LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.A. DEGREE EXAMINATION – **ECONOMICS**

FIRST SEMESTER – **APRIL 2019**

16/17/18UEC1MC02– MATHEMATICS FOR ECONOMICS

Date: 04-04-2019 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

PART – A

ANSWER ANY FIVE QUESTIONS IN ABOUT 75 WORDS EACH (5 X 4 = 20 marks)

1. When the price is Rs. 50 , Fifty pens are available for sale ; when the price is Rs.75 , Hundred of the pens are available for sale . What is the Supply function?
2. Given $A = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 & 4 \\ 1 & -2 & -4 \\ -1 & 2 & 4 \end{bmatrix}$
   Prove that $A^2 = A$ and $B^2 = B$.
3. State the conditions for maxima, minima and point of inflexion for the function Y = f (X).
4. Find A^{-1} if $A = \begin{bmatrix} 4 & 2 & 5 \\ 3 & 1 & 8 \\ 9 & 6 & 7 \end{bmatrix}$
5. Derive the relationship between AC and MC.
6. Given the demand function $Q = \frac{5P}{[1-3P]^2}$ find the price elasticity of demand at price P = 20.
7. Evaluate $\int \frac{5x}{[x-1]^2} dx$.

PART – B

ANSWER ANY FOUR QUESTIONS IN ABOUT 300 WORDS EACH (4 X 10 = 40)

8. Given the matrix $A = \begin{bmatrix} \mathbf{8} & \mathbf{-5} & \mathbf{2} \\ \mathbf{2} & \mathbf{9} & \mathbf{3} \\ \mathbf{3} & \mathbf{-1} & \mathbf{0} \end{bmatrix}$ prove any three properties of Determinant.
9. Explain the market demand function of a firm is given by 8 P + Q – 64 = 0
   and the firm's average cost function takes the form
   AC = (8 / Q) + 6 – 0.4 Q + 0.08 Q^2 Find the level of output and price which maximizes profit.
10. The demand function for a particular commodity is **Y = 20 – 4 X** and the

Average cost to the monopolist is **AC = 2** . If a tax of **' t'** per unit is imposed on the monopolist , determine his maximum possible profit and the value of 't' for which tax revenue is maximized.

11. Solve the following simultaneous system by using Cramer's rule

$$3x + y - z = 2$$
$$x - 2y + z = -9$$
$$4x + 3y + 2z = 1$$

12. If $Y = X^3 - 12X + 12$

Find the maximum / minimum values of the function .

13. Explain the various functions and its uses in economic analysis.

14. a) Explain the properties of definite integrals.

b) Evaluate $\int_1^3 (x^3 + x + 6)\, dx$.

PART – C

ANSWER ANY TWO QUESTIONS IN ABOUT 900 WORDS EACH(2 X 20 = 40)

15. How does Calculus and Matrix Algebra help in Economic analysis and Business Decision making?

16. Given $A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 0 & 4 \\ 0 & 2 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 3 & 1 \\ 0 & 2 & 0 \\ -2 & 0 & 4 \end{bmatrix}$

Prove that $[AB]^{-1} = B^{-1} A^{-1}$

17. A firm has a total cost function $TC = 0.2Q^2 + 2000Q + 22500$.

The demand function of a firm is $P = 2500 - 0.8Q$ where P = price and Q output. Find out the price and output level which

a) Minimize average cost b) Maximize total revenue

c) Minimize marginal Cost and d) Maximize profit.

18. If $MR = 15 - 5x$ and $MC = 10 - 3x + 3x^2$ find the profit maximizing output and the corresponding total profit assuming pure competition.

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