2023

(FYUGP)

(1st Semester)

ECONOMICS

(Major)

Paper Code : EC1 CC2

(Mathematical Methods for Economics—1)

Full Marks : 75

Pass Marks : 40%

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)* Distinguish between equal and equivalent sets. Give examples. 4

(b) If $A = \{a, b, c, d, e\}$, $B = \{a, c, e, g\}$ and $C = \{b, e, f, g\}$, then show that

$$A \cap (B \cap C) = (A \cap B) \cap C$$ 5

(c) If $E = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $A = \{1, 2, 3, 4\}$ and $B = \{2, 4, 5, 7\}$, then find $(A \cap B)'$ and $A' \cup B'$. Also show that

$$(A \cap B)' = A' \cup B'$$ 6

2. (a) Define functions with example. 3

(b) Solve the following system of equations : $3\frac{1}{2} \times 2 = 7$

(i) $2x + 3y = 5$
$5x - 4y - 1 = 0$

(ii) $2x^2 - 5x + 3 = 0$

(c) Draw the graph of the function

$$y = x^2 - 3x + 2$$ 5

UNIT—II

3. (a) Define 'real number'. State and explain with example the 'axioms of the field' of real number. $2+9=11$

(b) What do you mean by 'axioms of trichotomy' and 'axioms of transitivity' of real number? 4

4. *(a)* Define 'complex number'. Rationalize the following complex numbers : 2+4+4=10

(i) $\frac{1+2i}{2+i}$

(ii) $\frac{3-4i}{3+4i}$

(b) Find the square root of the following complex numbers : 2½×2=5

(i) $-8-6i$

(ii) $-5-12i$

UNIT—III

5. *(a)* Find the slope and intercept of the line

$$3x-2y+7=0$$ 3+2=5

(b) Find the equation of the line passing through the point $(-2, 4)$ having slope equal to $-\frac{4}{5}$. 5

(c) The vertices of a triangle ABC are $A(a, 0)$, $B(-a, 0)$ and $C(0, a\sqrt{3})$. Show that the triangle is an equilateral one. 5

6. *(a)* Find the centre and radius of the following circle : 7

$$3x^2+3y^2-6x+12y-5=0$$

(b) If the producer's supply function is given by

$$Q = -5 + \frac{4}{5} \cdot P$$

and market price $P = 15$, then find the producer's surplus. 7½

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