MASTER OF ARTS EXAMINATION, 2018

(1^{ST} Year, 2^{nd} Semester)

ECONOMICS

MICROECONOMICS II

Full Marks: 30

Time: Two Hours

Attempt Question no. 1 and any one from the rest:

(1). Consider an employer who hires an employee to run a very simple stochastic technology. The employee when hired may decide to exert a productive effort e that may take one of the two values 0 (low effort) and 1 (high effort). If the employee chooses effort $e=0$ then revenue of the firm denoted by y takes the value $y=35$ with probability .4 and $y=5$ with probability .6. On the other hand, if the employee exerts effort $e=1$, then $y=35$ with probability .6 and $y=5$ with probability .4.

The employer is assumed to be risk neutral but the employee is risk averse and the employee's utility function is given as $\sqrt{w}-e$. Also assume that the employee's reservation utility is normalized to 0. Finally assume that any contract offered to the employee needs to satisfy a limited liability constraint specifying that the employee cannot be paid a negative amount.

Assume first that the level of effort e **is verifiable**.

(a). Solve for the first best optimal contract that the employer offers the employee to induce him to exert the high effort $e=1$?

(b). Solve for the first best optimal contract that the employer offers the employee to induce him to exert the low effort $e=0$?

(c). Find out the optimal first best contract? (2+2+2)

Now assume that the effort e **is non-verifiable** while the amount of output y is verifiable.

(d). Try to characterize the second best optimal contract when the employer wants the employee to exert the high level of effort i.e. $e=1$?

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(e). Try to characterize the second best optimal contract when the employer wants the employee to exert the low level of effort i.e. $e = 0$?

(f). Find out the optimal second best contract that the employer will offer the employee?

(3+3+3)

(2). (a). Consider the following **All-Pay** Auction (Complete info case):

An indivisible object is to be assigned to one of 2 players in exchange of a payment. Player 1's payoff from the consumption of the indivisible good is v_1 while player 2's payoff is v_2 and assume that $v_1 = v_2 = v$. The valuations are common knowledge. The mechanism used to assign the object is a (sealed-bid) **All-Pay** auction: the players simultaneously submit bids (non-negative amounts), and the object is assigned to the player who submits the highest bid. If both players submit the same bid then the winner is chosen **through a coin toss. Both players pay their respective bids (even if he/she doesn't win)**. This is known as an **All-Pay** auction. If a player fails to win the object he/she gets 0 **gross** payoff.

(i). Describe the strategy sets and payoffs of both the players?

(ii). Write down the best-response strategies for both the players?

(iii). Is it optimum for both players the bid their true valuation?

(iv). Find out the Nash-equilibrium of this game (if any)?

(2+4+2+2)

(b). In the above game now assume that **the loser gets an altruistic pleasure of the magnitude 'A'** when the other player gets the object. Assume A to be same for both the players. Everything else remains the same.

(i). Now state the payoff functions of both the players?

(ii). Write down the best-response strategies for both the players? (2+3)

(3). (a). Consider a Cournot duopoly model with linear inverse demand given by $p = a - q_1 - q_2$ where q_i is the output of firm i = 1, 2. Firm 1's cost function is given by $C(q_1) = cq_1$ and this is known to both the firms. But firm 2's cost function is known only to firm 2 and firm 1 has the following belief on firm 1's cost function:

$$\begin{aligned} C(q_2) &= c_H q_2 \text{ with Prob } \theta \\ &= c_L q_2 \text{ with Prob } (1-\theta) \end{aligned}$$

It is given that $c_H > c_L$. In other words firm-2 has two possible types, high cost type with probability θ and low cost type with probability $(1-\theta)$. This belief is common knowledge. Assume that both the firms choose quantities simultaneously.
Compute the Cournot equilibrium under asymmetric information and also try to provide intuitions to your results.

(10)

(b). Explain the following concepts:

(i). Hidden information (ii). Rationalizable Strategies.

(2.5+2.5)