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

**SUBJECT CODE: 11EC/PE/MM34**

**M.A. DEGREE EXAMINATION NOVEMBER 2015**
**BRANCH III – ECONOMICS**
**THIRD SEMESTER**

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

**SECTION – A**

**ANSWER ANY FIVE QUESTIONS:** **(5x8=40)**

1. The market demand function of a firm is given by 8 P + Q – 64 = 0 and the firm's average cost function takes the form
   AC = (8 / Q) + 6 – 0.4 Q + 0.08 $Q^2$ Find the level of output and price which maximizes profit.

2. Prove that Cobb Douglas production function satisfies Euler's theorem.

3. Prove Cayley – Hamilton's Theorem for the given matrix $\begin{bmatrix} 3 & 0 & 4 \\ 1 & 1 & 2 \\ 1 & -2 & 2 \end{bmatrix}$

4. Find the general solution of the differential equation.
   $\frac{dy}{dt}$ + 4 y = 12.

5. Explain Harrod Domar growth model with differential equations.

6. Solve the difference equation $Y_t = 6\ Y_{t-1}$ .

   a) Check the answer using t = 0 and t = 1
   b) Comment on the nature of the time path.

7. Solve the Solve the following Linear Programming problem by graphical method.

   Maximise $\pi = 25\ x + 35\ y$
   Subject To
   $4x + 8y \leq 400$
   $4x + 4y \leq 280$
   $6x + 3y \leq 360$
   $x\ ;\ y \geq 0$

..2

## SECTION – B

**ANSWER ANY THREE QUESTIONS: (3x20=60)**

8. In monopolistic competition a producer facing the following demand functions for two different brand of a product:

   $Q_1 = 14 - 0.25\ P_1$ and $Q_2 = 24 - 0.5\ P_2$ and the joint cost function is
   $TC = Q_1^2 + Q_1\ Q_2 + Q_2^2$.
   Find the profit maximizing levels of price and output under
   a) Price discrimination
   b) No price discrimination.

9. Determine the total demand for industries 1, 2, and 3, given the matrix of technical co efficient A and the Final demand vector F below:

$$A = \begin{bmatrix} 0.4 & 0.3 & 0.1 \\ 0.2 & 0.2 & 0.3 \\ 0.2 & 0.4 & 0.2 \end{bmatrix} \quad \text{and} \quad F = \begin{bmatrix} 140 \\ 220 \\ 180 \end{bmatrix}$$

10. Solve the following Linear Programming problem by Simplex method.

Maximize $\pi = 30\,x + 24\,y + 60\,z$

Subject to $6\,x + 3\,y + 5\,z \leq 30$
$2\,x + 2\,y + 10z \leq 50$

$x\ ;\ y\ ;\ z \geq 0$

11. Given the demand function and supply function of a firm respectively.

$P = 113 - Q^2$ and $p = (Q + 1)^2$

Find a) consumers' surplus and b) producers' surplus.

12. Describe Samuelson's multiplier with second order difference equations.

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