25P157 (Pages: 4) Name: .....

Reg.No: .....

FIRST SEMESTER M.A. DEGREE EXAMINATION, NOVEMBER 2025

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19PECO1C04 - QUANTITATIVE METHODS FOR ECONOMIC ANALYSIS - I

(Economics)

(2019 Admission onwards)

Time : 3 Hours Maximum : 30 Weightage

Part A

Answer ***all*** questions. Each question carries 1/5 weightage.

1. The function $y = 3x^2 - 14x + 5$ is increasing when x is equal to:
   (a) 4 (b) 5 (c) 7 (d) 9

2. The transpose of the co-factor matrix is called:
   (a) Minor (b) Adjoint (c) Inverse (d) Symmetric Matrix

3. The value of the determinant $\begin{vmatrix} a-b & a+b \\ a+b & a-b \end{vmatrix}$ is:
   (a) $-4ab$ (b) $4ab$ (c) $a^2 - b^2$ (d) None of these

4. The two numbers whose sum is 30 and difference is 4 :
   (a) 13,17 (b) 12,18 (c) (a) and (b) (d) None of these.

5. The rank of the matrix $[3]$ is:
   (a) 0 (b) 1 (c) 3 (d) None of these

6. $\lim_{x \to 0} \cos x$ is:
   (a) 0 (b) 1 (c) sin x (d) None of these

7. If the demand law for certain commodity is P = 25-2q and the equilibrium price for the product is Rs. 15 then the consumers surplus is:
   (a) 75 (b) 100 (c) 25 (d) None of these

8. The point of output or sales at which the total revenue equal total cost is:
   (a) Equilibrium point (b) Break- even point (c) Isoquants (d) None of these

9. If $u = e^{3xyz}$, then $\frac{\partial u}{\partial z}$ at x = 1, y = 1 is:
   (a) $3e^{3z}$ (b) $3e^{3z}$ (c) e^{3z} (d) $3e^{3xyz}$

10. Which of the following approximates the marginal impact on the objective function caused by a small change in the constant of the constraint:
    (a) the Legrange multiplier (b) the Jacobian
    (c) the Hessian (d) the determinant

11. $\int_0^{\frac{\pi}{2}}(1+cosx)dx$ is equal to :
    (a) $1+\pi$ (b) $\frac{\pi+2}{2}$ (c) $\frac{\pi-2}{2}$ (d) None of these

12. The producers surplus when the supply function is p = 10+2q and the equilibrium price 20 is:
    (a) 35 (b) 25 (c) 100 (d) 50

13. The degree of the differential equation $\left(\frac{d^3y}{dx^3}\right)^2+\frac{d^2y}{dx^2}-6y=0$ is:
    (a) First (b) Second (c) Third (d) None of these

14. The 14th term of the series 13,17,21,25,…....is:
    (a) 268 (b) 120 (c) 39 (d) 65

15. The decrease in the price or the values of the assets with time is called:
    (a) Annuity (b) Depreciation (c) Interest (d) Sinking

(15 × 1/5 = 3 Weightage)

Part B (Very Short Answer Questions)

Answer any ***five*** questions. Each question carries 1 weightage.

16. Define exponential function.

17. Solve the system of equations y = 3(x+1), 4x = y+1.

18. What is the rank of a matrix

19. The marginal revenue function of a product is MR = 20q. Find the price of the product when q=10 . Also find how much price will change when q increases to 20.

20. Given: $Z=x^2e^{2y}$. Find first and second order partial derivatives.

21. The marginal cost function for a certain product is $MC=3q^2-4q+5$. Find the total cost function given the fixed cost is 100.

22. If the MR is Rs.25 and the elasticity of demand with respect to price is 2, find AR.

23. Solve $\frac{dy}{dx}+\frac{4}{x}y=\frac{1}{x^3}$.

(5 × 1 = 5 Weightage)

Part C (Short Answer Questions)

Answer any ***seven*** questions. Each question carries 2 weightage.

24. Obtain the inverse of matrix

$$\begin{bmatrix} 1 & -2 & 3 \\ 3 & -1 & 4 \\ 2 & 1 & -2 \end{bmatrix}$$

25. Define the term limit of a function. Find $\lim_{x \to 3} \dfrac{x-3}{x+3}$.

26. (i) Define elasticity of demand . (ii) Given $Q = 700 - 2P + 0.02y$, where $p = 25$ and $y = 5000$. Find the price elasticity of demand.

27. The demand function faced by a firm is $p = 500 - 0.2x$ and its cost function is $C = 25x + 10000$ (p=price, x=output, C=cost). Find the output at which the profits of the firm are maximum. Also find the price it will charge.

28. Optimize $TC = 35 + 5Q - 2Q^2 + 2Q^3$.

29. The rate at which the volume of sales(Q) for a new type of printer increase after an advertising campaign is given by the equation $\dfrac{dQ}{dt} = 0.05(700 - Q)$, given that Q=0 at t=0. Q is the number of printers sold, t is the time in years. Solve the differential equation to obtain an expression for Q in terms of t.

30. For the data given below determine (i) market price P_t in any time period (ii) the equilibrium price P_e. $Q_{dt} = 180 - 0.75\ P_t,\ \ Q_{st} = -30 - 0.3\ P_{t-1},\ \ P_0 = 220.$

31. Find the amount at the end of 5 th year for Rs. 5000 at 10% p.a., simple interest. What is the total amount of growth?

32. What is first order linear differential equation and then solve $\dfrac{dy}{dx} + \dfrac{3}{x}y = \dfrac{1}{x^2}$.

33. Explain the relationship between interest rates and price of bonds.

(7 × 2 = 14 Weightage)

Part D (Essay questions)

Answer any ***two*** questions. Each question carries 4 weightage.

34. Find the adjoint of the matrix and verify that $A(AdjA) = |A|I$ if $A = \begin{pmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{pmatrix}$.

35. If $A = \begin{pmatrix} 1 & 4 & 3 \\ 4 & 2 & 1 \\ 3 & 2 & 2 \end{pmatrix}$, find A^{-1}.

36. A firm has the following total cost and demand functions:
$C = \frac{1}{3}Q^3 - 7Q^2 + 111Q + 50$ and $Q = 100 - p$. Find profit maximizing level of output; also find profit at this level of output.

37. The cost of producing 'y' tons of steel is given by $C(Y) = y^3 + 2y^2 - 6y + 4$ Obtain the following.
(i) Slope of marginal cost at y = 6. (ii) Average cost. (iii) Average variable cost. (iv) The value of 'y' for which marginal cost is same as average variable cost.

(2 × 4 = 8 Weightage)

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