HUL212 - MICROECONOMICS
MAJOR EXAMINATION (**May 05, 2018**), IITD SEM-II, AY 2017-18,
Time Allowed: 2 Hours. (ANSWER ALL, Max marks=35)

1. State whether the following statements are true or false. Please provide a VERY brief explanation for your answer. (4 * 2)

   (a) In a stackleberg model with two firms choosing prices, the firm that moves first is at an advantage, i.e., he earns higher profits than the firm who moves after him.

   (b) Consumers have the maximum surplus when Price = MC.

   (c) In a strategic game with n players, if one player has a dominant strategy then that strategy will always be played by him in the Nash equilibrium.

   (d) A stable matching μ is efficient.

2. Suppose the following:

   - Two countries EACH with demand for a homogeneous good given by $P(Q) = 40 - Q$.
   - In Country A there is one firm with a marginal cost of production of c_a.
   - In Country B there are two firms, each with a marginal cost of production of c_b.
   - Competition in the relevant markets is cournot

   (a) Find for each country expressions for the equilibrium price and quantity under the assumption that no trade between the two countries occurs. (2)

   (b) Now assume a state of free trade exists between the two countries. If $c_a = 6$ and $c_b = 4$, which country will import the good? What quantity of good will be imported by that country? (3)

3. (a) Consider a two sided matching model with n men and n women. Build a preference profile $\succ$ such that DAA (Deferred Acceptance Algorithm) with men proposing and DAA with women proposing lead to the same stable matching.
   Establish whether this matching can be achieved using serial dictatorship social choice function. (2 + 1)

   (b) Consider 4 students A,B,C and D who have recently joined IIT Delhi and need to be alloted two 2-seater rooms. Each student has a preference over the other students, given as follows
   $A : B \succ C \succ D$
   $B : C \succ A \succ D$
   $C : A \succ B \succ D$
   $D : A \succ B \succ C$
   which means that A's most preferred choice for a roommate is B followed by C and his least preferred choice is D (the preferences for students B, C and D can also be interpreted in the same way). Thus, two students can be paired with each other to be alloted a room. We call this pairing a matching. For the given preference profile, can you find a stable matching? Give a brief explanation for your answer. (2)

Yeah! PUZZLES

4. You decide to open a bar. For any given night, you will have fixed cost of $ 1,000 plus a variable cost of $ 0.50 per drink (drinks are the only thing you sell at the bar):
   $TC = 1000 + 0.5Q$

(a) So you look to the market and find a set of party animals . There are 500 of these customers in a given night. They each have the same demand curve for drinks: $Q_{party} = 10 - 2P$. You decide to add a cover charge at the door while setting a new price for each drink. How can you find the optimal price for the cover charge and the drinks? What will be your profit in this case? (2)

(b) You notice that there are also some other folks who like to dance. They are currently not coming because the cover charge is too high. You want to get these customers to come to your bar also. There are 500 of these dancers each with the exact same demand curve for drinks: $Q_{dancer} = 5 - P$. What must be the cover charge and price per drink in order to maximize profits? What is the new profit? (3)

5. (a) Consider the following two player game in the table below and use this to find out:

	a	b	c
A	(1, 0)	(3, 0)	(2, 1)
B	(3, 1)	(0, 1)	(1, 2)
C	(2, 1)	(1, 6)	(0, 2)

i. any strategy of each player which is never a best response. (1)

ii. the set of pure strategy Nash equilibria using this. (1)

iii. the strategy that each player will play if they are risk averse and want to maximise their minimum payoff. (1)

(b) Two players write down either heads or tails on a piece of paper. If they have written down the same thing, player 2 gives player 1 a dollar. If they have written down different things then player 1 pays a dollar to player 2 instead.
Model this situation as a strategic form game. Find Nash equilibrium of this game. (2)

6. (a) Can you write the pay off matrix in a 2×2 public good contribution game where there are two pure strategy Nash equilibria - either both give zero or both give positive amount? (2)

(b) You and your friend are writing a joint project under Prof. P where total time devoted by both of you matter for grading. You also enjoy your private time in doing other activities. This time allocation equation can be written as: $T_i = c_i + g_i$; where T_i is the total time available to i, c_i is her private time and g_i is her time allocation for joint project; $i \in \{1, 2\}$. Utility for i^{th} student is given by: $u_i = ln(c_i) + ln(g_1 + g_2)$; for $i \in \{1, 2\}$, and, 'ln' is natural logarithm. Both of you are utility maximizer subject to resource constraint.

i. Solve for the time allocation for joint project (g_i) that each of you decide selfishly? (3)

ii. Are both of you free riding on each other? (2)