STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 86
(For Candidates admitted during the academic year 2008 – 2009)

                                                          SUBJECT CODE: EC/PE/MM15

M.A. DEGREE EXAMINATION NOVEMBER 2008
BRANCH   III – ECONOMICS
FIRST SEMESTER

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

SECTION – A

ANSWER ANY FIVE QUESTIONS   **(5 X 8 = 40)**

1.   a) Explain differentiability and continuity of a function   (4 marks)
      b) Find the limit of the following function.

$$\underset{x \to 0}{Lt} \quad \frac{\sqrt{2-x} - \sqrt{2+x}}{x}$$ (4 marks)

2.   For the following function (1) find the critical values (2) test for concavity to
      determine relative maxima or minima (3) check for inflection points (4) evaluate
      the function at the critical values and inflection points.
$$f(x) = x^3 - 18x^2 + 96x - 80$$

3.   A radio manufacturer produces x sets per week at a total cost of

      Rs. $(\frac{x^2}{25} + 3x + 100)$. He is a monopolist and the demand for his product is

      $x = 75 - 3p$; where P is the price in rupees per set. Show that the maximum net
      revenue is obtained when about 30 sets are produced per week. What is the
      monopoly price?

4.   Explain the properties of Linearly Homogenous function.

5.   If a consumer has Rs.90 to the divided between two commodities X and Y, and
      the price of Y is fixed at Rs. 0.20. What will be his demand equation for X if his
      utility function is:
          $U = \log Qx + 2\log Qy$ (Where Q_x and Q_y are the amounts of X and Y
      consumed by him)?

6.   a) Find the consumer's surplus
          P=375-3x^2; x_o=10 p_o=75
      b) Find the Producer's surplus
          P=x2+4x + 60; x_o=5, p_o=85

7.   Bring out the relationship between AR,MR and elasticity of demand.

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SECTION – B

ANSWER ANY THREE QUESTIONS **(3 X 20 = 60)**

8. A producer has the possibility of discriminating between the domestic and foreign markets for a product where the demands, respectively are

$$Q_1 = 21 - 0.1P_1 \qquad Q_2 = 50 - 0.4P_2$$

Total Cost $=2000+10Q$ where $Q=Q_1+Q_2$. What price will the producer charge in order to maximize projects

a) with discrimination between markets

b) with out discrimination

9. A firm has the following total cost and demand functions:

$$C = \frac{1}{3}Q^3 - 7Q^2 + 111Q + 50$$

$$Q = 100 - P$$

Find the profit maximizing level of output, also find profit at this level of output.

10. Find the general solution for the differential equation $\dfrac{dy}{dt} + 3t^2 Y = t^2$ where

$V = 3t^2$ and $Z = t^2$.

11. A firm's production function is $Q = 5L^{0.7}K^{0.3}$. The price of labour is Rs.1 per unit and the price of capital is Rs.2 per unit. Find the minimum cost combination of capital and labour for an output rate of 20.

12. Explain the derivation of slutsky equation and importance of income and substitution effect.

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