UNIVERSITY OF RUHUNA

2018/2019 Academic Year B. A. (Special) Degree - 2000 Level

1st Semester Examination - October/November 2019

STS 21533/ STS 21653/ ECN 21633 – Mathematical Economics

Answer <u>Six (06)</u> questions only.
Use of Calculator are allowed.

Time: 03 Hours

1.

(i). Using the following demand functions compute the price elasticity of demand at the indicated prices.

i. $P^2 + 2P + Q = 176$ $\quad$ $P = 11$

ii. $P(Q + 100) = 150$ $\quad$ $P = 10$

iii. $PQ = 80$ $\quad$ $P = 10$

(06 Marks)

(ii). Supply and demand for a product are given by $4P - 20Q = 100$ and $2PQ = 200Q - 40Q^2$ respectively.
Find the market equilibrium price and quantity.

(04 Marks)

2. consider the following demand and supply data in the market (Assume that demand and supply functions are linear)

Demand	
P	Q
10	45
60	20

Supply	
P	Q
30	35
50	70

I. Estimate the demand function. (03 Marks)

II. Estimate the supply function. (03 Marks)

III. Calculate the market equilibrium. (02 Marks)

IV. Calculate the equilibrium price elasticity. (02 Marks)

3.

(i) While the cost function of a firm operating in a purely competitive environment is given by $TC = Q^2 + 2Q + 100$ the faced market price of this product is Rs. 40/= per unit.
Determine the maximum profit that the firm could earn.

(04 Marks)

(ii) Using the above facts, determine

i. The Quantity and price of the Product,
ii. The amount of profit mode by monopolist.

at the time of obtaining maximum profit.

(06 Marks)

4.

(i). The Total cost function of a firm is given by $TC = ax^3 - bx^2 + cx$ Where, X stands for the output and a, b, and c are positive constants. At what output does average cost equal marginal cost.

(03 Marks)

(ii). if the total cost of a firm is given by TC= $\left[60 + \frac{12}{5}Q^2\right]^2$ where Q is level of output find the marginal cost at Q=5.

(03 Marks)

(iii). Suppose that the demand function for a certain product is given by the equation $Q = 2250 - 150P^{\frac{1}{2}}$ calculate the price and quantity of the product while maximizing the total revenue.

(04 Marks)

5. The demand and supply function for three (3) related goods A,B, and c are given by

$Qd_A = 92 - 2P_A + 2P_B - 2P_C$
$Qd_B = 35 + P_A - 3P_B + 2P_C$
$Qd_C = 28 + P_A + 2P_B - 4P_C$
$QS_A = -8 + 2P_A$
$QS_B = -15 + 3P_B$
$QS_C = -22 + 2P_C$

Where,

Qd_A = Demand of good A.
Qd_B = Demand of good B.
Qd_C = Demand of good C.
QS_A = Supply of good A.
QS_B = Supply of good B.
QS_C = Supply of good C.
P_A = Price of good A.
P_B = Price of good B.
P_C = Price of good C.

Find the equilibrium price and quantities for each goods.

(10 Marks)

6.

a. Suppose that the following equations describe the demand and supply function of a commodity.

Demand function $Qd = 140-4P$
Supply function $Qs = -20 + P$

the Government impose a tax "t" on each unit produced.

(i). Calculate the tax rate "t" on production that will maximize tax revenue.

(03 Marks)

(ii). Estimate the total tax revenue.

(03 Marks)

b. The total cost function of a firm is given by $TC = 1500 + 90Q - 8Q^2 + Q^3$ Find the Average variable cost (AVC) and Marginal cost (MC) for the level of output at which AVC curve is minimum.

(04 Marks)

7.

a. Given the production function $Q = 100K^{0.35} L^{0.65}$ Find the marginal rate of Technical substitution (MRTS).

(04 Marks)

b. Answer the Following Question using the lagrangian method.
The utility function of a consume who consume only the two commodities X and Y, is estimated as

$$U = X^3 Y^2$$

the price of X is Rs. 12.00 and the price of Y is Rs. 16.00. The daily income is Rs. 400.00. If he spends this amount of only money to buy the products X and Y, Find the X and Y that maximizes utility.

(06 Marks)

8.

(i). A company makes a product that sells for Rs. 15/= per unit. Fixed cost in Rs. 4000/= and variable cost per unit is Rs. 7/=.
Find the break even point.

(04 Marks)

(ii). Fixed cost of a firm is Rs. 10000/= average variable cost per unit of output is Rs. 150/= and the firm sells its product at Rs. 200/= per unit.
Determine break-even point of output.

(03 Marks)

(iii). The Break event Point of a product produced by a company is 1000 units, variable cost is Rs.2/= and fixed cost is Rs. 4000/=
Find the unit price of a product.

(03 Marks)

@@@@@@@@@@@@