STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 86
(For candidates admitted from the academic year 2008– 2009 & thereafter)

SUBJECT CODE : EC/MC/MM24

B. A. DEGREE EXAMINATION, APRIL 2010
BRANCH IV - ECONOMICS
SECOND SEMESTER

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

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

1. Distinguish between column vector and row vector.
2. Define Matrix multiplication with suitable examples.
3. Write down the properties of transpose of a matrix.
4. Evaluate $\begin{vmatrix} 2 & 45 & 55 \\ 1 & 29 & 32 \\ 3 & 68 & 87 \end{vmatrix}$
5. Prove $A \times A^{-1} = I$ if $A = \begin{bmatrix} 3 & 4 \\ 1 & 2 \end{bmatrix}$
6. Define the technique of input-output analysis.
7. State Hawkins-Simon conditions and explain with suitable example.
8. What are convex sets? Explain with examples.
9. Distinguish between a game and a strategy.
10. What is co-efficient matrix in value terms?

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

11. Define some special forms of square matrices with suitable examples.
12. Explain the properties of determinants with suitable examples.
13. A manufacturer produces three products P, Q and R which the sells in two markets. Annual sales volumes are indicated as follows.

Markets	Products		
	P	Q	R
I	10,000	2,000	18,000
II	6,000	20,000	8,000

Unit sales prices of P, Q & R are
Rs 2.50, Rs 1.25 and Rs 1.50
Unit costs of P, Q, and R are
Rs 1.80, Rs 1.20 and Rs 0.80
respectively.
Find the gross profits by Matrix Algebra.

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14. If $\boldsymbol{A} = \begin{bmatrix} \mathbf{2} & \mathbf{-1} \\ \mathbf{4} & \mathbf{3} \end{bmatrix}$ $\boldsymbol{B} = \begin{bmatrix} \mathbf{1} & \mathbf{0} \\ \mathbf{-2} & \mathbf{1} \end{bmatrix}$ $\boldsymbol{C} = \begin{bmatrix} \mathbf{2} \\ \mathbf{-3} \end{bmatrix}$ and $\boldsymbol{I}$ is the unit matrix of order 2.
Find (a) $\boldsymbol{B - 4A - 2I}$
(b) $\boldsymbol{X}$ if $\boldsymbol{AX = C}$.

15. Solve the following LPP by graphical method.
Minimise: $= \mathbf{0.6}\boldsymbol{x_1} + \boldsymbol{x_2}$.
Subject to $\mathbf{10}\boldsymbol{x_1} + \mathbf{4}\boldsymbol{x_2} \geq \mathbf{20}$
$\mathbf{5}\boldsymbol{x_1} + \mathbf{5}\boldsymbol{x_2} \geq \mathbf{20}$
$\mathbf{2}\boldsymbol{x_1} + \mathbf{6}\boldsymbol{x_2} \geq \mathbf{12}$
$\boldsymbol{x_1},\ \boldsymbol{x_2} \geq \mathbf{0}$

16. Solve the following game by dominant strategy.

$$A = \begin{bmatrix} 3 & -5 & -4 \\ -2 & 1 & 2 \\ -1 & 1 & 2 \end{bmatrix}$$

17. Use Laplace Expansion to find the value of determinant for the following matrix.

$$A = \begin{bmatrix} 5 & 0 & 1 & 3 \\ 4 & 2 & 6 & 0 \\ 3 & 0 & 1 & 5 \\ 0 & 1 & 4 & 2 \end{bmatrix}$$

SECTION – C

ANSWER ANY TWO QUESTIONS. EACH ANSWER NOT TO EXCEED 1200 WORDS (2 X 20 =40)

18. Use matrix inversion to solve for the unknowns in the system of linear equations given below.
$\mathbf{2}\boldsymbol{x_1} + \mathbf{4}\boldsymbol{x_2} - \mathbf{3}\boldsymbol{x_3} = \mathbf{12}$
$\mathbf{3}\boldsymbol{x_1} - \mathbf{5}\boldsymbol{x_2} + \mathbf{2}\boldsymbol{x_3} = \mathbf{13}$
$-\boldsymbol{x_1} + \mathbf{3}\boldsymbol{x_2} + \mathbf{2}\boldsymbol{x_3} = \mathbf{17}$

19. Define open and closed models and explain the process to obtain the solution of open model with help of suitable Input-output Transaction Table.

20. Solve the following LPP by simplex method.
Maximize $\mathrm{Z} = 6\mathrm{x} + 4\mathrm{y}$
Subject to $4x + 5y \leq 10$
$3x + 2y \leq 9$
$8x + 3y \leq 12$
$x, y \geq 0$

21. Write short notes on
a) Pure Strategy
b) Maximise and Minimise
c) Saddle point solutions
d) dominant strategy

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