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R – 2206

Reg. No. : .....

Name : .....

Fourth Semester B.A. Degree Examination, July 2023

First Degree Programme under CBCSS

Economics

Core Course IV

EC 1441 : Mathematical Methods for Economics

(2019 Admission onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – I

Answer in **one** or **two** sentences. Attempt **all** questions. Each question carries **1** mark.

1. Quadratic function
2. Rank of a matrix
3. Constrained optimization
4. Producer's surplus
5. Marginal cost
6. Identity matrix
7. Utility function
8. Implicit differentiation
9. Elasticity of demand
10. Definite integral

(10 × 1 = 10 Marks)

P.T.O.

SECTION – II

Answer any **eight** questions not exceeding one paragraph. Each question carries **2** marks.

11. Given $A=\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$ $B=\begin{bmatrix}0 & -1\\ 6 & 7\end{bmatrix}$ prove that $AB \neq BA$.

12. Discuss the various marginal concepts using in mathematical economics.

13. Find the adjoint of a matrix $A=\begin{bmatrix}13 & -2 & 8\\ -9 & 6 & -4\\ -3 & 2 & -1\end{bmatrix}$.

14. Explain the concept of Constrained Optimization.

15. If $f(x)=4x^3+9x^2-12x+22$, find $f'(x)$ and $f''(x)$.

16. Integrate $(2x^6-3x^4)dx$.

17. What are the properties of a determinant?

18. Explain the concepts of convex and concave functions.

19. Find $\frac{dy}{dx}$ if $y=(x^4+x^3)(x^2+x)$.

20. Describe the important rules of partial differentiation.

21. Determine the following integrals.

    (a) $\int x^5 dx$

    (b) $\int 4x^2 dx$.

22. Write a note on quadratic and logarithmic functions.

(8 × 2 = 16 Marks)

SECTION – III

Answer any **six** questions not exceeding **120** words. Each question carries 4 marks.

23. Find the first, second and cross partial derivatives for $z = 7x^3 + 9xy + 2y^5$.

24. Briefly explain the application of derivatives in Economics.

25. Find the Rank of the matrix $\begin{bmatrix} 1 & 0 & 2 & 3 \\ 2 & 1 & 0 & 1 \\ 4 & 1 & 4 & 7 \end{bmatrix}$.

26. Explain different types of Matrices.

27. Solve the following quadratic equation: $2q^2 - 85q + 200 = 0$.

28. The demand for a commodity is $D = 35 - 7P$. The Supply function is $S = 2P - 5$. Find the equilibrium price.

29. Evaluate $\int_0^4 \left(\frac{1}{1+x} + 2x \right) dx$.

30. Briefly explain different types of elasticity of demand and point out its relative advantages.

31. Solve the equations using Crammer's rule.

$$2x - 3y + z = 7$$
$$2x + y - z = 1$$
$$4y + 3z = -11$$

(6 × 4 = 24 Marks)

SECTION – IV

Answer any **two** questions, not exceeding four pages. Each question carries **15** marks.

32. Discuss the role of mathematics in economics analysis and highlight its contemporary relevance.

33. Solve the following system of equations by matrix inversion.

$$2x + y + 3z = 15$$
$$x - 2y + 5z = 13$$
$$4x + 3y - z = 11$$

34. Maximise $y = x_1x_2 + 2x_1$ subject to $x_1 + 2x_2 = 20$. Solve the equations with Lagrange multiplier method.

35. Briefly explain the various economic applications using differential calculus and integral calculus approach.

(2 × 15 = 30 Marks)