



QP CODE: 25050804



25050804

Reg No :

Name :

MA DEGREE (CSS) EXAMINATION DECEMBER 2025

First Semester

MA Econometrics

Core Courses - EM010104 - MATHEMATICAL METHODS FOR ECONOMETRIC ANALYSIS-1

2020 Admission Onwards

1A17D426

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

Answer any **eight** questions.

Weight **1** each.

1. What is the difference between coefficient matrix and augmented matrix?

2. Evaluate :

$$\begin{vmatrix} 2 & 4 \\ -1 & 2 \end{vmatrix}$$

3. Find the trace of:

$$A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 2 & 1 \\ 1 & 2 & 1 \end{bmatrix}$$

4. What do you mean by points in Euclidean space with respect to R^1 and R^2 ?

5. Compute eigenvalues for the diagonal matrix $A = \begin{bmatrix} 1 & 0 \\ 0 & 3 \end{bmatrix}$

6. Find the inverse of function

1) $f(x) = 6x + 5$

2) $g(x) = \frac{x+2}{x}$

7. Discuss on exponential and logarithmic functions.

8. Evaluate the composite function $f\{g(x)\}$ for $f(x) = 3x^2 + 6$ and $g(x) = x - 8$

9. Find total derivative of $u = 6x^3 + 7y$

10. What do you mean by gradient vector?

(8×1=8 weightage)





Part B (Short Essay/Problems)

Answer any **six** questions.

Weight 2 each.

11. Given the matrix A and B, find $AB+2(BA)$

$$A = \begin{bmatrix} 3 & 4 & 8 \\ 6 & 2 & 5 \\ 5 & 2 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 4 & 9 & 6 \\ 1 & 8 & 2 \\ 3 & 6 & 2 \end{bmatrix}$$

12. Find the rank of the following matrix by reducing to echelon form

$$A = \begin{bmatrix} 0 & 1 & -2 & 1 \\ 0 & 1 & 2 & 1 \\ 1 & -1 & 4 & 0 \\ -2 & 2 & 8 & 0 \end{bmatrix}$$

13. If

$$A = \begin{bmatrix} 24 & 15 \\ 8 & 7 \end{bmatrix}$$

Find A^{-1} and verify your answer.

14. Find the inverse of the matrix

$$\begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 1 \\ -1 & 1 & 1 \end{bmatrix}$$

15. Find the distance from P to Q, drawing the picture wherever possible.

a) P (7,5,4) Q(1,1,2)

b) P(1,8) Q(7,2)

16. Consider the production function, $Y = f(L)$ with functional form: $y = 12L^2 - L^3$. Find marginal productivity of labour when optimum labors were employed.

17. Find direct and cross partial derivatives of $f(x, y) = \sin x \cos y$ and form its Hessian matrix.

18. Explain matrix differentiation.

Find differentiation of $f(x, y) = x + 2y$ and $g(x, y) = 3x + 4y$ using matrix differentials.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight 5 each.

19. Discuss the 10 special kind of matrices with examples.

20. Examine the economic applications of matrices and determinants.

21. a) Write a note on linear independence and linear dependence of vectors

b) Check whether the following set of vectors are linearly independent or not.





A) $a = (1; 1; 1)$, $b = (1; 2; 0)$, $c = (0; -1; 2)$

B) $a = (3; 4; 5)$, $b = (-3; 0; 5)$, $c = (4; 4; 4)$, $d = (3; 4; 0)$

22. a) Illustrate Set theory based on set operations and properties with examples.
b) Check properties based on set U of results on throwing a dice with 3 subsets of getting even number, odd number and number less than 4.

(2×5=10 weightage)

