

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 determinant 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 :

$$\begin{aligned} \text{Max. } Z &= 5x + 6y \\ \text{Subject to } x + y &\leq 5 \\ 2x + 3y &\leq 12 \\ x \geq 0, y &\geq 0. \end{aligned}$$

- (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 :

$$\text{Maximise } Z = 5x_1 + 3x_2$$

$$\text{Subject to } 4x_1 + 3x_2 \leq 36,000$$

$$4x_1 + 10x_2 \leq 60,000$$

$$2x_1 + 2.5x_2 \leq 20,000$$

$$x_1 \geq 0, x_2 \geq 0.$$

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

$$Y = C + I_0 + G_0$$

$$C = \alpha + \beta(Y - T) \quad (\alpha > 0, 0 < \beta < 1)$$

$$T = \gamma + \delta Y \quad (\gamma > 0, 0 < \delta < 1)$$

- (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.

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