STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 86
(For Candidates admitted during the academic year 2009 – 2010)

SUBJECT CODE: EC/PE/MM13

M.A. DEGREE EXAMINATION NOVEMBER 2009
BRANCH III – ECONOMICS
FIRST SEMESTER

COURSE : ELECTIVE
PAPER : MATHEMATICAL METHODS - I
TIME : 3 HOURS **MAX.MARKS : 100**

SECTION – A

ANSWER ANY FIVE QUESTIONS. EACH ANSWER NOT TO EXCEED 300 WORDS: (5 X 8 = 40)

1. a) What is a continuous function ?
   b) Select the graph of the limit of a function: $\lim_{x \to 7} f(x) = 4$
2. Find the successive derivative of the function:
   $f(x) = 2x^4 + 5x^3 + 3x^2$
   and also interpret the second – order derivative as measure.

3. Find the first order derivative of the following functions:

   a) $y = \left(\frac{x+1}{x-1}\right)^2$

   b) $y = \log(4x^5 - 3x^2 + 6x)^3$

4. Given the demand function $P = 30 - 2Q$
   a) Find the marginal Revenue at $Q = 4$
   b) Find the marginal cost at $Q = 2$ if $TC = Q^2 + 7Q + 23$

5. Distinguish between
   i) increasing and decreasing functions
   ii) Concavity and convexity functions with suitable diagrams

6. Prove the elasticity of substitution, σ of Cobb – Douglas production function is unitary.

7. a) Marginal cost is given by MC = $25 + 30Q - 9Q^2$. Fixed cost is 55. Find the
   i) total cost, ii) average cost and iii) variable cost functions.

   b) Given the demand function $P = 42 - 5Q - Q^2$. Assuming equilibrium price is 6, evaluate the consumer's surplus.

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SECTION – B

ANSWER ANY THREE QUESTIONS: EACH ANSWER NOT TO EXCEED 1200 WORDS: (3 X 20 = 60)

8. For the following function: $y = x^3 - 18x^2 + 96x - 80$
   Find
   i. The critical values
   ii. Test for concavity to determine relative maxima or minima
   iii. Check for inflection points
   iv. Evaluate the function at the critical values and inflection points

9. Explain the properties of Cobb- Douglas Production functions

10. Find with two distinct demand functions
    $Q_1 = 24 - 0.2P_1$ $Q_2 = 10 - 0.05P_2$

    Where $TC = 35 + 40Q$, what price will be firm charge (a) with discrimination b) without discrimination

11. Optimize the function $z = 4x^2 + 3xy + 6y^2$ subject to the constraint $x + y = 56$

12. Explain the dynamics of growth in the economy with suitable example.

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