বিদ্যাসাগর বিশ্ববিদ্যালয়

VIDYASAGAR UNIVERSITY

Question Paper

B.Sc. Honours Examinations 2021

(Under CBCS Pattern)

Semester - II

Subject: ECONOMICS

Paper : C 4-T

Mathematical Methods in Economics-II

Full Marks : 60

Time : 3 Hours

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Answer ***any four*** of the following: 4×15=60

1. a) What do you mean by a homogenous function? Which of the following functions are homogeneous?

   i) $3x^5y+2x^2y^4-3x^3y^3$

   ii) $3x^5y+2x^2y^4-3x^3y^4$

   iii) $x^{\frac{1}{2}}y^{-\frac{1}{2}}+3xy^{-1}+7$

b) Prove that for a linear homogeneous production function total product gets exhausted if the factors are paid according to their marginal productivities. (3+(3×2)) +6

2. Derive the compensated demand functions of q_1 and q_2, given the utility function $U = q_1 q_2$ and the budget constraint $p_1 q_1 + p_2 q_2 = M$, and check the second order condition. 15

3. Solve the following problem graphically:

$$Max \ \pi = 2x_1 + 5x_2$$

Subject to $x_1 \leq 4$

$x_2 \leq 3$

$x_1 + 2x_2 \leq 8$

And $x_1, x_2 > 0$

Also find out the dual of the above mentioned problem. (10+5)

4. Derive the cost function from the following production function:

$$q = Ak^{\alpha} l^{\beta}$$

where A, α and β are constants and positive 15

5. Utility function of a consumer is given as $U = e^{x_1 x_2}$. His budget constraint is given as $y_0 = p_1 x_1 + p_2 x_2$. Find the expression for price elasticity of demand for both the commodities. Discuss the economic interpretation of the Lagrange multiplier. (10+5)

6. Show by using the method of calculus that the Indifference curves are downward sloping and convex to the origin. 15

7. The rate of price change is 3 times the amount of excess demand in a market. If the demand and supply functions are given respectively as D (t) = 5 - 3 p(t) and S(t) = 3+2p(t), examine the dynamic stability of the market. The initial condition is given as p(t) = p_0 when t = 0.

15

8 a) Given $A = \begin{bmatrix} -1 & 5 & 7 \\ 0 & -2 & 4 \end{bmatrix}$

Show that AI = IA = A

b) Given $B=\begin{bmatrix} 6 & -12 \\ -3 & 6 \end{bmatrix}$

Can you derive inverse of Matrix B? If not, why.

c) Given $C=\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $D=\begin{bmatrix} 0 & -1 \\ 6 & 7 \end{bmatrix}$ show that $(CD)' = D'C'$

d) Find the rank of the Matrix $A=\begin{bmatrix} 4 & 5 & 6 \\ 5 & 7 & 2 \\ 8 & 10 & 12 \end{bmatrix}$

(3+2+5+5)