STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 86
(For candidates admitted from the academic year 2015– 2016 and thereafter)
SUBJECT CODE: 15EC/AC/MM25
B. A. DEGREE EXAMINATION, APRIL 2019
BRANCH IV - ECONOMICS
SECOND SEMESTER

COURSE : ALLIED – CORE
PAPER : MATHEMATICAL METHODS FOR ECONOMICS
TIME : 3 HOURS **MAX. MARKS: 100**

SECTION – A

ANSWER ANY TEN QUESTIONS. EACH ANSWER NOT TO EXCEED 50 WORDS: (10 X 2 = 20)

1. Find the equation of the line joining the points (2,6) and (4,3)
2. State the properties of transpose of a matrix
3. Find the equilibrium price and quantity: $Q_d = 10 - 0.5\,P$, $Q_s = 5 + 2\,P$
4. State the condition for equilibrium of a firm using calculus
5. Find 5A + 3B if $A = \begin{bmatrix} 6 & 0 \\ 2 & 6 \end{bmatrix}$ $B = \begin{bmatrix} 4 & 7 \\ 4 & 2 \end{bmatrix}$
6. Find the derivative of : $y = (2x^2 + 5)^3$
7. Check if the function $y = 2x + 10x^2$ is increasing or decreasing at $x = 5$
8. If $Z = 39x^2 + 40xy + 39y^2$ show that $Z_{xy} = Z_{yx}$
9. Find the determinant of

$$A = \begin{vmatrix} 4 & 3 & 1 \\ 5 & 0 & 3 \\ 3 & 8 & 9 \end{vmatrix}$$

10. Find the MC and AC functions for $TC = 2Q^3 - 3Q^2 + 400Q + 5000$
11. Given the demand function $P = 10 - 2P$, Find the MR function
12. State the conditions for finding maxima and minima.

…2

SECTION – B

ANSWER ANY FIVE QUESTIONS. EACH ANSWER NOT TO EXCEED 400 WORDS:
(5 x 8 = 40 Marks)

13. Solve the following simultaneous equations using Cramer's Rule:

$x + y = 12$

$2x + 5y + 2z = 20$

$6x + 3y + 6z = 0$

14. The demand function of a monopolist is given by $P = 50 - 2Q$. Graph the Total Revenue function for $0 \leq Q \leq 30$. Estimate from the graph the value of Q at which revenue is maximum.

15. Prove that $A\ A^{-1} = I$

$$\begin{vmatrix} 2 & 1 & 4 \\ 3 & 7 & 5 \\ 6 & 1 & 4 \end{vmatrix}$$

16. Bring out the general structure of an input-output model and show how output is determined.

17. Discuss the use of different kinds of mathematical functions in economics.

18. Show that a Cobb-Douglas production function $Q = A K^{\alpha} L^{\beta}$ satisfies Euler's theorem.

19. Given the demand function $P = 50 - 4Q$. Find the revenue maximizing price and output. What is the elasticity of demand at that price?

20. $Q_A = 100 - 2P_A + 0.2\ Y + 0.3\ P_B$ Find the price, income and cross-price elasticities of demand at $P_A = 6$, $Y = 500$ and $P_B 10$.

SECTION – C

ANSWER ANY TWO QUESTIONS. EACH ANSWER NOT TO EXCEED 1000 WORDS (2 X 20 =40)

21. State and prove the properties of determinants.

22. Given the Input Output table for a three sector economy

		Input to			
		Agriculture	Industry	Services	Other demand
Input From	Agriculture	150	225	125	100
	Industry	210	250	140	300
	Services	170	0	30	100

If the final demands from each sector are changed to 500, 550 and 300 respectively for agriculture, industry and services, calculate the total output from each sector.

23. TC = $0.5Q^3 – 15Q^2 + 175Q +300$ and P = 152.5 – 3Q; Find the profit maximizing output & price and the maximum profit.

24. A perfectly competitive firm produces two goods X and Y, which are sold at Rs. 54 and Rs. 52 respectively. The firm has a cost function given by TC = $3x^2 + 3xy + 2y^2 – 100$. Find the quantities of each good which must be produced and sold to maximize profits. What is the maximum profit?

****