2015

(1st Semester)

ECONOMICS

(Honours)

Paper No. : ECO–102

[Quantitative Technique—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)* Write the different types of sets. 5

   (b) In a group of 800 people, 550 can speak Hindi and 450 can speak English. How many can speak both Hindi and English? 5

   (c) Let

   $A = \{3, 6, 12, 15, 18, 21\}$

   $B = \{4, 8, 12, 16, 20\}$

   $C = \{2, 4, 6, 8, 10, 12, 14, 16\}$

   Find *(i)* $A - B$ and *(ii)* $C - A$. 2+2=4

2. *(a)* Define function. Briefly explain its application in economics. 2+5=7

(b) Solve the following : 3½+3½=7

(i) $\frac{5}{2}x+3=\frac{21}{2}$

(ii) $2x-(3x-4)=3x-5$

UNIT—II

3. *(a)* Discuss the axiomatic properties of real number. 8

(b) Perform the indicated operation and find the result in the form of $a+ib$: 3+3=6

(i) $\frac{2-\sqrt{-25}}{1-\sqrt{-16}}$

(ii) $\frac{3-\sqrt{-16}}{1-\sqrt{9}}$

4. *(a)* Find the equation of the path traced out by a point P, which remains equi-distant from the points $A(3, -4)$ and $B(-5, -1)$. 6

(b) Find the distance between the following pairs of points : 4+4=8

(i) (2, 3), (1, 1)

(ii) (3, −4), (−5, −1)

UNIT—III

5. *(a)* Write four rules of differentation with examples. 3×4=12

(b) Suppose you are given a short run total cost function as

$$C = F(Q) = Q^3 - 3Q^2 + 15Q + 27$$

Find AC and MC functions. 2

6. *(a)* Find maxima and minima values of the following function : 7

$$y = 3x^4 - 10x^3 + 6x^2 + 5$$

(b) The demand function for a commodity is $P = 15 - D$ and the supply function is $P = (0 \cdot 3)\, D + 2$. Find the consumer's surplus at the equilibrium market price. 7

UNIT—IV

7. *(a)* If

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \text{ and } B = \begin{bmatrix} -1 & 2 \\ 2 & -1 \end{bmatrix}$$

compute $2A - 3B$. 4

(b) Define inverse of a matrix and find the inverse of

$$\begin{bmatrix} 1 & 4 & 3 \\ 4 & 2 & 1 \\ 3 & 2 & 2 \end{bmatrix}$$

2+8=10

8. (a) Prove that

$$\begin{bmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{bmatrix} = 2(a+b+c)^3$$

6

(b) Solve the equations by Cramer's rule : 8

$$x-2y+3z=1$$
$$3x-y+4z=3$$
$$2x+y-2z=-1$$

UNIT—V

9. (a) What are the basic assumptions of linear programming model? 7

(b) Explain the graphical determination of the region of feasible solution. 7

10. (a) Discuss the two theorems of input-output analysis. 3½+3½=7

(b) The following inter-industry transaction table was constructed for an economy for the year 2000 (in crores) :

Industry	*1*	*2*	*Final Consumption*	*Total*
1	500	1,600	400	2,500
2	1,750	1,600	4,650	8,000
Labour	250	4,800	—	

Prepare the table of input-output coefficients, if the demand for final consumption of industry 1 and 2 changes to 500 and 4850 respectively. Calculate their gross outputs to meet the new demands. 7

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