QP CODE: 21001990

21001990

Reg No : .....

Name : .....

M A DEGREE (CSS) EXAMINATION, NOVEMBER 2021

First Semester

CORE - EC010105 - MATHEMATICAL METHODS FOR ECONOMIC ANALYSIS

M A Economics, Business Economics

2019 ADMISSION ONWARDS

BE0E52F8

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Define transpose of a matrix with suitable example.
2. 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 $3A - 2B$.
3. If $A = \begin{bmatrix} 4 & 6 \\ 3 & 5 \end{bmatrix}$, find the rank of A.
4. Show that $\frac{\partial^2 z}{\partial x \partial y} = \frac{\partial^2 z}{\partial y \partial x}$ for the function $z = 6xy - 12$
5. Find the optimum value of the function $y = 3x^2$.
6. Find $\int 3e^x dx$.
7. Distinguish between homogeneous and non-homogeneous difference equation.
8. Define producer surplus.
9. Define surplus variable.
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. Mention any three properties of determinants with proper examples.

12. Solve the following system of equations using Cramer's rule
$3x + y - 6z = 0$
$x - 3y - 4z = -5$
$x + y + 2z = 4$

13. Define an implicit function and find $\frac{dy}{dx}$ for the function $x^2 - y^2 + 5xy = 12$

14. Explain Euler's theorem and verify Euler's theorem for the production function $Q = 17K^{0.8}L^{0.2}$.

15. Find the price, income and cross price elasticities of demand for a demand function
$Q_A = 120 - 3P_A + 0.3Y + 0.4P_B$ at $P_A = 8, \quad Y = 520, \quad P_B = 8$

16. Integrate the following functions.
(i) $x^2 + \frac{1}{x^2}$ (ii) $\frac{x^2 + \sqrt{x}}{x}$

17. Define Beta integral.

18. Mention a situation in which LPP is preffered over the minimization/maximization technique using differential calculus.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Describe Input-Output analysis and derive the formula for calculating output.

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) Derive the difference equation of Cobweb economic model.
(ii) The demand and supply functions for a good at time t are given as $Q_{d,t} = 120 - 3P_t$ and $Q_{s,t} = -45 + 1.3P_{t-1}$.
(a) State the equilibrium condition and hence deduce a difference equation in P.
(b) Solve the difference equation to find the equilibrium price and quantity.

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)