

## SIXTH SEMESTER B.A. DEGREE EXAMINATION, MARCH 2019

(CUCBCSS)

Economics

ECO 6B 12—MATHEMATICAL ECONOMICS

Time : Three Hours

Maximum : 80 Marks

## Part A

Answer all questions.

Each question carries  $\frac{1}{2}$  mark.

1. A linear function is in the form :

(a)  $y = a + bx$ .

(b)  $y = a + bx + cx^2$ .

(c)  $y = ax^n$ .

(d)  $y = a^x$ .

2. For the consumption function,  $C = 100 + 0.8y$ , MPC is :

(a) 100.

(b)  $0.8y$ .

(c) 0.8.

(d) None of the above.

3. If the total revenue function is given as,  $R = 2x^2 - 10x$ , MR is :

(a)  $x^2 - 5$ .

(b)  $4x$ .

(c)  $4x - 10$ .

(d)  $2x^3 - 10x^2$ .

4. If change in price, either rise or fall, is followed by a fall in total outlay, the Elasticity of demand is said to be :

(a) Less than unity.

(b) Greater than unity.

(c) 1.

(d) 0.

5. For the demand function,  $D = 100 - 2P$ , price elasticity is :

(a)  $\frac{-2P}{100 - 2P}$ .

(b)  $-2P$ .

(c)  $-2$ .

(d)  $\frac{100 - 2P}{2P}$ .

Turn over

6. The sufficient condition for maximum is :

- (a)  $f''(x) > 0$ . (b)  $f''(x) < 0$ .  
(c)  $f'(x) = 0$ . (d)  $f''(x) < 0$ .

7. Marginal utility for the utility function  $U = 20x^4 + 7x^3 + 13x^2 + 12x + 9$  is :

- (a)  $80x^3 - 7x^2 - 13x$ . (b)  $80x^3 + 21x^2 + 26x + 12$ .  
(c)  $80x^3 + 12$ . (d)  $80x^3 + 21x^2 + 13x$ .

8. In order to maximize profit, a firm must choose the output level such that its :

- (a)  $MR < MC$ . (b)  $MR > MC$ .  
(c)  $MR = MC$ . (d)  $MR \neq MC$ .

9. If the production function is a linear homogeneous production function then the elasticity of substitution between capital and labour is :

- (a) 0. (b) Greater than one.  
(c) Less than one. (d) Equal to one.

10. Linear Programming as an economic tool was first developed and applied by :

- (a) Prof. Danzig. (b) Von Neumann.  
(c) Morgenstern. (d) Prof. W.W. Leontif.

11. The quantity of the supply of a product at a given price depends upon the nature of its :

- (a) AC curve. (b) MC curve.  
(c) MR curve. (d) AR curve.

12. Input-Output analysis assumes :

- (a) Increasing returns to scale. (b) Diminishing returns to scale.  
(c) Constant returns to scale. (d) None of the above.

(12 × ½ = 6 marks)



**Part B (Very Short Answer Questions)**

Answer any **ten** questions.

Each question carries 2 marks.

13. Distinguish between Leontief open and closed input-output model.
14. What is a linear homogeneous function ?
15. What is optimal solution ?
16. Define cross elasticity of demand.
17. Define production possibility curve.
18. For the total utility function  $U = 20x^4 + 7x^3 + 13x^2 + 12x + 9$ , compute marginal utility.
19. What is an economic model ?
20. Define Marginal propensity to consume.
21. If the price of a commodity is Rs. 5 and MR is Rs. 10, find the elasticity of demand.
22. Define market equilibrium.
23. What is an isoquant ?
24. Compute Average cost for the Total cost  $C = 8x^3 + 3x^2 - 6x + 3$ .

(10 × 2 = 20 marks)

**Part C (Short Essay Questions)**

Answer any **six** questions.

Each question carries 5 marks.

25. What is meant by input-output analysis ? What are the various uses of input-output analysis ?
26. Explain the concepts of maxima and minima of functions. How are they estimated ?
27. Discuss the conditions for profit maximization under monopoly.
28. For a firm under perfect competition, it is given that  $p = 3$  and  $c = 100 + .015x^2$ . Find how many items are produced to maximize the profit. What is the profit ?
29. Determine Marginal Utilities of  $x$  and  $y$  at  $x = 3$  and  $y = 2$  for the Total Utility Function  $U = 5x^2 y + 2xy^3 + 3x + 9y$ .

**Turn over**



30. What are the applications of Linear Programming methods ?
31. Calculate marginal productivity of labour and capital from the following production functions  
(i)  $X = L^2 + 2L + 10$ ; (ii)  $X = K^2 + 3K^3$ .
32. Write a note on indifference curve. What are the properties of indifference curve ?

(6 × 5 = 30 marks)

**Part D (Essay Questions)***Answer any two questions.**Each question carries 12 marks.*

33. Solve the following LPP graphically :

$$\begin{aligned} \text{Maximize } Z &= 2x_1 + 3x_2 \\ \text{subject to } &x_1 + x_2 \leq 1 \\ &3x_1 + x_2 \leq 4 \\ &x_1 \geq 0, x_2 \geq 0. \end{aligned}$$

34. Given the utility function  $U = f(x, y)$ , the prices are  $p_1 = \text{Rs. } 5$  and  $p_2 = \text{Rs. } 5$  and consumer's income for the period is Rs. 50. Find out the consumer's equilibrium level of consumption of commodity  $x$  and  $y$ . Also prove the conditions for maximization.
35. Given the following Revenue (R) and Cost (C) functions for a firm  $R = 20q - q^2$  and  $C = q^2 + 8q + 2$ , find the equilibrium level of output, price, total revenue, total cost and profit.
36. Given the Demand and the Average Cost Functions of a monopolistic firm as  $P = 32 - 3q$ ,  $AC = q + 8 + \frac{5}{q}$ , what level of output maximizes total profit and what are the corresponding values of R, AR, MR, C, AC, MC and Profit ?

(2 × 12 = 24 marks)