STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 86
(For Candidates admitted during the academic year 2015 – 2016 and thereafter)

SUBJECT CODE: 15EC/PE/ME14

M.A. DEGREE EXAMINATION NOVEMBER 2016
BRANCH III – ECONOMICS
FIRST SEMESTER

COURSE : ELECTIVE
PAPER : MATHEMATICS FOR ECONOMICS
TIME : 3 HOURS **MAX. MARKS: 100**

SECTION – A

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

1. Use Cramer's rule to solve the following equation system:
   x+y-z=4
   x-2y+3z=-6
   2x+3y+z=7

2. Will a monopolist with a marginal cost c produce when the market demand curve is given by $P=AQ^{-1}$, where P is the price and Q is the quantity? Explain your answer.

3. Formulate the dual for the following problem:

$$\text{Minimize } z = x_1 + 3x_2 + 3x_3 + x_4$$

$$\text{subject to} \quad \left\{ \begin{array}{rrrrcl} 3x_1 & +4x_2 & -3x_3 & +x_4 & = & 2, \\ 3x_1 & -2x_2 & +6x_3 & -x_4 & = & 1, \\ 6x_1 & +4x_2 & & +x_4 & = & 4 \\ x_1, & x_2, & x_3, & x_4 & \geq & 0. \end{array} \right.$$

   State the weak duality theorem.

4. Find out consumers' surplus and producers' surplus in a market where demand is P=2000-50Q and supply is P=500+10Q.

5. Find out Eigen value for the following matrix:

$$A = \begin{pmatrix} 1 & -3 & 3 \\ 3 & -5 & 3 \\ 6 & -6 & 4 \end{pmatrix}$$

6. Solve the differential equation P'+aP=b, where $a \neq 0$ where P'=dP/dt

7. Show that demand curves are homogeneous of degree zero in prices and money income. Using this, show that the sum of own price elasticity, cross price elasticity and income elasticity of demand is 0.

SECTION – B

ANSWER ANY THREE QUESTIONS: (3x20=60)

8. Explain the open Leontief Input-output model. How is the closed model different from this? What condition will guarantee a non-negative solution?

9. State and prove the properties of a Cobb-Douglas production function.

10. Consider the following utility maximization problem:

    Max U=$x_1^{\alpha}.x_2^{(1-\alpha)}$

    Subject to $p_1x_1+p_2x_2=M$.

    Let $U^*(p_1,p_2)$ be the Indirect Utility function and λ be the Lagrange Multiplier. Then show that $x_1^* = -\frac{\frac{\partial U*}{\partial p_1}}{\lambda}$ and $\lambda = \partial U^*/\partial M$

11. Solve using simplex method:

    Max $z = 4x_1 + 6x_2$

    Subject to $-x_1 + x_2 \leq 11$

    $x_1 + x_2 \leq 27$

    $2x_1 + 5x_2 \leq 90$

    $x_1, x_2 \geq 0$

12. Formulate the Samuelson Accelerator Model and explain the cases of convergence and divergence.

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