

M. A. DEGREE EXAMINATION, APRIL 2009
BRANCH III – ECONOMICS
SECOND SEMESTER

COURSE : ELECTIVES
PAPER : MATHEMATICAL METHODS - II
TIME : 3 HOURS

MAX. MARKS : 100

SECTION – A

ANSWER ANY FIVE QUESTIONS.

(5 X 8 = 40)

1. Explain the properties of determinant with examples.
- 2.a. Define i) Diagonal matrix ii) Identity matrix
iii) Symmetric matrix iv) Idempotent matrix
- b. Find the rank of the matrix

$$A = \begin{bmatrix} 1 & 3 & 4 & -2 \\ 2 & 6 & 8 & -4 \\ 3 & 0 & 3 & 3 \end{bmatrix}$$

- 3.a. If $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$ $B = \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix}$ and $(A+B)^2 = A^2 + B^2$ find a and b .

- b. Show that the matrix $A = \frac{1}{6} \begin{bmatrix} 1 & -2 & 1 \\ -2 & 4 & -2 \\ 1 & -2 & 1 \end{bmatrix}$ is an idempotent matrix.

4. Given $A = \begin{bmatrix} 6 & 6 \\ 6 & -3 \end{bmatrix}$ find

- a. the characteristic roots
- b. the characteristic vectors

5. Explain the basic features and assumptions of Input – Output analysis with the help of Input – Output transaction table.
6. Solve $Y_{t+i} = ay_t + b$ by the iterative method.
7. Write the dual of the programme

$$\text{Minimize } f = x_1 + x_2 + 3x_3 + 2x_5$$

$$\text{Subject to } x_1 + 3x_2 - x_3 + 2x_5 \geq 7$$

$$-2x_2 + 4x_3 + x_4 \geq 12$$

$$-4x_2 + 3x_3 + 8x_5 + x_6 \geq 10$$

$$\text{and } x_j \geq 0 \quad j = 1, 2, \dots, 6$$

SECTION – B

ANSWER ANY THREE QUESTIONS

(3 X 20 = 60)

8.a. Find the Inverse of the matrix

$$A = \begin{bmatrix} 4 & 2 & 5 \\ 3 & 1 & 8 \\ 9 & 6 & 7 \end{bmatrix}$$

b. Solve the following equation by Cramer's rule

$$5x_1 - 2x_2 + 3x_3 = 16$$

$$2x_1 + 3x_2 - 5x_3 = 2$$

$$4x_1 - 5x_2 + 6x_3 = 7$$

9. Given $A = \begin{bmatrix} 0.1 & 0.3 & 0.1 \\ 0 & 0.2 & 0.2 \\ 0 & 0 & 0.3 \end{bmatrix}$

and final demand are F_1, F_2 and F_3 . Find the output levels consistent with the model. What will be the output levels if $F_1=20, F_2=0$ and $F_3=100$?

10.a. From the data given below, determine

i) the market price P_t in any time periodii) the equilibrium price P_e

iii) the stability of time path

$$Q_{dt}=180-0.75P_t, \quad Q_{st}= -30 +0.3P_{t-1}, \quad P_0=220$$

b. Explain Samuelson's multiplier – acceleration interaction model.

11. Maximize $f = 2x_1 + 3x_2 + x_3 + 7x_4$

$$\text{Subject to } 8x_1 + 3x_2 + 4x_3 + x_4 \leq 6$$

$$2x_1 + 6x_2 + x_3 + 5x_4 \leq 3$$

$$x_1 + 4x_2 + 5x_3 + 2x_4 \leq 7 \quad \text{and}$$

$$x_j \geq 0 (j = 1, \dots, 4)$$

Solve the above L.P.P by simplex method

12.a. Solve the following game

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

b. Explain the assumption and basic concepts of game theory.

