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 2013
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. Find the equation of the straight line passing through the points (7,-3) and cutting off equal intercepts on the axis.
2. Find the slope of the line $2x - 3y + 7 = 0$
3. Define a rectangular hyperbola and give its equation.
4. Give the definition of a conics, focus and directrix .
5. Indicate whether the following function is continuous at the specified point $f(x) = 3x^2 - 4x + 7$ at $x = 2$
6. Given the following average cost function A, find the MC function $A = 6Q + 9 + \frac{120}{Q}$
7. Test to see if the function $Y = 3x^3 - 7x^2 - 8x + 93$ is concave upwards or concave downwards at $x = 5$
8. State the Eulers Theorem.
9. Show that $x^3 + ax^2y + bxy^2$ is a homogeneous function and state the degree of homogeneity.
10. For the following function find the second order derivative and evaluate it at $x = 3$ $Y = (4x - 1)(3x^2 + 2)$

SECTION – B

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

11. Find the equation of the line through the intersection of $2x + y = 8$ and $3x + 7 = 2y$ and parallel to $4x + y = 11$.
12. Find the focus, latus rectum, vertices and directrix of $y^2 + 4x - 2y + 3 = 0$
13. $P = \frac{150}{Q^2+2} - 4$ represents the demand function for a product where p is the price per unit for q units. Determine the MR function.
14. Given the equation for the production isoquant as $80L^{1/2}K^{1/2} = 3840$ find the MRTS and evaluate it at L = 36, K = 64
15. The demand function for a product is $x = 500 - 40p + p^2$ where p is the price per unit and x is the number of units demanded. Find the point elasticity of demand when p =15. If this price of Rs 15 is increased by 2% what is the approximate percentage change in demand? Hence find the approximation to the elasticity of demand
16. Verify Eulers theorem for the Cobb Douglas production function $Q = AK^aL^{1-a}$
17. Verify that the cross partials are equal for the function $Z = (2x + 5y)e^y$

SECTION - C

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

18 (a) Given the following total revenue TR and total cost TC functions maximize profits Π for the firm as follows (1) set up the profit function Π = TR – TC. (2) find the critical values were Π is maximum.(3) calculate the maximum profit.

$TR = 440q - 3q^2 \quad TC = 14q + 225$

And

(b) for the following total cost TC function (1) find the average cost AC function .(2) the critical values at which AC is minimized and (3) the minimum average cost.

$TC = 2q^3 - 12q^2 + 225q$

19. A monopolist produces two goods x and y for which the demand functions are $P_x = 315 - 4x$ and $P_y = 260 - 3y$ and the joint cost function is $C = 2x^2 + 3xy + y^2 + 400$. Find (a) the profit maximizing level of output for each product (b) the profit maximizing price for each product and c) the maximum profit.

20. Differentiate the following

(i) $y = \left(\frac{5x + 4}{3x + 2}\right)^2$

(ii) find $\frac{dy}{dx}$ if $x = \frac{(1-t)}{(1+t)}$ and $y = 2t^3 + 4t$

21. The average cost y of a monthly output x kgs of a firm producing a metal is Rs $(1/10x^2 - 3x + 50)$. Show that the average variable cost curve is a parabola. Find the output and average cost at the vertex of the parabola.

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