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Reg. No. : .....

Name : .....

First Semester M.A. Degree Examination, May 2023

Economics

EC 214 : QUANTITATIVE METHODS FOR ECONOMICS

(2018 Admission Onwards)

Time : 3 Hours Max. Marks : 75

PART – A

Define the following in **one** or **two** sentences

1. Scalar matrix
2. Properties of a Determinant
3. Constrained Optimization
4. Degree of freedom
5. Statistic and Parameter
6. Adjoint *of a* Matrix
7. Linear programming.
8. Find $\frac{dy}{dx}$ of the following functions

   (a) $y = 5x^4$

   (b) $y = 4x^{-5}$

P.T.O.

9. Eigen values

10. Order of the equation

(10 × 1 = 10 Marks)

PART – B

Answer any **seven** questions. **Each** question carries **5** marks.

11. Explain the importance of Matrix algebra in Economics and briefly explain different types of Matrices.

12. Write a short note on Rank of a Matrix and find the rank of the following matrix

$$\begin{bmatrix} 1 & 2 & -1 \\ 2 & 4 & 3 \\ -1 & -2 & 6 \end{bmatrix}$$

13. Discuss the concept of Leontief Open input-output model.

14. Write the dual of the following primal LP problem.

Maximize $Z = 3X_1 + X_2 + 2X_3 - X_4$ subject to the constraints

(a) $2X_1 - X_2 + 3X_3 + X_4 = 1$

(b) $X_1 + X_2 - X_3 + X_4 = 3$

and $X_1, X_2 \geq 0$ and X_3, X_4 unrestricted in sign.

15. Solve the following system of linear equations $4x + 3y = 4$; $3x + 4y = 10$

16. Given $y = f(x_1, x_2) = 2x_1^2 + x_1x_2 + 3x_2^2$ find out $\frac{dy}{dx1}$ and $\frac{dy}{dx2}$.

17. Fit a normal curve to the following data

Class	60–62	63–65	66-68	69–71	72–74
Frequency	5	18	42	27	8

18. The average life of 26 electric bulbs were found to be 1200 hours with a standard deviation of 150 hours. Test whether these bulbs could be considered as a random sample from a normal population with mean 1300 hours.

19. Find the value of $\begin{vmatrix} 1 & 5 & 2 \\ 3 & 1 & 2 \\ 6 & 2 & 5 \end{vmatrix}$

20. Find the first, second, and cross partial derivatives for $z = 2x^3 - 11x^2y + 3y^2$.

(7 × 5 = 35 Marks)

PART – C

Answer any **three** questions. **Each** carries **10** marks.

21. Briefly explain the components and characteristics of Linear programming. What are the important steps involved in linear programming?

22. Briefly explain various methods of Sampling.

23. Find the inverse of the matrix $A = \begin{vmatrix} 1 & 3 & 0 \\ -2 & 3 & 3 \\ 1 & 1 & 4 \end{vmatrix}$

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

25. Given a system of Linear equation

$$-2X + Y + 3Z = 2$$
$$4X + 2Y - Z = 3$$
$$5X - 4Z = 4$$

Solve the equation using matrix approach.

(3 × 10 = 30 Marks)