with an example.

c. Describe the differences between zero-sum and non-zero-sum games with suitable examples.

d. Explain the concept of Pareto efficiency in game theory.

e. How is the concept of utility used in game theory? Explain with an example.

f. Describe how the discount factor (δ) affects the players' preferences for current versus future payoffs in infinitely repeated games.

Q2.a) Consider a game with the following payoff matrix for Player A and Player B: **(20)**

	B1	B2
A1	4,2	3,3
A2	2,3	1,4

i. Identify the Nash Equilibrium,if any.
ii. Discuss whether this game has a dominant strategy for any player.

b) Explain in detail the prisoner's dilemma (PD) with payoff matrix and with suitable examples.

Q3. a) Explain typical application areas for game theory with proper examples. **(20)**

b) Explain the Vickrey-Clarke-Groves (VCG) mechanism with an example.

Q4 a) Explain the concept of mixed strategy equilibrium. How does it differ from pure strategy equilibrium? Illustrate with an example. **(20)**

b) What is a sequential game? How does it differ from a simultaneous game?

Q5.a) What is Mechanism Design in game theory? Discuss its importance in economics, data science or any domain. **(20)**

b) What do you mean by games with Perfect Information and games with imperfect information? Explain with examples.

Q6. Write short note on **any two** **(20)**

a) Computing Solution Concepts of Normal – Form Games

b) Bertrand and Cournot models of oligopoly.

c) Repeated Games
