STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 86
(For Candidates admitted during the academic year 2011 – 2012 & thereafter)

SUBJECT CODE: 11EC/MC/MM14

B.A. DEGREE EXAMINATION NOVEMBER 2012
BRANCH IV – ECONOMICS
FIRST SEMESTER

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

SECTION – A

I. ANSWER ALL QUESTIONS. **(10 X2=20)**

1. Write the equation of a straight line of gradient $\frac{5}{6}$ and which makes a negative intercept of 3 units on the Y axis.
2. Show that the line 4x-2y+8=0 and 2x + 4y +1 = 0 are perpendicular to each other.
3. Define a rectangular hyperbola and give its equation.
4. Differentiate the following with respect to x
   $x^2 + y^2 = a^2$
5. Determine all the derivatives of the function
   $Y = x^3 - 6x^2 + 9x$
6. Determine whether the curve $y = x^2 - 4x + 10$ is increasing or decreasing when $x < 2$.
7. Find the partial derivatives of
   $Z = 12x^4 – 10x^2y^3 + 15y^6$
8. What is a homogeneous function?
9. State the Euler's theorem.
10. Given the demand function Q = 150 – 15p where p is the price. Find the elasticity of demand when the price is 4.

SECTION – B

II. ANSWER ANY FIVE QUESTIONS. **(5X8=40)**

11. Find the (i) length of the line joining the points (-4, -2) and (6, -3) and (ii) the equation of a straight line which makes a negative intercept of 4 units on the x axis and passes through the point (2, 4.5)
12. The demand function for a commodity is $p = 100 – x - x^2$. Find the elasticity of demand in terms of x.
13. Differentiate the following:
    $y = log\left(\frac{1+x^2}{1-x^2}\right)$
14. Show that the curves $y = \frac{a}{x-b} - c$ and $y = (a - bx)^2$ are downward sloping and convex from below.

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15. Find the partial derivative of,
$Z = \log (x^2 + y^2 + 2xy)$

16. Verify Euler's theorem for the function
$Z = ax^2 + 2hxy + by^2$

17. The demand for a good is given by

Price	Quantity
80	10
60	20

Find the linear demand function and its slope.

SECTION - C

III. ANSWER ANY TWO QUESTIONS. (2X20=40)

18. The total cost in rupees for a particular operation is given by
$C(x) = x^3 - 21x^2 + 360x + 3025$where x represents the number of units made. Determine
(i) The marginal cost of the tenth unit.
(ii) The number of units for which the marginal cost is minimum.
(iii) The minimum marginal cost.
(iv) The total cost and AC for the number of units were marginal cost is minimum.

19. A monopolist produces 2 commodities X_1 and X_2 which have the following demand functions $p_1 = 100 - 2x_1$ and $p_2 = 80 - x_2$ where p_1 and p_2 are the respective prices and x_1 and x_2 are their respective quantities. If the total cost function of the monopolist is $TC = 20(x_1 + x_2)$, find the prices and quantities that would maximize the profits.

20. A company has estimated its cost and revenue structure and has determined that C (cost), R(revenue) and x (no of units produced) are related as $C = 100 + 0.015x^2$ and $R = 3x$. (i) Find the product level x that will maximize profit and (ii) determine the level of profit when x = 120 units.

21. Find the vertex , focus, directrix, latus rectum of the parabola $y = x^2 - 2x + 3$.

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