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(FYUGP)

(1st Semester)

ECONOMICS

(Major)

Paper Code : EC1.CC2

(Mathematical Methods for Economics—I)

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) Define a set. What are the two ways of expressing a set? Give examples. 2+4=6

(b) If

$$A = \{1, 3, 5, 7, 9\}$$

$$B = \{2, 3, 4, 5, 8\}$$

$$U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

find—

(i) $A^c \cup B^c$;

(ii) $(A \cap B)^c$;

(iii) $(A - B)^c$.

3×3=9

2. (a) Define function. What are the different types of functions? Give examples. 6

- (b) Draw a graph of the linear function

$$y = -2x + 3$$

4

- (c) Solve the following equation : 5

$$6x^2 - 5x - 1 = 0$$

UNIT—II

3. (a) Define rational number and irrational number with examples. 6

- (b) State and explain with example the axioms of order of real number. 9

4. (a) State the laws of operations of complex number with example. 10

- (b) Find the values of x and y if

$$\frac{x+4}{4+i} + \frac{y}{4-i} = i$$

5

UNIT—III

5. (a) Define circle. Find the centre and radius of the circle

$$x^2 + y^2 + 8x + 10y - 8 = 0 \quad 1+6=7$$

- (b) Define parabola. Find the equation of the parabola whose focus is (2, 3) and directrix is $x - 2y - 6 = 0$. $2+6=8$

6. (a) Find the equation of the straight line passing through $P(-1, -5)$ and $Q(5, 4)$. 3

- (b) Find the slope of a line joining the points (3, 2) and (7, -2). 3

- (c) Line through the points (-2, 6) and (4, 8) is perpendicular to the line passing through the points (8, 12) and (x, 24). Find the value of x. 5

- (d) If the distance between the points (x, 10) and (1, 5) is 13 cm, find the value of x. 4

UNIT—IV

7. (a) Explain the different rules of differentiation with examples. 10

- (b) Find $\frac{dy}{dx}$, if—

(i) $y = 10x^2 - 15x + 10$

(ii) $y = (2x + 1)(x^2 - 2x)$

$$2+3=5$$

8. (a) Find the extreme value of the following function :

10.

5

$$y = x^3 - 9x^2 + 15x + 20$$

- (b) A monopolist has the following revenue and cost functions :

$$R = 30Q - Q^2$$

$$C = Q^3 - 15Q^2 + 10Q + 100$$

Find—

- (i) profit maximising output;
- (ii) maximum profit;
- (iii) equilibrium price;
- (iv) point elasticity of demand at equilibrium output.

4+2+2+2=10

UNIT—V

9. (a) State the different rules of integration with examples.

10

- (b) Integrate the following functions :

2+3=5

(i) $\int (x^2 - 2x + 1) dx$

(ii) $\int \left(4x^3 + \frac{1}{\sqrt{x}} - 3 \right) dx$

10. (a) If marginal cost function is given as

$$MC = 3Q^2 - 4Q + 6$$

find—

(i) average cost (AC);

(ii) average variable cost (AVC). $2+3=5$

- (b) What do you mean by consumer's surplus and producer's surplus? Calculate producer's surplus if supply function is given as $Q = \sqrt{-4 + 4P}$ and price $(P) = 10$. $4+6=10$

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