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2018

2nd Semester

ECONOMICS

PAPER—C4T

(Honours)

Full Marks : 60

Time : 3 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Group-A

1. Answer any *ten* questions : 10×2

(a) Find the determinent of the matrix A

$$\text{where } A = \begin{bmatrix} 1 & 1 & 1 \\ 2 & -1 & 3 \\ 3 & 2 & -1 \end{bmatrix}_{3\times 3}$$

(Turn Over)

(b) Find the dual of the following problem :

$$\text{Max.} \quad Z = 5x + 6y$$
$$\text{Subject to} \quad x + y \le 5$$
$$2x + 3y \le 12$$
$$x \ge 0,\ y \ge 0.$$

(c) A production function is given by $Q = \frac{1}{3}K^3L^3$, where Q is the level of output and K and L are capital and labour inputs. Obtain the marginal productivities of capital and labour.

(d) What do you mean by points of inflexion?

(e) Write the Kuhn-Tucher conditions for maximisation problem.

(f) Find the minors of the elements of the third row, given

$$A = \begin{bmatrix} 9 & 11 & 4 \\ 3 & 2 & 7 \\ 6 & 10 & 4 \end{bmatrix}.$$

(g) Let $f(x, y) = 2x - y - x^2 + 2xy - y^2$ for all (x, y). Is $f(x, y)$ concave or convex?

(h) Determine whether the following function is homogeneous. If so, of what degree?

$$h(x, y, w) = 2x^2 + 3yw - w^2$$

(i) What do you mean by feasible solution in LPP?

(j) What do you mean by quasi-concave function?

(k) State the Euler's theorem.

(l) Differentiate between slack variable and surplus variable.

(m) State the properties of transpose of a matrix.

(n) Mention the role of Hessian determinant in solving optimization problem.

(o) Define Eigen vector.

Group-B

Answer any *four* questions. 4×5

2. The demand function for two goods are $q_1 = p_1^{-1.7}\, p_2^{0.6}$ and $q_2 = p_1^{0.4}\, p_2^{-0.8}$. Calculate the two cross price elasticities of demand and point out the relationship between the two commodities.

3. A monopolist faces the demand curve given by $P = 20 - q$ and his cost function is given as $C = q^2 + 8q + 2$. Determine the profit maximising output and the corresponding price.

4. Use the Jacobian determinants to test the existence of functional dependence between the paired functions given below :

$$y_1 = 3x_1^2 + 2x_2^2$$
$$y_2 = 5x_1 + 1$$

5. Prove that every homogeneous function is homothetic but a homothetic function may or may not be homogeneous function, although both of them produce linear expansion path.

6. Prove that $\begin{vmatrix} 1 & a & 1 \\ 0 & a+b & b \\ 0 & a & a+b \end{vmatrix} = \begin{vmatrix} 0 & 1 & 1 \\ 1 & a & 0 \\ 1 & 0 & b \end{vmatrix}$.

7. Given the function $U = Ax^b y^c$, A, b, c are constants. Find the conditions under which this will be a linear homogeneous function.

Group-C

Answer any *two* questions. 2×10

8. Solve graphically the following maximisation problem :

$$\begin{aligned} \text{Maximise} \quad & Z = 5x_1 + 3x_2 \\ \text{Subject to} \quad & 4x_1 + 3x_2 \le 36{,}000 \\ & 4x_1 + 10x_2 \le 60{,}000 \\ & 2x_1 + 2{\cdot}5x_2 \le 20{,}000 \\ & x_1 \ge 0,\ x_2 \ge 0. \end{aligned}$$

9. Let us have the National Income model as follows :

$$Y = C + I_0 + G_0$$
$$C = \alpha + \beta(Y - T) \qquad (\alpha > 0,\ 0 < \beta < 1)$$
$$T = \gamma + \delta Y \qquad (\gamma > 0,\ 0 < \delta < 1)$$

(a) Write the endogenous variables, exogenous variables and the parameters.

(b) Discuss the economic meaning of the restrictions of the parameters.

(c) Check whether the conditions of the implicit-function theorem are satisfied, if so write the equilibrium identity. 3+2+3

10. What do you mean by the maximum value function (indirect objective function) ? In this context discuss the Envelope theorem for unconstrained optimization.

11. The rate of price change in a market is governed by the excess demand of the product sold, such that $\frac{dp}{dt} = 4(S - D)$. Now if the demand and supply functions of the product are given by $D = 10 - 2P$ and $S = -3 + 3P$, then examine the stability of the market equilibrium. 10

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