



Reg. No. :

Name :

Fourth Semester M.A. Degree (Reg./Suppl./Imp.) Examination, March 2017
(2014 Admission Onwards)
ECONOMICS/APPLIED ECONOMICS/DEVELOPMENT ECONOMICS
Elective – ECO 4E15 : Mathematical Economics

Time : 3 Hours

Total Marks : 60

PART – A

Objective type questions. Answer all questions.

1. Utility function is a _____ function.

a) Convex	b) Quasi convex
c) Concave	d) Quasi concave

2. Cross elasticity of demand for jointly consumed goods is

a) Positive	b) Negative
c) Zero	d) None of these

3. An isoquant is rectangular hyperbola, when _____ equals one.

a) Marginal product of labour	b) Marginal product of capital
c) Marginal rate of technical substitution	d) Elasticity of substitution

4. If $MRTS_{LK}$ equals 6, then $\frac{MP_K}{MP_L}$ is

a) 6	b) 3
c) $\frac{1}{6}$	d) $\frac{1}{3}$

5. For a monopolist, price equals 4 and the elasticity of demand with respect to price is -0.5 , his marginal revenue is

a) -4	b) 2
c) 6	d) -8



6. In CES production function, when elasticity of substitution is _____, then the factors are perfect substitutes.
- a) One
b) Zero
c) Infinity
d) Less than one.
7. Total cost function is $\frac{3}{4}x + \frac{15}{3}$, then the average cost for 20 units of output is :
- a) 2
b) 10
c) 20
d) 1
8. The equilibrium point where the maximin strategy of firm A and the minimax strategy of firm B are the same are called
- a) Pay off
b) Mixed strategy
c) Nash equilibrium
d) Saddle point **(8×1/2=4)**

PART – B

Short answer questions, answer **any 8** questions. Answer should not exceed **1 1/2 pages each** :

9. If the utility function of an individual is $U = u(x_1, x_2) = x_1^2 x_2^2$, find the marginal utility function of each of the two goods ?
10. Find out the nature of good 1, good 2 and good 3 in the given demand function
 $Q = 50 - 0.5 P_1 + 0.75 P_2 - P_3 + 0.8 M$
 Where P is Prices of goods, Q is Quantity demanded and M is income of the consumer ?
11. Given the demand function : $x_1 = P_1^{-0.6} P_2^{1.2}$, find the own price elasticity and the cross price elasticity of demand.
12. Find the degree of homogeneity of the function : $f(x, y) = \sqrt{x^2 + xy + y^2}$.
13. Define expansion path.



14. Show that the production function : $Q = Ak^\alpha L^\beta$ is homogenous of degree $(\alpha + \beta)$.
15. The demand function is given as : $P = 100 - 2Q$. Find the marginal and average revenue function.
16. Total revenue function : $R = 20Q - 4Q^2$ and total cost function : $C = 10 + 4Q$. Find the equilibrium output of the firm.
17. Define Lerner index of monopoly power. Calculate Lerner index when the elasticity of demand for the firm is -4 .
18. Given the input matrix and the final demand vector of an input-output analysis.

$$A = \begin{bmatrix} 0.75 & 0.90 & 0.34 \\ 0.10 & 0.05 & 0.63 \\ 0.38 & 0.67 & 0.18 \end{bmatrix} \quad d = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 2 & 3 & 0 & 0 \\ 9 & 0 & 0 & 0 \end{bmatrix}$$

Write out the specific input-output matrix equation for this model. Explain the economic meaning of elements 0.10, 0.18 and 900.

19. Define two person zero sum game. (8x2=16)

PART - C

Short essay, answer **any 4** questions. Answer should **not** exceed **2 1/2** pages **each**.

20. Show that the indifference curve is negatively sloped.
21. Explain indirect utility function.
22. Define consumer surplus. If the demand function is $P = 42 - 4x - x^2$ and the demand $x_0 = 3$, what will be the consumer's surplus ?
23. Show that Euler's theorem is satisfied in linearly homogenous production function : $Q = Ak^{0.25} L^{0.75}$.
24. Given the cost function : $C = r_1 x_1 + r_2 x_2 + b$ and the production function : $q^0 = f(x_1, x_2)$, derive the conditions of cost minimisation subject to constraints by an entrepreneur.



25. Explain linear programming. Find out the dual of the given primal problem :

$$\text{Maximize : } Z = 3x_1 + 5x_2$$

$$\text{Subject to : a) } x_1 + 4x_2 \leq 24$$

$$3x_1 - x_2 \leq 6$$

$$2x_1 + 6x_2 \leq 11$$

$$x_1 - 7x_2 \leq 18$$

$$\text{b) } x_1, x_2 \geq 0.$$

(4×5=20)

PART - D

Long essay – Answer **any two** questions. Answer should **not exceed 6 pages each** :

26. Utility function $U = 2xy + 15$, $P_1 = 4$ and $P_2 = 3$ are prices of x and y respectively. Income of the consumer equals ₹ 360. Find the optimal quantities of x and y .

27. Discuss in detail linear expenditure system and its components.

28. If two firms constitute duopoly industry with their profit functions as

$$\pi_1 = 16x_1 - x_1^2 - 2x_2^2 - 20 \text{ and}$$

$$\pi_2 = 18x_2 - x_2^2 - 4x_1 - 12, \text{ what will be the firm's profits and output if they set output level by collusion or if they try to maximise their joint profits ?}$$

29. What is input-output analysis ? What are its limitations ?

(2×10=20)