BACHELOR OF ARTS EXAMINATION, 2017

(1st Year, 2nd Semester)

ECONOMICS (HONOURS)

MATHEMATICAL ECONOMICS II

Time : Two hours   Full Marks : 30

Answer any three questions:

1) a) State the condition for the existence of a unique solution to a system of simultaneous equations?   1

   b) For a Leontief open static input-output model, the input coefficient matrix A and the final demand vector d are given as:

$$A = \begin{bmatrix} 0.2 & 0.1 & 0.6 \\ 0 & 0.5 & 0.1 \\ 0.4 & 0.2 & 0.2 \end{bmatrix} \quad d = \begin{bmatrix} 5 \\ 4 \\ 2 \end{bmatrix}$$

   Find out the equilibrium outputs for all the three industries.

   c) What will be the effect on the equilibrium output of the first and third industry for a change in the final demand for the second and the third industry?   4

2) Answer the following questions for a market model given as (all the variables have their usual meanings):

   $Q^d = Q^s$

   $Q^d = 3 - 0.7P + 0.8P' + 2.5P''$

   $Q^s = -7 + 0.9P + 0.5P''$

   a) Find out whether the time path for P is stable or not (use two decimal point approximation).   7

   b) Given the initial conditions $P(0) = 7$ and $P'(0) = -7$, find out whether the time path for P will converge to the equilibrium value or not (use two decimal point approximation).   3

3) a) For a market model given as (all the variables have their usual meanings):

   $Q^d_t = Q^s_t$

   $Q^d_t = 3 - 2P_t$

   $Q^s_t = -5 + 6P_{t-1}$

   Find out the time path for price and infer about its stability.   7

   b) If instead, demand curve becomes a function of time such that the model becomes:

   $Q^d_t = Q^s_t$

   $Q^d_t = 3 - 2P_t + 3t^2$

   $Q^s_t = -5 + 6P_{t-1}$

   Find the time path of price.   3

4) a) Solve the following differential equation:

   $3y^3 t\,dy + (y^4 + 2ty)dt = 0$.   6

   b) For a growth model given as (all the variables have their usual meanings):

   $Q = f(K, L)$,

   $\lambda Q = f(\lambda K, \lambda L)$

   $f_K > 0$ and $f_L > 0$

   $f_{KK} < 0$ and $f_{LL} < 0$

[Turn over

$K' = \alpha Q$ and $L'/L = \lambda$,

Find out whether equilibrium, defined by $(K/L)' = 0$, is stable or not.   4

5) For an income determination model given as (all the variables have their usual meanings):

$Y_t = C_t + I_t + G_t$

$C_t = 3 + 0.8Y_{t-1}$

$I_t = 0.5(C_t - C_{t-1})$

$G_t = G_0 t$

Find out the time path for Y and C using simultaneous difference equation analysis. Analyse the nature of the time paths. Analyse the stability of the time paths.   7+1.5+1.5