



Date: 25-04-2025

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

SECTION A

ANSWER ANY FOUR OF THE FOLLOWING

4 X10=40 Marks

1. Explain the various properties of determinants with relevant examples.
2. Find the maximum and minimum of $y = x^3 - 3x^2 + 20$.
3. Explain the concepts of linear, quadratic and cubic equations with suitable examples.
4. What is transpose of a matrix? State the various properties of transpose of a matrix.
5. State the first and second order conditions for maxima, minima and point of inflexion in case of one dependent and one independent variables.
6. Find the X and Y Intercepts of the equation $3x + 4y = 12$
7. Suppose that demand is given by the equation $Q_D = 500 - 50P$, where Q_D is quantity demanded, and P is the price of the good. Supply is described by the equation $Q_S = 50 + 25P$ where Q_S is quantity supplied. What is the equilibrium price and quantity?
8. Find the first derivative of
 - i. $y = x^3 + 4x^2 - 5$
 - ii. $y = (x - 1)(x^2 + 3)$

SECTION – B

ANSWER ANY THREE OF THE FOLLOWING

3 X 20 =60 Marks

9. Derive the relationship between MC and AC using derivatives.
10. Elucidate the application of Derivatives and Partial Derivatives in Economics.
11. If the demand for a consumer is given by the function $p = 27 - 3x - x^2$ (where x = quantity demanded, p = price), find the consumer's surplus at $x = 3$.
12. Explain the procedure for finding inverse of a matrix.
13. Find $\frac{\delta z}{\delta x}, \frac{\delta z}{\delta y}, \frac{\delta^2 z}{\delta x^2}$ and $\frac{\delta^2 z}{\delta y^2}$ also prove that $\frac{\delta^2 z}{\delta x \delta y} = \frac{\delta^2 z}{\delta y \delta x}$ for $Z = 3x^2 + 2xy - y^2$.
14. Solve using Cramer's Rule
$$\begin{aligned}x + y - z &= 6 \\3x - 2y + z &= -5 \\x + 3y - 2z &= 14\end{aligned}$$
