ECO101|Fall'23

1. In a perfectly competitive industry, all firms are identical with identical cost curves. Suppose that a representative firm's total cost is given by the equation: $\boldsymbol{TC = 2q^2 + 5q + 50}$, where q is the quantity of output produced by an individual firm. Additionally, the market demand for this product is given by the equation $\boldsymbol{P = 1000 - 2Q}$ and the market supply is given by $\boldsymbol{P = 100 + Q}$, where Q is the overall market output.
   a) Find the equilibrium price and quantity in the market. **(2 marks)**
   b) The firm's MC equation based upon its TC equation is $\boldsymbol{MC = 4q + 5}$. Given this information and your answer in part (a), what is an individual firm's profit-maximizing level of production in the short-run? **(3 marks)**
   c) Calculate the firm's total revenue, total cost, and profit at this market equilibrium. **(3 marks)**
   d) Find the equation for a representative firm's average total cost (ATC) curve. What should be the relationship between price and ATC in the long run? **(2 marks)**

2. For each of the following questions, illustrate with an accurately labelled demand and supply diagram:
   a) Farmers can either grow lime or lemon on their land. Both the lime and the lemon markets are initially in equilibrium. The price of lime increases, what happens in the market for lemon? **(2.5 Marks)**
   b) A breakthrough in agricultural technology allows farmers to produce twice as much corn per acre. At the same time, a growing trend among consumers promotes healthier eating habits, increasing the demand for vegetables and reducing the demand for starchy foods like corn. Assess the overall effect on the corn market. **(2.5 Marks)**
   c) The country experiences a rise in income levels and brown rice is classified as an inferior good, simultaneously, there is a reduction in the number of farmers cultivating brown rice. What happens in the market for brown rice given that the effect of the increase in income is stronger? **(2.5 Marks)**
   d) Delton can produce both laptops and tablets. Although laptops and tablets are considered substitutes to each other, recently the prices of tablets have increased. Simultaneously, users are finding tablets to be more user-friendly. How do you think this is going to impact the market for laptops? **(2.5 Marks)**

3. Consider the following inverse-demand and inverse-supply functions for Starbursts, a type of fruit-flavored candy:

$$P_d = 350 - 3Q_d \text{ and } \quad P_s = 30 + 2Q_s$$

   a) Find the market equilibrium price and quantity. **(2 Marks)**
   b) To discourage the consumption of sugary foods, the government has imposed a lump-sum tax of $40 on sellers of all types of candy. Calculate the new market equilibrium quantity and the prices paid by buyers and received by sellers respectively. **(3 marks)**
   c) What is the tax revenue earned by the government due to this tax? What is the tax incidence on buyers and sellers? Calculate the change in total surplus (if any) due to this tax imposition on sellers. **(3 marks)**
   d) If the inverse-demand function instead had been $P_d = 350 - 4Q_d$ and the inverse-supply function remained the same, how would the tax incidence change? Explain intuitively using the concept of elasticity **without any calculations**. **(2 marks)**

4. In June 2021, three friends started a new venture called "Company Y". This start-up company provides a unique service for connecting working parents and home cooks within the residence proximity. Initially, the founders had to invest 500,000 BDT each for setting up the business: app development, office facilities, and other fixed expenses. For each successful service (Q), the company received a 20TK fixed commission (P). They have also hired workers to conduct the business operations. The monthly wage rate is 20,000TK per worker. The following table illustrates the labour-output schedule in the short run:

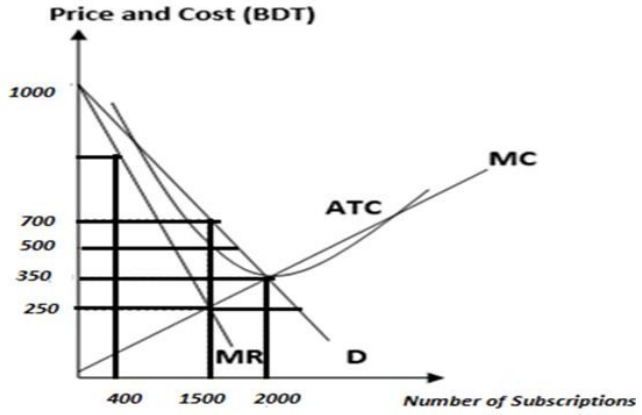
Month	Labour	Service units (Q)	TC	ATC	MP	MC
June	0	0				
July	5	800				
August	7	2000				
September	12	2400				
October	14	2500				
November	17	2550				

a) Fill out the table (TC, ATC, MP, MC) and present it in your answer script. **(6 Marks)**

b) In the short run, from the given table, will the Average Fixed Cost (AFC) always fall but not the Average Variable Cost (AVC)? Briefly write your reasoning. **(2 Marks)**

c) Why does MP fall when MC starts increasing? **(2 Marks)**

5. The graph below shows the Market conditions of Rocky's Cable Service, which is the only broadband service provider in Bashundhara Residential Area. Use the graph to answer the following questions:



a) To maximize profit, how many subscriptions are provided and how much does each user pay? **(2 marks)**

b) If Rocky is forced to charge a perfectly competitive market price, what price Rocky be charging now and how many subscriptions be sold by him? **(2 marks)**

c) Compute the change in Rocky's profit between part (a) and part (b). **(2 marks)**

d) Calculate the Dead weight loss of operating under monopoly. **(2 marks)**

e) Which of the outcomes is efficient from a social point of view and why? Explain. **(2 marks)**

Answers to ECO101 Fall'23 Final

1.a) At the equilibrium, Qd = Qs

1000 – 2Q = 100 + Q

3Q = 900

Q* = 300 P* = 400

b) We know, A perfectly competitive firm maximizes profit at the quantity where MR =MC

Also, for a perfectly competitive firm, MR = Price

Therefore, MR = 400

Solving for q*: MR = MC

4q + 5 = 400 , **q* = 98.75**

c) **TR = p X q = 400 X 98.75 = $ 39,500**

We know, Substitute q = 98.75 in equation for TC, **TC = $ 20,046.875**

Total Profits = TR – TC = $ 19,453.125

d)In a perfectly competitive industry, firms make zero economic profits in the long run.

This means they are at the break-even point where **Price = ATC**

2. a) Answer: In addition to a proper explanation, students are expected to draw a D&S graph of lemon with demand shifting right and supply left.

   b) Answer: In addition to a proper explanation , students are expected to draw a D&S graph of the corn market with supply shifting **further** right and demand shifting left

   c) Answer: In addition to a proper explanation , students are expected to draw a D&S graph of brown rice with supply shifting left and demand shifting **further** left.

   d) Answer: In addition to a proper explanation, students are expected to draw a D&S graph of laptops with both supply and demand shifting left.

3. *a)*Answer: Equilibrium Quantity = 64 units, Equilibrium Price = $15

   (b) Answer: Equilibrium Quantity With Tax = 56 units, Price Paid by Buyers = $182,

   (c) Price Received by Sellers = $142||| `If tax divided equally then: Price Paid by Buyers = $178, Price Received by Sellers = $138; Qty=57 or 54`

   (d) Answer: Tax Revenue= $40*56 = $2240 `(or 2292 or 270)`, Tax Incidence on Buyers = $182-$158= $24 `(or $20)`,Tax Incidence on Sellers = $158-$142 = $16 `(or $20)`

   Find Change in Total Surplus by showing= DWL = 0.5*[40]*[64-56] = 160 `(or 134 or 200)`

(e) Answer: Since the new demand curve is more inelastic (steeper curve i.e., absolute value of slope is higher), tax incidence will be higher on buyers.

4. a)

Month	Labour	Quantity/Service (Q)	Total Cost	ATC	MP	MC
June	0	0	1500000	-	-	-
July	5	800	1600000	2000	160	125
August	7	2000	1640000	820	600	33.33333333
September	12	2400	1740000	725	80	250
October	14	2500	1780000	712	50	400
November	17	2550	1840000	721.5686275	16.66667	1200

A handful number of students have missed the fact that there were three (3) investors who have initially invested 500,000BDT each, therefore fixed cost will be 500,000x3= 15,00000BDT. In light of the challenges of the semester, lenient considerations were made and no marks were deducted for considering FC=500,000BDT

b) Ans**:** YES. Because AFC = TFC/Q. As TFC is fixed, Q increases. AFC will always fall here, however, AVC will vary as VC is changing as well.

c) Ans: Because the additional cost associated with additional production is higher. Usually, MP and MC move in the opposite direction.

5. a) Answer: Profit Maximizing Price= **700tk**

Quantity=**1500**

b)Answer: Profit Maximizing Price= **350tk**

Quantity=**2000**

c) Answer: Monopoly Profit= **(700-500)*1500=300000**

Perfect Competition Profit=**0**

d)Answer: Deadweight loss= **½* (700-250)*(2000-1500)=112500**

e) Answer: Perfect competition is more efficient as there is deadweight loss under the monopoly market. Students should draw a diagram and show the changes in total surplus and deadweight loss to get full marks.