B.A EXAMINATION, 2025
ECONOMICS (HONOURS)
1st Year, 2nd Semester
Subject Code : ECON/UG/SEC/12/102
MATHEMATICAL METHODS IN ECONOMICS - II

Time : Two Hours **Full Marks : 30**

1. Answer any ***one*** of the following questions (CO1) $2\times1=2$

(a) For a homogeneous set of simultaneous equations AX = B, what is the condition for unique solution ?

(b) For a non-homogeneous set of simultaneous equations AX = B, what is the condition for unique solution ?

2. Answer any ***one*** of the following questions (CO2) $6\times1=6$

(a) Solve the following system of equations :

$0.3X_1 + 0.5X_2 + 0.2X_3 + 9 = X_1$

$0.2X_1 + 0.3X_2 + 0.3X_3 + 11 = X_2$

$0.4X_1 + 0.1X_2 + 0.2X_3 + 7 = X_3$

(b) Solve the following system of equations :

$7S + 2P + 2Q = 0$

$2S + 5Q = 0$

$18S + 4P + 14Q = 0$

3. Answer any ***one*** of the following questions (CO3) $6\times1=6$

(a) For the following set of equations, find out the expression for dI/dp at equilibrium and check whether the value of equilibrium I will increase with 'p' or not.

$Y = C + 1 + G$

$C = C(Y), 0 < C^{/} (Y) < 1$

$I = p+qr$

$G = m + nY$

Where, Y, C, I, T and G are income, consumption, investment, tax and government expenditure respectively.

(b) For the following set of equations, find out the expression for dP/dw at equilibrium using implicit function theorem and check whether the value of equilibrium S will increase with 'w' or not taking different restrictions on the parameters.

$D = D(P, Y)$; $D_P < 0$, $D_Y > 0$

$S = S(P, w)$; $S_P > 0$, $S_W > 0$

$D = S$

Where, D, S and P are demand for apple, Supply of apple and price of apple respectively. Y is income and w is weather parameter.

4. Answer any ***two*** of the following questions (CO4) 8×2=16

(a) Solve (i) $2(dy/dt) + 7y = 5y^3$ 4

(ii) $Y_{t+1} - Y_t = t$ 4

(b) Solve for time path and infer about the nature and stability of the time path for P from the following set of differential equations : 8

$Q^d = a - bP + k(dP/dt) + m(d^2P/dt^2)$; $a, b > 0$

$Q^s = c + nP + s(dP/dt) + g(d^2P/dt^2)$; $c, n > 0$

$Q^d = Q^s$

Where, k, m, s and g are constant.

(c) Solve for time path and infer about the nature and stability of the time path for C_t the following set of difference equations : 8

$Y_t = C_t + I_t + G_0$

$C_t = \beta Y_{t-1}$

$I_t = \alpha (C_t - C_{t-1})$