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Fourth Semester B.A. Degree Examination, August 2022

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 **all** questions in **one** word to maximum **two** sentences. Each question carries **1** mark.

1. Function.
2. Consumer's surplus.
3. Marginal product.
4. Production function.
5. Matrix.
6. Derivative of a function.
7. Trace of a matrix.
8. Slope and intercept.

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9. Minors.

10. Partial differentiation.

(10 × 1 = 10 Marks)

SECTION – II

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

11. Find the derivative of y with respect to x if $y = 4x^3 - 7x + 15$.

12. Explain the ad-joint of a matrix.

13. Compare dependant and independent variables.

14. What is a singular matrix?

15. Distinguish between definite and indefinite integrals.

16. Suppose $AC = 3Q + 7$, find MC.

17. Explain point of inflection.

18. What is constrained optimisation?

19. State the conditions for a function to be minimum.

20. Solve $x^2 - 6x + 8 = 0$.

21. Compare marginal product and average product.

22. Given utility function, $U = xy + 3x + 4y$, find the marginal utilities of good x and y.

23. If $A = \begin{bmatrix} 2 & 4 & -1 \\ 0 & 8 & 3 \\ -4 & 11 & 5 \end{bmatrix}$, find 2A.

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24. Find $\lim_{x \to 2} (x^4 + 2x)$.

25. Find $\int_2^3 x^2 dx$.

26. Explain Concavity and Convexity.

(8 × 2 = 16 Marks)

SECTION – III

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

27. Find the first order partial derivatives of the function, $Y = 3x_1^2 + x_1x_2 + 4x_2^2$.

28. Explain the Lagrange multiplier method of optimisation.

29. Find the Rank of the matrix $A = \begin{bmatrix} 2 & 0 & 5 \\ 3 & -7 & 3 \\ 1 & -4 & 6 \end{bmatrix}$.

30. Explain the major functions in economics.

31. State the relation between AC and MC.

32. Suppose revenue function of a multi-product firm is $Z = 3x^2 + 2xy + 5y^2$. Stare the conditions for maximum revenue.

33. Find the determinant of $\begin{bmatrix} 3 & 1 & 2 \\ 2 & 1 & 3 \\ 1 & 2 & 3 \end{bmatrix}$.

34. Differentiate $(x^2 + 2x)(x^2 + 5)$.

35. Explain the rules of differentiation.

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36. Given the demand function as $P = 27 - 3x - x^2$ find consumer surplus at $x = 3$.

37. Explain the inverse matrix.

38. Examine the various properties of a determinant.

(6 × 4 = 24 Marks)

SECTION – IV

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

39. Solve the following simultaneous equations using crammer's rule.

$$5x - 6y + 4z = 15$$
$$7x + 4y - 3z = 19$$
$$2x + y + 6z = 46$$

40. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ -1 & 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 2 & -1 \\ 1 & 3 & 4 \\ 0 & -2 & -3 \end{bmatrix}$ find the products AB and BA. Show that $AB \neq BA$.

41. Find the maximum and minimum values of $y = 2x^3 - 3x^2 - 12x + 4$.

42. What is mean by differentiation? Explain the various rules of differentiation and the application of differentiation in economics.

43. Find the first and second order derivatives of the following.

(a) $(2x + 3)^2$

(b) $(3x + 8)(2 + 5x)$

44. Define a matrix. Explain the various types of matrices.

(2 × 15 = 30 Marks)

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