M.A. DEGREE EXAMINATION, NOVEMBER 2017

FIRST SEMESTER

Branch — Economics

Paper IV — MATHEMATICAL METHODS IN ECONOMICS

(New Syllabus)

Time : 3 Hours

Max. Marks : 70

PART – A

Answer any FIVE questions. Each question carries 4 marks.

(Marks : 5 × 4 marks = 20 marks)

1. Define the concept of Exponential function with illustration.

2. Find the limit of the function, $y = \dfrac{(x^2 - 4)}{(x - 2)}$, as $x \to 2$.

3. State the product and the quotient rules of differentiation.

4. Find the partial derivative of the function, $z = x^2 - 4xy^2 - 9xy + 6x^2y - 8y^2$.

5. State the conditions for Maxima and Minima of the function, $y = f(x)$.

6. Show that $\displaystyle\int_0^2 (2x + 7)\, dx = 18$.

7. Explain the Upper and Lower Triangular Matrices with examples.

8. Find the determinant of the Matrix.

$$A = \begin{pmatrix} 3 & -4 & 1 \\ 1 & 0 & -1 \\ 2 & 5 & 1 \end{pmatrix},$$

9. Explain the concept of Technical Constraints in Linear Programming problem.

10. State the assumptions of Input-Output Analysis.

PART – B

Answer ALL questions. Each questions carries 10 marks.

(Marks : 5 × 10 marks = 50 marks)

11. (a) Define function and discuss different types of polynomial functions with illustrations.

Or

(b) Given the market model, $Q_d = Q_s$, $Q_d = a - bP$ and $Q_s = -c + dP$, find the equilibrium price and equilibrium quantity.

12. (a) Find the derivative of the function :

(i) $y = (x^2 + 5)(2x^2 - 4)$

(ii) $y = \dfrac{(x^2 + 2)}{(4x - 1)}$.

Or

(b) If the demand function of a firm is $Q = 30 - 4P - P^2$, compute the price elasticity demand, Marginal, Total and Average Revenue at $P = 3$.

13. (a) The total revenue and total cost functions of a firm respectively are $R = 20Q - Q^2$ $C = Q^2 + 8Q + 2$. Find the equilibrium level of output, price, total revenue and total that will give maximum profits to the firm.

Or

(b) If the demand function of a consumer is $P = 35 - 2x - x^2$, find the consumer's surpl when he buys 3 units of the commodity.

14. (a) Discuss the properties of the determinants with illustrations.

Or

(b) Solve the following system of equations by Cramer's Rule :

$7x_1 - x_2 - x_3 = 0$

$10x_1 - 2x_2 + x_3 = 8$

$6x_1 + 3x_2 - 2x_3 = 7$

15. (a) Solve the following Linear Programming problem through Graphical method :

Minimize $C = 0.6x_1 + x_2$

Subject to $10x_1 + 4x_2 \geq 20$

$\qquad\qquad 5x_1 + 5x_2 \geq 20$

$\qquad\qquad 2x_1 + 6x_2 \geq 12$

$\qquad\qquad x_1, x_2 \geq 0$

Or

(b) What is Input-Output analysis? Discuss the importance of Input-Output analysis economic policy making.

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