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Name: ....

SIXTH SEMESTER BA DEGREE EXAMINATION, APRIL 2024

(Supplementary - 2018 Admission)

ECONOMICS

AECO6B12T: MATHEMATICAL ECONOMICS

Time: 3 Hours　　　　　　　　　　　　　　　　　**Maximum Marks: 80**

PART A: Multiple Choices questions; Answer *all* the questions. Each carries *half* marks.

1. If the cost function is $C = q(q^2 - 3)$. Find MC.

   A) $q - 3$　　　　B) $q^3 - 3$　　　　C) q^2　　　　D) $3q^2 - 3$

2. For the saving function, $S = -100 + 0.4Y$, MPS is

   A) 100　　　　B) 0.4Y　　　　C) 0.4　　　　D) None of the above

3. In the case of perfect substitute, cross elasticity is ....

   A) >1　　　　B) < 1　　　　C) = 1　　　　D) Infinity

4. When E = 1, MR =

   A) 0　　　　B) 1　　　　C) Infinity　　　　D) None of the above

5. $MRTS_{LK}$ is ....

   A) MP_k / MP_L　　　　B) AP_k / MP_K　　　　C) MP_L / MP_K　　　　D) MP_L / AP_K

6. Sufficient condition for maximisation is ....

   A) $f''(x) > 0$　　　　B) $f'(x) > 0$　　　　C) $f'(x) = 0$　　　　D) $f''(x) < 0$

7. When $d(AP)/d_L = 0$

   A) MP> AP　　　　B) MP < AP　　　　C) MP = AP　　　　D) None of the above

8. If the sum of the exponents of C-D production function $\alpha + \beta < 1$, it means...........

   A) Return to scale is constant　　　　B) Returns to scale is increasing

   C) Returns to scale is increasing　　　　D) Returns to scale is infinite

9. Linear programming is introduced by...........................

   A) L V Kantorovich　　B) George B Dantzig　　C) Von Neuman　　D) R M Solow

10. The possible area where a producer can operate is ....

    A) Optimal solution　　B) Constrained area　　C) Feasible region　　D) All the above

11. In monopoly, the elasticity of demand is ....

    A) more　　　　B) 1　　　　C) less　　D) None of the above

12. The inter-relationships and mutual inter-dependence of inputs and outputs of various industries are studied under.........

    A) Linear programming　　B) Simplex method　　C) Input-Output model　　D) All the above

(12 × ½ = 6 Marks)

(PTO)

PART B: Answer any *ten* questions. Each carries *two* marks.

13. If the price elasticity of demand is 2 and the average revenue is Rs 30/-, find marginal revenue.

14. Define profit function.

15. What is a mathematical model?

16. Given consumption function C= 400+ 0.5Y. Find MPC and MPS.

17. Define Euler's theorem.

18. What is constrained optimization?

19. Define cross elasticity of demand.

20. Define linearly homogeneous production function.

21. What is Hawkins – Simon Condition?

22. What is the equilibrium condition of monopoly?

23. Given the cost equation $C=X- 0.2 X^3$. Find AC and MC.

24. If the demand function Q= 100-4P, find elasticity of demand If P = 2.

(10 x 2= 20 Marks)

PART C: Answer any *six* questions. Each carries *five* marks.

25. Write down the relation between AR, MR and Elasticity under Monopoly.

26. The revenue function of a firm is given by $R= 14x-x^2$ and the cost function by $C=x (x^2 – 2)$.
    Find AC, MC, MR and Equilibrium position.

27. For the given demand function.

    $Q_1 = 3-2P_1 + P_2$

    $Q_2 = 7+ P_1^2- 3P_2$

    Determine the cross elasticity of demand at $P_1 = 2$, $P_2 = 3$.

28. Solve the LPP using simplex method

    Max $Z= 2x_1 + 3x_2$

    Subject to $2x_1 + 2x_2 \leq 10$

    $2x_1 + x_2 \leq 6$

    $x_1 + 2x_2 \leq 6$

    $x_1, x_2 \geq 0$

29. Write and prove seven important properties of Cobb- Douglas production function.

30. What is the general differences of primal and dual of the linear programming problem?

31. Distinguish between a) Closed and open Input output models and b) Static and Dynamic Input output models.

32. Derive the mathematical conditions of equilibrium of a discriminating monopolist.

(6 x 5 = 30 Marks)

PART D: Answer any *two* questions. Each carries *twelve* marks.

33. a) Explain the meaning and significance of Lagrange multiplier method.
    b) A consumer has the following utility function $U = 4xy - y^2$, where x and y are the consumption goods and he has a budget of Rs. 6/-. If the prices of x and y are Rs. 2/- and Rs. 1/- respectively, find the optimum combination of x and y which will maximise his satisfaction.

34. a) What are the mathematical conditions of equilibrium of a firm under perfect competition?
    b) In a perfectly competitive market, a firm sells product at Rs. 8/- and if its given total cost function is $4x^2 - 8x + 20$, then find how many units should be produced by the firm in order to earn maximum profit?

35. Explain the method of input output model and find the input coefficients.

Purchasing sector → Producing sector ↓	Agriculture	Industry	Final Demand	Total output
Agriculture	300	600	100	1000
Industry	400	1200	400	2000

If the final demands are changed to 200 and 800 respectively, find goods output.

36. Explain the nature and scope of mathematical economics. What are the mathematical representations of economic models?

(2 x 12 = 24 Marks)