

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 86
(For candidates admitted from the academic year 2004 – 2005 & thereafter)
SUBJECT CODE : EC/MC/MM44

B. A. DEGREE EXAMINATION, APRIL 2009
BRANCH IV - ECONOMICS
FOURTH SEMESTER

COURSE : MAJOR – CORE
PAPER : MATHEMATICAL METHODS – II
TIME : 3 HOURS. MAX. MARKS : 100

SECTION – A

ANSWER ALL QUESTIONS. EACH ANSWER NOT TO EXCEED 50 WORDS:
(10 X 3 = 30)

1. Define matrix and order of a matrix.
2. Define Diagonal matrix and Identity matrix with example.
3. $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ $B = \begin{bmatrix} -1 & 2 \\ 2 & -1 \end{bmatrix}$ find $2A - 3B$.
4. If $A = \begin{bmatrix} 2 & 1 \\ 4 & 3 \\ 1 & 0 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 3 \\ 2 & 2 \end{bmatrix}$ show $(AB)^T = B^T A^T$.
5. Find the value of the determinant $\begin{bmatrix} 3 & 4 & 7 \\ 2 & 1 & 3 \\ 7 & 2 & 1 \end{bmatrix}$.
6. Define the product of two matrices.
7. State Hawkins-Simon conditions.
8. What is non-negativity constraint in Linear programming.
9. What is Linear programming?
10. Define convex sets.

SECTION – B

ANSWER ANY FIVE QUESTIONS. EACH ANSWER NOT TO EXCEED 300 WORDS.
(5 X 6 = 30)

11. Prove $\begin{bmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{bmatrix} = 2(a+b+c)^3$
12. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ find $A^2 - 5A + 7I$.
13. Solve x, y and z from the following equations using inverse matrices
 $x - 2y + 3z = 1$
 $3x - y + 4z = 3$
 $2x + y - 2z = -1$

14. If $A = \begin{bmatrix} 2 & -1 \\ 4 & 3 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 0 \\ -2 & 1 \end{bmatrix}$ $C = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$ and I is the unit matrix of order 2. Find (a) $B - 4A - 2I$ (b) X if $AX = C$.
15. Explain the assumption of linear programming.
16. Solve the following Linear programming problem by graphical method
 Maximize $f = 2X + 5Y$
 Subject to $X + 4Y \leq 24$
 $3X + Y \leq 21$
 $X + Y \leq 9$
 X and $Y \geq 0$
17. Explain the process of solving an open Input-Output model.

SECTION – C

ANSWER ANY TWO QUESTIONS. EACH ANSWER NOT TO EXCEED 1200 WORDS

(2 X 20 =40)

- 18.a. Explain the properties of determinants with suitable examples.
- b. Find the inverse of $A = \begin{bmatrix} 1 & 4 & 3 \\ 4 & 2 & 1 \\ 3 & 2 & 2 \end{bmatrix}$
- 19.a. Find the value of $\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix}$
- b. Use Cramer's rule to solve the following equations
 $2x_1 + 4x_2 - x_3 = 52$
 $-x_1 + 5x_2 + 3x_3 = 72$
 $3x_1 - 7x_2 + 2x_3 = 10$
20. An economy produces only x and y . The two commodities serve as an intermediate inputs in each other's production. 0.4 tonnes of x and 0.7 tonnes of y are required to produce a tonnes of x . Similarly 0.1 tonnes of x and 0.6 ton of y are required to produce a ton of y . No capital inputs are needed. 2 and 5 labour days are required to produce a ton x and y respectively. If the economy needs 100 tonnes of x and 50 tonnes y , calculate the gross output of the 2 commodities and total labour required.
21. Solve the following Linear programming problem by simplex method
 Maximize $f = X + 4Y$
 Subject to $2X + 3Y \leq 4$
 $3X + Y \leq 3$
 $X \geq 0, Y \geq 0$
