PG Odd Semester (CBCS) Exam., December—2016

ECONOMICS

(3rd Semester)

Course No. : ECOCC–305

(Mathematical Economics—I)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

Answer **five** questions, selecting **one** from each Unit

UNIT—I

1. *(a)* A consumer has the following utility function derived over x_1 and x_2 :

    $U(x_1, x_2) = a_1 \log x_1 + a_2 \log x_2; a_1 + a_2 = 1$

    If p_x and p_y are the fixed prices of two goods x and y and the individual's fixed income is M, find his demand schedules from x_1 and x_2.

(b) Show that diminishing marginal utility is neither necessary nor sufficient for diminishing marginal rate of substitution.

(c) Present Slutsky equation in terms of elasticities. 7+5+2=14

2. *(a)* An individual lives in a two-commodity world. How will his purchases change if prices and money income are doubled?

(b) Establish the relationship between the Lagrangean multipliers of the utility maximization problem and its dual problem.

(c) Assume a demand function

    $q = 25 - 5p$

    What is the highest price anybody will pay for the commodity? 6+6+2=14

UNIT—II

3. *(a)* Given the production function $q = x_1^{1/2} x_2^{1/2}$ and prices per unit of x_1 and x_2 are ₹ 2 and ₹ 4 respectively and total cost of ₹ 80. Determine the maximum output subject to the cost constraint.

(3)

(b) If the production function is of the form

$$q = 8x_1^{1/2} + 20x_2^{1/2}$$

and if $r_1 = 1$, $r_2 = 5$, derive the equation of the expansion path.

(c) State and prove the 'adding-up' theorem. 6+5+3=14

4. (a) Given the production function

$$Q = K^{1/2}L^{1/2} \text{ and } P_K = ₹\,4, P_L = ₹\,8$$

Derive equation of the total cost function.

(b) Show that if the production function is given by the equation

$$q = Ax_1^2 x_2^2 + Bx_1^3 x_2^3$$

the expansion path is given by

$$r_1 x_1 - r_2 x_2 = 0$$

where r_1 and r_2 are the unit prices of x_1 and x_2 respectively.

(c) Verify Euler's theorem of homogeneous function. 6+5+3=14

(4)

UNIT—III

5. (a) A profit maximizing monopolist has the following demand and total cost functions :

Demand function, $p = \dfrac{3}{q}$

Cost function, $c = 2q + 3q^2$

Is it possible for this monopolist to produce positive amounts for which his profit would be maximum? Give reasons for your answer.

(b) Decompose economic efficiency as the sum of the technical and allocative efficiencies using Farrell's input-based measure. 8+6=14

6. (a) Given the following demand and cost functions :

$$p = 250 - 3q \text{ and } c = 3q + 5q^2$$

Find the profit maximizing price and output. How would the firm adjust its price and output, if a tax of ₹ 4 per unit of output be imposed on the firm?

(5)

(b) Illustrate Farrell's output-based measure of technical efficiency and inefficiency using a well-behaved production function. 8+6=14

UNIT—IV

7. (a) Distinguish between Marshallian and Walrasian static stability conditions of equilibrium. Examine the stability of equilibrium when both demand and supply curves have slopes of same sign.

(b) You are given the market demand and supply functions as

$$Q^D(t) = \alpha - \beta P(t), \text{ with } (\alpha, \beta) > 0$$

$$Q^S(t) = \gamma + \delta P(t), \text{ with } (\gamma, \delta) > 0$$

Further a dynamic price adjustment mechanism is given as

$$\dot{P} = \lambda [Q^D(t) - Q^S(t)]$$

$\lambda > 0$ is a constant. Find the time path of price. What restrictions should you impose on the parameters for dynamic stability? (5+2)+(4+3)=14

(6)

8. (a) Formally derive the impacts of specific sales tax and ad valorem tax on competitive equilibrium. Suppose a competitive industry consist of 100 identical firms each having a cost function of the form

$$C_i = 0 \cdot 1 q_i^2 + q_i + 10$$

If a per unit sales tax of ₹ t is imposed, derive the market supply function.

(b) A monopolist having the following inverse demand and cost functions is able to separate her consumers into two distinctly separate markets :

$$P_1 = 80 - 5Q_1$$

$$P_2 = 180 - 20Q_2$$

$$C = 50 + 20(Q_1 + Q_2)$$

Calculate profit maximizing prices and quantities. (4+6)+4=14

UNIT—V

9. (a) Derive the slopes of the aggregate demand and aggregate supply functions under a complete Keynesian system. What change do you observe in if you insert a classical money demand function into the system?

(b) Establish the result that money is neutral in the Lucas-Phelps model under the assumption of perfect information for buyers and sellers.

(4+3)+7=14

10. Write short notes on any *two* of the following :   7×2=14

(a) Kaldor-Kalecki model of business cycle

(b) Dynamic multipliers in macroeconomic system

(c) The new Phillips curve

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