QP CODE: 23003066

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Reg No : .....

Name : .....

M A DEGREE (CSS) EXAMINATION, APRIL 2023

First Semester

CORE - EC010105 - MATHEMATICAL METHODS FOR ECONOMIC ANALYSIS

M A Economics, MA Business Economics

2019 ADMISSION ONWARDS

BB2962CB

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. If $A = \begin{bmatrix} 3 & 4 & 8 \\ -1 & 9 & 6 \\ 7 & -2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 8 & -6 & 2 \\ 6 & -2 & -7 \\ 2 & 0 & 9 \end{bmatrix}$, find the value of $3A - 2B$.
2. Define a singular matrix with example.
3. Examine the following equations are independent.
   $2x + 5y = 6$
   $4x + 6y = 10$
4. Find $\lim_{x \to 0} \quad (x^2 - 5x + 6)$
5. Define implicit function.
6. Evaluate $\int \frac{1}{\sqrt{x^3}} dx$
7. Define producer surplus.
8. Define marginal propensity to save.
9. What is a decision variable of an LPP?
10. Define the duel and primal of an LPP.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Find the inverse of the following matrix. $A = \begin{bmatrix} 8 & 2 & 4 \\ 9 & 5 & 6 \\ 2 & -8 & 4 \end{bmatrix}$

12. What are the assumptions of Input Output analysis?

13. Show that $\frac{\partial^2 z}{\partial x \partial y} = \frac{\partial^2 z}{\partial y \partial x}$ for the function $z = x^3 + y^3 - 6xy + 7y - 12$

14. Find the point of inflection of the curve $y = 3x^2 - 0.1x^3$.

15. Define the Income elasticity of demand and Price elasticity of demand. Also write the expressions for finding it for a general demand function.

16. Evaluate $\int_{x=0}^{x=\infty} e^{-3x} x^4 dx$ using Gamma function.

17. What is a differential equation? Find the general solution for the differential equation $2\frac{dy}{dx} - 10x = 0$.

18. What is the importance of slack variable in simplex method?

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. (i)Explain Cramer's rule for solving a system of equtions.
    (ii) Solve the following system of equations using Cramer's rule
    $x + 2y - z = -5$
    $2x - y + z = 6$
    $x - y - 3z = -3$

20. (i) Distinguish between marginal cost and average cost.
    (ii) The total cost and total revenue functions of a firm are given by $TC = \frac{1}{3}Q^3 - 9Q^2 + 200Q + 5050$ and $TR = Q(120 - 10Q)$ Find (a) Marginal cost (b) Marginal revenue (c) Average cost and (d) Average revenue.

21. (i) State the product rule of integration.

(ii) Evaluate (a) $\int (3x+1)log(x)dx$ (b) $\int_0^\infty 2xe^x dx$

22. Solve the LPP using graphical method

Maximize $Z = 60x + 40y$

suject to $x + 2y \leq 2000$

$x + y \leq 1500$

$x \geq 0, \quad y \geq 0.$

(2×5=10 weightage)