

Total number of marks is 35.

INSTRUCTIONS for ANSWER SHEETS:

1. The answers should be written **ONLY** in the below mentioned order.
2. Write your roll number on the top of every page.
3. Credits reserved for formal and succinct answers.

Any evidence of copying will attract a serious penalty.

Clearly state any assumptions that you have taken.

Best of luck!

1. **(13 Marks)** Consider a market game that consists of two companies P_1 and P_2 that are competing to maximize their own profit. Let C be the production cost of company P_1 . Company P_2 (with 0.5 probability) can set the production cost either as C or half of C . Let the inverse demand price function be $(a - (q_1 + q_2))$, where a is a constant and q_i is the quantity produced by the company i . You can assume q_L and q_H are the quantities produced by company P_2 for the respective low cost (half of C) and high cost (C). Find the bayesian nash equilibrium of this game.
2. **(13 Marks)** Consider an auction consisting of two bidders. In this auction, all bidders have to pay an amount equal to their bid – irrespective of the outcome of the auction. Let b_i and v_i denote the bid and valuation of bidder i , respectively. Justify if $b_i = 0.5 \times v_i^2$ is the nash equilibrium. Also calculate the expected revenue of this game.
3. **(9 Marks)** Consider a game where two players (P_1 and P_2) plan to distribute one full size pizza amongst themselves. The distribution is done as follows: P_1 proposes to offer a portion x (where $x = 0, 25, 50, 75$ or 100%) of the pizza to P_2 . If P_2 accepts the offer, then P_2 gets x and P_1 gets $100 - x$. If P_2 rejects the offer, then they both get nothing. Find all the sub-game perfect nash equilibrium outcomes.