

## SIXTH SEMESTER B.A. DEGREE EXAMINATION, MARCH/APRIL 2016

(UG-CCSS)

Economics

EC 6B 11—MATHEMATICAL ECONOMICS AND ECONOMETRICS

(2013 Admissions)

Time : Three Hours

Maximum : 30 Weightage

## Part A

Answer all questions.

1. Given the demand function  $D = 200 - X$ , the marginal demand is :
- (a)  $-10$ . (b)  $-1$ .  
(c)  $-X$ . (d)  $1$ .
2. Given the iso-utility function  $U^0 = XY$ , the marginal rate of substitution of X for Y is :
- (a)  $-\frac{Y}{X}$ . (b)  $\frac{Y}{X}$ .  
(c)  $-\frac{X}{Y}$ . (d)  $\frac{X}{Y}$ .
3. In the optimisation format  $L = f(x, y) + \lambda [M - \phi(x, y)]$  where  $f(x, y)$  is the utility function,  $M - \phi(x, y) = 0$ , the budget constraint and  $\lambda$ , the Lagrange multiplier,  $\lambda$  stands for the :
- (a) Marginal utility. (b) Marginal budget share.  
(c) Marginal expenditure. (d) Marginal utility of money.
4. The function  $Q = 2K + 3L$  belongs to the class of \_\_\_\_\_ production function :
- (a) Fixed coefficient. (b) Variable coefficient.  
(c) Constant elasticity. (d) Variable elasticity.
5. The elasticity coefficient of the demand function  $D = a - bP$  is :
- (a)  $-b\frac{D}{P}$ . (b)  $b\frac{D}{P}$ .  
(c)  $-b\frac{P}{D}$ . (d)  $b\frac{P}{D}$ .

Turn over

6. When  $K_t = 500$  and  $K_{t-1} = 350$  are stock of capital respectively during the current period and the past period, the investment,  $I_t$  is :
- (a) - 150. (b) 150.  
(c) 0.7. (d) 10/7.
7. When the marginal product,  $MP = 120$  and the average product,  $AP = \text{Rs. } 20$  at particular level of output the output elasticity at that level of output is:
- (a) 100. (b) 1/6.  
(c) 6. (d) 140.
8. Which of the following is a linear homogeneous production function ?
- (a)  $Q = XY$ . (b)  $Q = X + Y$ .  
(c)  $Q = X / Y$ . (d)  $Q = Y / X$ .
9. Which of the following is not using derivatives as an optimisation technique ?
- (a) Simplex method. (b) Kuhn-Tucker method.  
(c) Big M method. (d) Lagrange multiplier method.
10. Given the Cost equation,  $C = X - 0.2 X^3$ , the average cost is :
- (a)  $1 - 0.2X^2$ . (b)  $1 - 0.6X^2$ .  
(c)  $X - 0.2X^2$ . (d)  $X - 0.1X^2$ .
11. The Optimal value in a linear programming problem is an element belonging to :
- (a) Universal Set. (b) Power Set.  
(c) Convex Set. (d) Concave Set.
12. If the total revenue under perfect competition is given by  $R = PQ$  then the marginal revenue is given by :
- (a) P. (b) Q.  
(c)  $P / Q$ . (d)  $Q / P$ .

(12 × ¼ = 3 weightage)

### Part B (Short Answer Type Questions)

Answer all questions.

13. Define a function.
14. Define Marginal rate of technical substitution.
15. What is elasticity of substitution ?
16. What do you mean by optimisation ?

17. Define linear homogeneous function.
18. What are the mathematical conditions for maximisation?
19. What is equilibrium ?
20. Define discriminating monopoly.
21. What is producer's surplus ? Explain.

(9 × 1 = 9 weightage)

### Part C (Short Essay/Paragraph Type Questions)

Answer any **five** questions out of seven.

22. Show that the slope of a standard isoquant is negative.
23. Given the demand function  $Q_1 = P_1^\alpha P_2^\beta$ , where  $P_1$  and  $P_2$  are own price and price of related good obtain own price and cross price elasticity coefficients.
24. Find the level of maximum output given the production function  $Q = xy$  and the cost constraint is  $50x + 100y = 500$ , by applying the substitution method.
25. Explain the simplex method.
26. When the total revenue under monopoly is given by  $R = PQ$ , where  $P$  and  $Q$  are variable price and quantity, show that marginal revenue depends on the average revenue and price elasticity of demand ?
27. Establish the relationship between average and marginal products.
28. Examine the Euler's theorem for homogeneous function.

(5 × 2 = 10 weightage)

### Part D Essay Questions

Answer any **two** questions out of three.

29. Given the utility function,  $U = x_1 x_2$  and the budget constraint,  $2x_1 + 5x_2 = 100$  derive the quantity demanded for two goods assuming that utility is maximised subject to the constraint.
30. Given the Cobb-Douglas production function  $Q = AK^\alpha L^\beta$  state and explain any of the five properties.
31. The demand and supply equations in three prices in a perfectly competitive market are given as below :

$$\begin{array}{ll} D_1 = 20 - P_1 + 2P_2 + P_3 & S_1 = 10 + P_1 \\ D_2 = 5 - 2P_2 & S_2 = 3P_2 - P_1 \\ D_3 = 20 + P_1 - 0.5P_3 & S_3 = 5 - P_2 + P_3 \end{array}$$

Solve the system and obtain the equilibrium price vector.

(2 × 4 = 8 weightage)