Answers may be written either in English or in Malayalam

Part A

Answer *all* questions. Each question carries ½ mark.

1. This is a simplified description of reality, designed to yield hypotheses about economic behaviour that can be tested

   (a) An economic model
   (b) A theory
   (c) A postulation
   (d) A possibility

2. The given function $f(x) = ax^2 + bx + c$, is an example of ---------- function

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

3. If a saving function is given as $S = \propto + \beta y$, where Y is the disposable income, the expression for investment multiplier is

   (a) β
   (b) $\frac{1}{\beta}$
   (c) $\frac{1}{1-\beta}$
   (d) $1 - \beta$

4. Given a saving function S = 100 + 0.8Y, MPC is

   (a) 100
   (b) 0.8
   (c) 0.2
   (d) −100

5. If $u = x^n$ is total utility, the function of marginal utility will be

   (a) x^{n+1}
   (b) u^{n-1}
   (c) 0
   (d) nx^{n-1}

6. $\frac{AR}{AR-MR}$ *is equal to*

   (a) Elasticity of demand
   (b) Marginal Revenue
   (c) Average Revenue
   (d) Supply function

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

   (a) variables in the constraint
   (b) constant of the constraint
   (c) objective function
   (d) any of these is possible

34. What is Cobb-Douglas production function? State and prove the properties of a C-D function.

35. What is linear programming? What are its components? What are its uses?

36. Determinate the total demand x for industries I, II and II given the matrix of technical coefficient of A and final demand vector B.

$$A = \begin{bmatrix} 0.3 & 0.4 & 0.1 \\ 0.5 & 0.2 & 0.6 \\ 0.1 & 0.3 & 0.1 \end{bmatrix} \quad B = \begin{bmatrix} 20 \\ 10 \\ 30 \end{bmatrix}$$

(2 × 12 = 24 Marks)

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8. If $MRTS_{LK} = 2$, then $\frac{MP_K}{MP_L}$ is

    (a) 1   (b) 4   (c) $\frac{1}{2}$ (d) $\frac{2}{7}$

9. The first derivative of a function measures the rate of change or ---------- of a function.

    (a) slope   (b) concavity   (c) convexity   (d) intercept

10. Where $\propto = \frac{3}{4}$ and $\beta = \frac{1}{4}$, the returns to scale for the Cob Douglas Productions functions is

    (a) Increasing   (b) Decreasing

    (c) Constant   (d) Cannot say without additional data

11. ---------- matrix represents in monetary terms or quantitative terms all the transactions of the economic system.

    (a) Transactions   (b) Technology   (c) Square   (d) Column

12. ---------- are structural parameters showing the linear relationship between the input of each industry and its total output.

    (a) Leontief matrix   (b) Critical values

    (c) Transactions matrix   (d) Technical coefficients

(12 × ½ = 6 Marks)

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

13. What is an economic model?

14. Define a consumption function.

15. Given a total revenue function, $TR = 14 - Q^2$, find Average Revenue.

16. Given a $TR = 600q - 10q^2$ and $TC = 2q^3 - 4q^2 + 100q + 624$, find the profit function

17. Given a production function $Q = x^2 + 2xy + y^2$ for a firm which uses two inputs x and y in the production process, find marginal product of the two inputs.

18. Define the Rate of Commodity Substitution.

19. Given the demand function q = −5p + 100, find price elasticity of demand when price is Rs. 5

20. The cost function of a firm is $C = 3q^2 + 5q + 75$. At what level of production will the average cost per unit be the smallest.

21. What is a Leontief matrix?

22. What is a matrix of technical coefficients?

23. What is feasible solution in an LP problem?

24. Given the demand function $= 54 - p^3$, find the marginal revenue of demand when the output x is 27 units and price is Rs. 3.

(10 × 2 = 20 Marks)

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

25. State the advantages of mathematical treatment of economics.

26. Given a production function of a firm with two inputs, $Q = 6x^2 + 3xy + 2y^2$, find $MRTS_{xy}$ when y = 4 and x = 5

27. Given $Q_1 = 100 - P_1 + 0.75P_2 - 0.25P_3 + 0.0075Y$. At $P_1 = 10$, $P_2 = 20$, $P_3 = 40$ and Y = 10,000, find the different cross elasticities of demand.

28. Given the total cost function, $TC = 3x^2 - xy + 2y^2 - 4x - 7y + 12$ of a firm producing two goods x and y, find the quantities of the two goods x and y that should be produced to minimise cost.

29. The cost function of a firm producing two goods x and y is $c = 5x^2 + 2xy + 3y^2 + 800$. The firm has to meet a production quota x + y = 39. Estimate the quantities of output of the two goods the firm should produce so that the costs are kept to the minimum.

30. Distinguish between homogenous and non-homogenous functions.

31. 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.

32. Suppose the demand for a good is represented by the demand equation: $Q_D = 70000 - 2000\,P$ and that the supply is represented by the supply equation: $Q_S = 5000 + 2000\,P$. Find the equilibrium price and quantity.

(6 × 5 = 30 Marks)

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

33. Solve graphically:

$Maximise\ Z = 80x_1 + 120x_2$

subject to the constraints $x_1 + x_2 \leq 9$

$$x_1 \geq 2$$

$$x_2 \geq 3$$

$$20x_1 + 50x_2 \leq 360$$

And the non-negativity constraint $x_1, x_2 \geq 0$