Uva Wellassa University

Faculty of Management

Degree of Bachelor of Business Management in Entrepreneurship and Management

FIRST YEAR SECOND SEMESTER EXAMINATION –AUGUST/SEPTEMBER 2014

EMG 241 – 2 Business Mathematics

Instructions to candidates:

No. of pages : Three (03)
No. of questions : Five (05)
Time allocation : Two (02) Hours
Marks allocation : 100 Marks
Answer only four (4) questions **including question no. (01)**
Calculators are allowed.

Index No:

01. Total cost of a firm is given by,

$$C = 5000 + 1000Q - 500Q^3 + 2/3Q^3$$

i. Find marginal cost equation.
ii. Find the expression for the slope of the marginal cost curve.
iii. Find the average cost equation.
iv. At what level of output (Q) does the marginal cost minimize?
v. At what level of output (Q) does the average cost minimize?

(5x5 = 25 Marks)

02. Utility function of a consumer has quantified as follows.

$$U = 10X^{0.4}Y^{0.6}$$

Where, X and Y are two commodities. Price of X (Px) = 5 and price of Y (Py) = 8. Further, consumer income (I) is equal to 150.

i. Find the levels of two commodities that the consumer should consume in order to maximize the utility.
ii. Estimate the effect of the objective function due to one unit change in constant term of the constraint.
iii. Find the maximum utility that the consumer can gain.
iv. If the income of the consumer is doubled, what will happen to the initial consumption bundle?
v. Find the marginal utility functions for both X and Y commodities.

(5x5 = 25 Marks)

03. Production function of typical firm can be interpreted as follow.

$$Q = 25K^{0.5}L^{0.5}$$

Where, K – Capital
L – Labor

The price of capital (r) and price of labor (w) are equal to 40 and 20 respectively. Moreover, the firm intends to spend 1000 of expenditure for the production process.

i. If this firm is willing to employ "Output Maximization" method, find the optimum levels of labor and capital that the firm should employ.

ii. Find the maximum output level of the firm.

iii. If this firm is willing to employ "Cost Minimization" method, find the optimum levels of labor and capital that the firm should employ in order to produce 4000 level of output.

iv. Find the profit of the firm when the employs "Output Maximization" method. (Assume that the firm is selling their output at the price of Rs.50 per unit)

v. Find the maximum output which they can produce in the long run.

(5x5 = 25 Marks)

04.

i. Sketch the graphs of following two functions in one diagram.

$$y_1 = 7 - x$$
$$y_2 = 4x - x^2$$

ii. Find the area between two curves over the stated interval. (Interval: from x=1 to x=4)

Consider the given demand and supply functions under pure competition and answer the following questions.

$$P_D = 113 - Q^2$$
$$P_S = (Q+1)^2$$

iii. Find the market equilibrium price and quantity.

iv. Calculate the consumer surplus.

v. Calculate the producer surplus.

(5x5 = 25 Marks)

05. Find the value of "x" of the following determinants.

i. $\begin{vmatrix} 2 & x \\ 3 & 4 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & -7 \end{vmatrix}$

ii. $\begin{vmatrix} 2 & -5 & 1 \\ 0 & 3x & 7 \\ 6 & 2 & 1 \end{vmatrix} = 0$

iii. $\begin{vmatrix} 3 & 2 & 2 \\ 4x & 5x & 1 \\ 5 & 2 & 4 \end{vmatrix} = \begin{vmatrix} 2 & 5 \\ 3 & x \end{vmatrix}$

Answer to the question number (IV) and (V) using the following matrices.

$$A = \begin{pmatrix} 3 & 4 & -2 \\ 8 & 0 & 2 \\ 1 & 1 & -2 \end{pmatrix} \qquad B = \begin{pmatrix} -4 & 2 & 6 \\ 4 & -2 & -2 \\ -4 & -2 & 0 \end{pmatrix}$$

iv. Prove that $(A+B)' = A' + B'$

v. Prove that AB $\neq$ BA

(5x5 = 25 Marks)

15