2017/SEM/EVEN/ECOH–203 (A/B)/204

TDC Even Semester Exam., 2017

ECONOMICS

(Honours)

(2nd Semester)

Course No : ECOH–203

Full Marks : 50

Pass Marks : 17

Time : 2 hours

The figures in the margin indicate full marks for the questions

Arts students will answer ECOH–203 (A) and Science students will answer ECOH–203 (B)

(For Arts Students)

Course No : ECOH–203 (A)

(MATHEMATICS FOR ECONOMICS—II)

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

UNIT—I

1. Find the complementary function, the particular integral and general solution of the following : 5+5=10

   (a) $2\cdot\frac{dy}{dx}+10y=15;\ \ y(0)=0$

   (b) $\frac{dy}{dx}-7y=7,\ \ y(0)=7$

2. The demand and supply functions are given as follows :

$$Q_d = \alpha - \beta p;\ (\alpha, \beta) > 0$$

$$\text{and } Q_s = -\gamma + \delta p;\ (\gamma, \delta) > 0$$

$$\text{moreover } \frac{dp}{dt} = \theta(Q_d - Q_s)\ ;\ \theta > 0$$

(a) Find the time path of price.

(b) Obtain the condition for dynamic stability. 6+4=10

UNIT—II

3. The total cost function of a firm is

$$C = \frac{1}{3}Q^3 - 3Q^2 + 9Q$$

At what output level is average cost minimum? What is the value of marginal cost at this point? 5+5=10

4. The demand function in a market for a particular good is

$$Q_d = \frac{20}{p+1}$$

Find the price elasticity of demand at $p = 3$ and $p = 5$. Explain the nature of these elasticities. (4+4)+2=10

(Continued)

UNIT—III

5. (a) Use the principle of cost minimization to derive the equation of the expansion path for the production function

$$Q = AK^{\alpha} \cdot L^{1-\alpha}$$

with $A > 0$, $0 < \alpha < 1$ 5

(b) Find the degree of homogeneity of the following production functions : 2+2+1=5

(i) $Q = 0 \cdot 68 \cdot K^{0 \cdot 53} \cdot L^{0 \cdot 36}$

(ii) $Q = K^{\alpha} \cdot L^{1-\alpha} + \alpha \cdot K + (1-\alpha) \cdot L$

(iii) $Q = K^{0 \cdot 64} \cdot L^{0 \cdot 36}$

6. Write a note on Eugel curve. Elaborate how you would plot an Eugel curve, given the utility function of a consumer, her budget and prices of two commodities. 2+8=10

UNIT—IV

7. Given the technical coefficient matrix

$$A = \begin{bmatrix} 0 \cdot 1 & 0 \cdot 3 & 0 \cdot 1 \\ 0 & 0 \cdot 2 & 0 \cdot 2 \\ 0 & 0 & 0 \cdot 3 \end{bmatrix}$$

and final demands F_1, F_2 and F_3. Find the output levels consistent with the model. 10

(Turn Over)

8. Given the input-output coefficient matrix

$$A = \begin{bmatrix} 1/8 & 1/3 & 1/4 \\ 1/2 & 1/6 & 1/4 \\ 1/4 & 1/6 & 1/4 \end{bmatrix}$$

and final demand vector

$$\begin{bmatrix} 10 \\ 28 \\ 14 \end{bmatrix}$$

Find the total output of the three sectors. 10

UNIT—V

9. Find the demand vector D which is consistent with the output vector

$$X = \begin{bmatrix} 25 \\ 21 \\ 18 \end{bmatrix}$$

when the input-output coefficient matrix is

$$A = \begin{bmatrix} 0\cdot2 & 0\cdot3 & 0\cdot2 \\ 0\cdot4 & 0\cdot1 & 0\cdot2 \\ 0\cdot1 & 0\cdot3 & 0\cdot3 \end{bmatrix}$$

10

10. *(a)* How does the closed Leontief input-output system differ from the open system? Elaborate. 5

(b) Point out the limitations of input-output analysis. 5

(For Science Students)

Course No : ECOH–203 (B)

(ELEMENTS OF MATHEMATICAL ECONOMICS—II)

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

UNIT—I

1. *(a)* Consider a game with the following pay-off matrix :

		Player-B	
		B_1	B_2
Player-A	A_1	2	6
	A_2	–2	λ

(i) Show that the game is strictly determinable, whatever λ may be.

(ii) Determine the value of the game.

(b) Solve the game whose pay-off matrix is given by

		Player-B			
		B_1	B_2	B_3	B_4
Player-A	A_1	1	7	3	4
	A_2	5	6	4	5
	A_3	7	2	0	3

(3+2)+5=10

(Turn Over)

2. *(a)* Determine the optimum strategies for the two players X and Y and find the value of the game from the following pay-off matrix :

Player-Y

$$\text{Player-X} \quad \begin{bmatrix} 3 & -1 & 4 & 2 \\ -1 & -3 & -7 & 0 \\ 4 & -6 & 2 & -9 \end{bmatrix}$$

(b) Discuss the uses and limitations of game theory. 5+5=10

UNIT—II

3. Given

$$A = \begin{bmatrix} 0\cdot1 & 0\cdot3 & 0\cdot1 \\ 0 & 0\cdot2 & 0\cdot2 \\ 0 & 0 & 0\cdot3 \end{bmatrix}$$

and final demands are F_1, F_2 and F_3.

(a) Find the output levels consistent with the model.

(b) What will be the output levels if $F_1 = 20$, $F_2 = 0$ and $F_3 = 100$?

(c) Check the Hawkins-Simon condition. 5+3+2=10

(Continued)

4. Suppose three industries are producing three commodities P, Q and R with the given coefficient matrix, and final demand as follows :

$$A = \begin{bmatrix} 0\cdot 3 & 0\cdot 5 & 0\cdot 2 \\ 0\cdot 2 & 0 & 0\cdot 5 \\ 0\cdot 1 & 0\cdot 3 & 0\cdot 1 \end{bmatrix}$$

$$\text{and } F = \begin{bmatrix} 100 \\ 40 \\ 50 \end{bmatrix}$$

(a) What will be the output levels?

(b) Check the Hawkins-Simon condition.

7+3=10

UNIT—III

5. (a) Write a short note on Leontief's dynamic model of input-output analysis.

(b) What are the assumptions of this model?

7+3=10

6. Write short notes on the following : 5+5=10

(a) Significant limitations of the input-output model

(b) Dynamic input-output model

(Turn Over)

UNIT—IV

7. (a) What is linear programming?

(b) A manufacturer makes two products x_1 and x_2. The first product requires 5 hours for processing, 3 hours for assembling and 4 hours for packaging. The 2nd product requires 2 hours for processing, 12 hours for assembling and 48 hours of packaging. The profit margin for x_1 is ₹ 7·00 and for x_2 is ₹ 21·00. Express the data in linear programming problem having objective function and constraints. 5+5=10

8. (a) Define feasible, basic and basic feasible solutions of linear programming problem.

(b) Graphically solve the following linear programming problem :

Maximize $\pi = 10x_1 + 8x_2$

subject to

$$6x_1 + 2x_2 \le 36$$
$$3x_1 + 5x_2 \le 30$$
$$x_1 + 4x_2 \le 20$$
$$x_1,\ x_2 \ge 0$$

(2+2+2)+4=10

UNIT—V

9. (a) Give some examples of application of linear programming.

(b) What is primal and dual problems in linear programming? 5+5=10

(Continued)

[illegible]. (a) What are the limitations of linear programming?

(b) What are the economic interpretations of duality?

5+5=10

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