SIXTH SEMESTER B.A. DEGREE EXAMINATION, APRIL 2020
(CUCBCSS-UG)

(Regular/Supplementary/Improvement)

CC15U ECO6 B12 - MATHEMATICAL ECONOMICS
Economics–Core Course

(2015 Admission onwards)

Time: Three Hours   Maximum: 80 Marks

Part A
Answer *all* questions. Each question carries ½ marks

1. The function $f(x) = ax + b$, is an example of _____ function

    (a) quadratic   (b) polynomial   (c) linear   (d) rational

2. For a utility function $u = xy + 3x + 4y$, marginal utility of good y is

    (a) $x + 3x + 4y$ (b) $y + 3$ (c) $x + 4$ (d) $y + 3x$

3. Given a saving function $S = 300 + 0.7Y$, MPC is

    (a) 300   (b) 0.7   (c) −300   (d) 0.3

4. For a total cost function $TC = 1.5 Q^2 + 8Q + 50$, AC is

    (a) $1.5Q + 8 + \frac{50}{Q}$ (b) $1.5Q + 8$ (c) $1.5Q$ (d) $8Q + 50$

5. Utility is maximized when the second order conditions of utility function is

    (a) Negative   (b) positive   (c) zero   (d) None of these

6. $\dfrac{AR}{AR - MR}$ gives the

    (a) Elasticity of demand   (b) elasticity of cost

    (c) iso revenue live   (d) elasticity of supply

7. The cost per output is given by $C = 2x + 27$. Then the marginal cost when $x = 5$ is

    (a) 2   (b) 27   (c) 0   (d) 47

8. A _____ is a point at which a function is at a relative maximum or minimum

    (a) plateau   (b) relative extremum

    (c) inflection   (d) critical value

9. The value of Lagrange multiplier λ gives the approximate change in the objective function caused by a small change in the.

    (a) constant of the constraint   (b) objective function

    (c) variables in the constraint   (d) any of these

10. The Cobb Douglas Production function $Q = AL^{\alpha}K^{1-\beta}$ represents.

    (a) Diminishing returns to scale   (b) Increasing returns to scale

    (c) Constant returns to scale   (d) None of the above

11. Feasible solution of LPP is

    (a) Values of decision variables satisfy the constraints

    (b) Values of decision variables satisfy the objective functions

    (c) Values of variable satisfy the objective functions

    (d) The value of the objective function

12. In a monopoly, marginal revenue is

    (a) equal to AR   (b) less than AR

    (c) more than AR   (d) initially less than AR then more than AR

$(12 \times \frac{1}{2} = \textbf{6 Marks})$

Part B (Very Short Answer Type)
Answer any *ten* questions. Each question carries 2 marks.

13. State the advantages of mathematical treatment of economics

14. How is validity of a model judged

15. Find the MR functions from the demand functions, $P = Q^2 + 2Q + 1$

16. The demand curve is given by $Q = 100 - 4P$. Find total, average and marginal revenue.

17. Compute marginal utility of x for the utility function $U = 3x^2y + 4xy^2 + 2x + 2y$ at $x = 1$ and $y = 2$

18. What are the conditions for the optimization of a function?

19. Given the profit function $\Pi = 160x - 3x2 - 2xy - 2y^2 + 120y - 18$ for a firm producing two goods x and y maximize profit.

20. Maximize utility functions $U = 4xy - y^2$ subject to the constraint $5x + y - 6 = 0$

21. What are the assumptions of linear programming?

22. What is a matrix of technical coefficients?

23. What is monopoly? State the conditions for equilibrium of a firm under monopoly.

24. What is price discrimination? When is it possible?

$(10 \times 2 = \textbf{20 Marks})$

Part C (Short Essay Type)
Answer any *six* questions. Each question carries 5 marks.

25. What is an economic model? What are the types of Economic Models?

26. The revenue functions of a firm is $R = 14x - x^2$ and the cost functions is $C = x(x^2 - 2)$, find out (a) AC (b) MC (c) MR

27. State the relation between AR, MR and Elasticity

28. Explain with example the important functions used in economics

29. State and prove the properties of a C- D function

30. Solve graphically

    Minimize $Z = 2500\, x_1 + 3500\, x_2$

    Subject to the constraints

    $50\, x_1 + 60\, x_2 \geq 2500$

    $100\, x_1 + 60\, x_2 \geq 3000$

    $100\, x_1 + 200\, x_2 \geq 7000$

    $x_1, x_2 \geq 0$

31. What is input out put analysis? What are its assumptions?

32. Derive mathematically the equilibrium of a firm under perfect competition

$(6 \times 5 = \textbf{30 Marks})$

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

33. Given that $Q_1 = 100 - P_1 + 0.75P_2 - 0.25P_3 + 0.0075y$ at $P_1 = 10$, $P_2 = 20$, $P_3 = 40$ and $y = 10000$, find the different cross elasticity of demand

34. What is linear programming. What are the components of an LP problem. Explain important uses of LP

35. Determine the total demand x for industries 1, 2 and 3, given the matrix of technical coefficients A and the final demand vector B.

$$A = \begin{bmatrix} 0.4 & 0.3 & 0.1 \\ 0.2 & 0.2 & 0.3 \\ 0.2 & 0.4 & 0.2 \end{bmatrix} \qquad B = \begin{bmatrix} 140 \\ 220 \\ 180 \end{bmatrix}$$

36. A perfectly competitive firm faces P = Rs. 4 and $TC = Q^3 - 7Q^2 + 12Q + 5$. Find the best level of output of the firm. Also find the profit of the firm at this level of output.

$(2 \times 12 = \textbf{24 Marks})$

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