PG Odd Semester (CBCS) Exam., December—2018

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)* Suppose the utility function and the budget constraint of a consumer is given by

$$V = xy \quad \text{and} \quad 100 - p_x x - p_y y = 0$$

respectively, where x and y are the amounts of two goods X and Y consumed by the consumer and p_x, p_y are the given prices of X and Y respectively.

  (i) Find the demand function of X and Y.

  (ii) Show that these demand functions are HGNS^0 in absolute prices and income.

  (iii) Can the two goods be complementary in the present model?

(b) Prove that in a two-commodity framework, the algebraic sum of own, cross and income elasticities of an individual's demand for commodity is zero. (4+3+3)+4=14

2. *(a)* Prove that DMU is neither necessary nor sufficient for DMRS.

(b) Determine how consumer will react to a change in his/her money income, when prices are constant.

(c) A rick averse person is offered a choice between a gamble that pays ₹ 1,000·00 with probability of $\frac{1}{4}$ and ₹ 100·00 with probability of $\frac{3}{4}$ or a direct cash payment of ₹ 325·00. Which one would the person choose and why? 5+5+4=14

(3)

3. *(a)* The rate of change of output Q with respect to the input x is equal to the product of the input and output. Find the production function if $Q = 4e^2$, when $x = 2$.

(b) Calculate the elasticity of substitution for the production functions $X = 15L^{4/5}K^{1/5}$. Now do the same for $X = 50L^{2/3}K^{2/3}$. Are you surprised at either of these results?

(c) Given $q = 75[0 \cdot 3K^{0 \cdot 4} + 0 \cdot 7L^{0 \cdot 4}]^{2 \cdot 5}$, find out the degree of homogeneity of this production function and verify Euler's theorem. 4+5+5=14

4. *(a)* Find the elasticity of substitution for the production function
$$Q = 75[0 \cdot 3K^{0 \cdot 4} + 0 \cdot 7L^{0 \cdot 4}]^{2 \cdot 5}$$

(b) Show that for the production function $q = 0 \cdot 75L^{0 \cdot 63}K^{0 \cdot 37}$ the isoquants are downward sloping and convex to the origin.

(4)

(c) The partial elasticities of two inputs x and y are given by and respectively. Determine the production function. 5+5+4=14

UNIT—III

5. *(a)* Given the following demand cost functions $p = 250 - 3q$ and $C = 3q + 5q^2$ respectively, find the profit maximizing price and output. How would the firm adjusts its price and output, if a tax of ₹ 4·00 per unit of output be imposed on the firm?

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

6. *(a)* A monopolist faces two demand functions $p_1 = 12 - q_1$ and $p_2 = 20 - 3q^2$ in two markets. Suppose his total cost function is $C = 3 + 2(q_1 + q_2)$. Determine the prices that the monopolist will charge in the two markets if his objective is to maximize profit.

(5)

(b) Given the demand function $p \quad 20 \quad q$ and the total cost function $C \quad q^2 \quad 8q \quad 2$, answer the following :

  (i) What output maximizes total profit and what are the corresponding values of price, profit and sales?

  (ii) What output maximizes sales and what are the corresponding values of price, profit and sales?

  (iii) What output maximizes sales subject to the constraint that profit cannot be less than 8 and what are the corresponding values of price, profit and sales?   5+(3+3+3)=14

UNIT—IV

7. *(a)* Show that Walrasian static stability implies Marshallian instability when demand and supply curves have slopes of similar signs. Is the converse also true?

(b) You are given the following time varying demand supply functions :

$$Q^d(t) \qquad p(t); \ (\ ,\ ) \quad 0$$
$$Q^s(t) \qquad p(t); \ (\ ,\ ) \quad 0$$

(6)

Moreover excess demand directly influences the rate of price rise given by

$$\frac{dp(t)}{dt} \qquad (Q^d \quad Q^s); \qquad 0$$

Find the time path of price and derive the condition for dynamic stability. What happens to the system when—

  (i)   ;

  (ii)   ?   4+(8+2)=14

8. *(a)* For two separated markets for a good with different price elasticities of demand, establish the result that profit maximizing outputs are identical under pure and discriminating monopoly. Are profits also identical? Explain.

(b) Outline the phenomenon of Nash bargaining between 'firm' and 'union' and show how wages and employment can be determined under such bargaining.   8+6=14

UNIT—V

9. *(a)* Under the framework of the complete Keynesian model, derive the slopes of the aggregate demand and aggregate supply curves and verify whether aggregate supply is upward rising.

   (b) Examine how monetary expansion affects equilibrium values of output, employment, interest rate and the price level in the complete Keynesian model. Is real wage rate also affected? If so, why?   6+8=14

10. *(a)* In case of Friedman-Phelps expectations augmented Phillips curve shows that long-run Phillips curve is steeper than its short-run counterpart.

   (b) Write short notes on any *two* of the following :
     (i) Lucas supply function
     (ii) Dynamic multiplier
     (iii) Kaldor's business cycle   5+(4½×2)=14

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