

**FIRST SEMESTER M.A./M.Sc./M.Com. DEGREE EXAMINATION  
DECEMBER 2019**

(CBCSS)

Economics

**ECO 1C 04—QUANTITATIVE METHODS FOR ECONOMIC ANALYSIS—I  
(2019 Admissions)**

Time : Three Hours

Maximum : 30 Weightage

**Part A (Short Answer Type Questions)**

*Answer any four questions.*

*Each question carries a weightage of 2.*

1. Distinguish between linear and quadratic functions with example.
2. Explain characteristic equation and characteristic roots.

3. Find the value of  $\lim_{x \rightarrow 3} \frac{x^3 - 27}{x^2 - 9}$ .

4. Find  $\frac{dy}{dx}$  if  $y = (x^3 + 1)(1 + x)$ .

5. Give the conditions for maximum and minimum of a function. Find the maximum and minimum values of  $y = x^3 - 6x^2 + 9x - 5$ .

6. Define a differential equation. What do you mean by order and degree of a differential equation ?

Solve  $\frac{dy}{dx} = y + 1$ .

7. Find the compound interest on Rs. 1,000 at 10 % per annum for  $1\frac{1}{2}$  years when interest is accumulated every 6 months ?

(4 × 2 = 8 weightage)

**Turn over**

**Part B (Paragraph Type Questions)***Answer any four questions.**Each question carries a weightage of 3.*

8. Explain the properties of a determinant.
9. Solve the following equations  $2x + 3y = 1$  and  $3x + y = 5$  using Cramer's rule.
10. Find the rank of  $A = \begin{bmatrix} 1 & 2 & 0 & 5 \\ 3 & 1 & 2 & 2 \\ 2 & 4 & 0 & 10 \end{bmatrix}$ .
11. The total cost function of a firm is  $C = \frac{1}{3}x^3 - 5x^2 + 28x + 10$  where  $C$  is the total cost and  $x$  is the output. A tax at the rate of Rs. 2 per unit of output is imposed and the producer adds it to his cost. If the market demand function is given  $p = 2530 - 5x$  where  $p$  is the price per unit of output. Find the profit maximizing output and price.
12. Explain the optimization techniques using Lagrangian multiplier method. Maximize the utility function  $U = 4xy - y^2$  maximizing subject to the constraint  $2x + y - 6 = 0$ .
13. If  $z = \frac{x^2y^2}{x+y}$ , show that  $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} = 3z$ .
14. Find the difference between compound interest and simple interest for 2 years on a sum of Rs. 1,800 at 4 % per annum.

 $(4 \times 3 = 12 \text{ weightage})$ **Part C (Essay Type Questions)***Answer any two questions.**Each question carries a weightage of 5.*

15. Solve the following equations using matrix inversion method :

$$5x - 6y + 4z = 15$$

$$7x + 4y - 3z = 19$$

$$2x + y + 6z = 46.$$

16. Define the derivative of a function. Explain the rules of differentiation. Discuss the applications of derivatives in Economics. Find the elasticity of demand for the demand function  $x = \frac{27}{p^3}$ .
17. Define integration. What do you mean by integration by parts? Show that the area bounded by the curve  $y = \frac{4}{x^2} + x^3$ , the  $x$ -axis and the ordinates  $x = 2$  and  $x = 4$  is 61 square units.
18. Define consumer's surplus and producer's surplus. The demand function for a commodity is  $p = 80 - 4x - x^2$ . Find the consumer's surplus when (i)  $p = 20$ ; and (ii)  $p = 35$ .

(2 × 5 = 10 weightage)