

BACHELOR OF ARTS EXAMINATION, 2025

(2nd Year, 3rd Semester)

ECONOMICS (HONOURS)

Mathematical Methods in Economics BII

Time : Two Hours

Full Marks : 30

Answer any **three** questions :

10×3

1. In an open static input output model, following data are given :

$$A = \begin{bmatrix} 0.3 & 0.4 & 0.2 \\ 0.5 & 0.1 & 0.3 \\ 0.1 & 0.4 & 0.3 \end{bmatrix} \quad d = \begin{bmatrix} 3 \\ 4 \\ 2 \end{bmatrix} \quad X = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

Find out the equilibrium output levels.

10

2. (a) Infer about stability of equilibrium y from the following differential equation :

$$y' + 9y = 5t$$

(b) Infer about the nature and stability of the time path for y in the following differential equation :

$$2y'' + 7y = 25$$

3+7

(2)

3. (a) For a market model given as (all the variables have their usual meaning)

$$Q_{dt} = k - nP_t$$

$$Q_{st} = -m + bP_{t-1}$$

$$Q_{st} = Q_{dt}$$

($\alpha, \beta, \gamma, \delta$ are parameters bearing positive values),
Find out the time path for P and infer about the nature and stability.

(b) Solve the following difference equation and infer about the nature and stability of the time path :

$$y_{t+2} + 7y_{t+1} + 10y_t = 13 \quad 5+5$$

4. For a model, the required equations are

$$P_t = A_t + B_t + C_0 (C_0 > 0) \dots (1)$$

$$A_t = \beta P_{t-1} (0 < \beta < 1) \dots (2)$$

$$B_t = \theta (A_t - A_{t-1}) (\theta > 0) \dots (3)$$

Infer about the nature and stability of the time path for P_t .
Analyse how the stability conclusion will change if β will take a value greater than 1 (one). 8+2

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