2020

(1st Semester)

ECONOMICS

(Honours)

Paper No. : ECO–102

(Old Course)

[Quantitative Techniques—I (Mathematics)]

Full Marks : 70
Pass Marks : 45%

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, taking **one** from each Unit

UNIT—I

1. *(a)* Define set. State the two methods describing a set. 5

(b) In a class, 64% students have chosen Mathematics (M) as a subject and 56% students have chosen Economics (E). How many students have chosen both the subjects? 3

(c) If A (1, 2, 3, 4), B (2, 4, 5, 6) and C {1, 3, 4, 6, 8}, verify that

$$A \quad (B \quad C) \quad (A \quad B) \quad (A \quad C)$$ 3

(d) Let A, B, C be three sets, then prove that

$$(A \quad B) \quad (A \quad C) \quad A \quad (B \quad C)$$ 3

2. *(a)* If A $\{\frac{1}{2}, 1, 2\}$ and B {4, 3, 7}, give two functions from A to B. 2

(b) Write short notes on the following : 4×2=8

(i) Cartesian products

(ii) Inequalities in market equilibrium

(c) Write different types of functions. 4

UNIT—II

3. *(a)* Discuss various axiomatic properties of real numbers. 8

(b) Find x, y if

$$\frac{x \quad 4}{4 \quad i} \quad \frac{y}{4 \quad i} \quad i$$ 6

4. *(a)* Define parabola and hyberbola. 4

(b) Find the equation of a circle with centre at $\frac{2}{3}, \frac{3}{4}$ and radius equals to 2. 6

(c) Differentiate between Iso-profit and Iso-cost. 4

UNIT—III

5. *(a)* If a short run, total cost function is given as $C \quad f(Q) \quad Q^3 \quad 3Q^2 \quad 15Q \quad 27$, then obtain AC and MC functions. 3+3=6

(b) Find $\frac{dy}{dx}$, if

(i) $z \quad y^4 \quad 3y^3$ and $y \quad x^2 i$

(ii) $y \quad \frac{3x^2 \quad 1}{x^2}$ 4+4=8

6. *(a)* What do you mean by integration? Discuss different rules of integration. 2+6=8

(b) Find maxima and minima values of the following function : 6

$$y \quad 3x^4 \quad 10x^3 \quad 6x^2 \quad 5$$

UNIT—IV

7. *(a)* Define determinant. Explain its properties. 2+6=8

(b) If $A \begin{matrix} 3 & 1 \\ 1 & 2 \end{matrix}$, show that $A^2 \quad 5A \quad 7I \quad 0$. 6

8. *(a)* Solve : 8

$$\begin{matrix} 2x & 3y & 4z & 8 \\ 3x & 4y & 5z & 4 \\ 4x & 5y & 6z & 12 \end{matrix}$$

(b) If

$$A \begin{matrix} 2 & 3 & 4 \\ 5 & 7 & 9 \\ 2 & 1 & 1 \end{matrix} \text{ and } B \begin{matrix} 4 & 0 & 5 \\ 1 & 2 & 0 \\ 0 & 3 & 1 \end{matrix}$$

verify that $(AB)^t \quad B^t A^t$. 6

UNIT—V

9. *(a)* Define linear programming. What are the applications of linear programming? 2+5=7

(b) A firm manufactures 3 products *A*, *B* and *C*. The profits are ₹ 3, ₹ 2 and ₹ 4 respectively. The firm has 2 machines and below is given the required processing time in minute for each machine on each product :

	Product		
	A	*B*	*C*
G	4	3	5
H	2	2	4

Machine *G* and *H* have 2000 and 2500 minutes respectively. The firm must

manufacture 100 *A*'s, 200 *B*'s and 50 *C*'s but not more than 150 *A*'s. Set up an LP problem to maximize profit. 7

10. *(a)* Write the meaning and importance of input-output analysis and its limitations. 6

(b) Solve the following equations through graph : 8

Minimize

$$Z \quad x_1 \quad 2x_2$$

subject to

$$9x_1 \quad 2x_2 \quad 18$$
$$3x_1 \quad 4x_2 \quad 12$$
$$4x_1 \quad 5x_2 \quad 20$$

where $x_1, x_2 \quad 0$

★ ★ ★