Bachelor of Arts Examination, 2023

(2nd Year, 1st Semester)

ECONOMICS

[Mathematical Methods in Economics BII]

Time : Two Hours   Full Marks : 30

Answer any *three* questions.

1. (a) In a market model, it is given that demand (Q^d) is dependent upon the income of the individual (Y) along with the price of the commodity (P), whereas supply (Q^s) is dependent upon the weather condition (W) along with the price of the commodity in the following way

$Q^d = f(P,Y)$

$Q^s = h(P,W)$

The quilibrium condition is

$Q^d = Q^s$

If $f_p < 0$, $f_Y > 0$, $h_p < 0$ and $h_w > 0$, find out the effect of change in Y and W on the equilibrium value of P, Q^d and Q^s.

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

$$y' + 7y = 5 \cos x$$

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

$$3y'' + 5y = [\sin(3/5)]^{2/3} \qquad 3+7$$

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

$$Q_{dt} = \alpha - \beta P_t$$

$$Q_{st} = \gamma + \delta P_t$$

$$P_{t+1} = P_t - k (Q_{st} - Q_{dt}) \ (\alpha, \beta, \gamma, \delta) \text{ are parameters}$$

bearing positive values),

Find out the time path for P and infer about the nature and stability.

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

$$Y'' + 7y' + 12y = 13 \qquad 5+5$$

4. For a multiplier accelerator model, the required equations are :

$$Y_t = Ct + I_t + G_0 \ (G_0 > 0) \ ..... \ (1)$$

$$C_t = \beta Y_{t-1} \ (0 < \beta < 1) \ ....(2)$$

$$It = \theta (C_t - C_{t-1}) \ (\theta > 0) \ ..... \ (3)$$

Where Y_t, C_t and I_t are the income, consumption and investment at period t.

Infer about the nature and stability of the time path for C_t and I_t using simultaneous equation analysis.

Analyse how the stability condition will change if β will take a value greather than 1(one).   8+2=10