(6 pages)

S.No. 8105 **P 22 ECCC 23**

(For candidates admitted from 2022–2023 onwards)

M.A. DEGREE EXAMINATION, NOVEMBER 2023.

Economics

MATHEMATICAL METHODS FOR ECONOMIC ANALYSIS

Time : Three hours Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions.

I. (A) Find the correct answer. (5 × 1 = 5)

1. Law of demand shows a relation between the _____.

   (a) Quantity demand and quantity supply of a commodity
   (b) Income and quantity demand of a commodity
   (c) Price and quantity of a commodity
   (d) Income and price of a commodity

2. If x>0, then which one is correct?

   (a) $\log(1+x) > x - (x^2/2)$

   (b) $\log(1+x) < x - (x^2/2)$

   (c) $\log(1+x) \geq x - (x^2/2)$

   (d) $\log(1+x) \leq x - (x^2/2)$

3. If (d/dx) f(x) is g(x), then the antiderivative of g(x) is

   (a) $f(x)$ (b) $f'(x)$

   (c) $g'(x)$ (d) None of the above

4. Given that A is a square matrix of order 3 and $|A| = -4$, then $|adj\ A|$ is equal to

   (a) –4 (b) 4

   (c) –16 (d) 16

5. The optimal value of the objective function is attained at the points:

   (a) on X-axis
   (b) on Y-axis
   (c) corner points of the feasible region
   (d) none of these

(B) Fill in the blanks (5 × 1 = 5)

6. In a particular year, the farmers experienced dry weather. If all other factors remain the same, the supply curve of wheat for farmers will shift to the _____ direction.

7. What will be the range of the function $f(x) = 2x^3 - 9x^2 - 24x + 5$ which increases with x?

8. $\int_0^2 x^2 dx =$

9. If A is an invertible matrix of order 2, then det (A^{-1}) is equal to.

10. A set of values of decision variables that satisfies the linear constraints and non-negativity conditions of an LP.P. is called its:

II. Answer ALL the questions. (5 × 2 = 10)

11. What is the format of partial derivative?

12. What is the differential equation for GDP?

13. What are the five basic integration formulas?

14. What is the order of matrix MCQS?

15. What do you mean by constraints in LPP?

PART B — (5 × 5 = 25)

Answer ALL the questions, choosing either (a) or (b).

16. (a) What is the terminology of demand and supply model?

Or

(b) What are the basic concepts of revenue and its types?

17. (a) What is Young's theorem for functions of two variables?

Or

(b) Difference between linear and nonlinear equations.

18. (a) What is the application of producer and consumer surplus concept?

Or

(b) What are the five rules of integration?

19. (a) What is matrix and determinant with example?

Or

(b) In the mid-term exam, there were 100 questions to be answered. Every correct answer was awarded 2 marks and every incorrect one with a negative mark. If the student answered all 100 questions and got go marks, how many did the student get correct and how many incorrect did the student get?

20. (a) How do you formulate an LP problem explain the steps?

Or

(b) A calculator company produces a handheld calculator and a scientific calculator. Long-term projections indicate an expected demand of at least 150 scientific and 100 handheld calculators each day. Because of limitations on production capacity, no more than 250 scientific and 200 handheld calculators can be made daily. To satisfy a shipping contract, a minimum of 250 calculators must be shipped each day. If each scientific calculator sold, results in a 20 rupees loss, but each handheld calculator produces a 50 rupees profit; then how many of each type should be manufactured daily to maximize the net profit?

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. What are the functions of IS and LM?

22. For a particular process. the cost function is given by $C = 56 - 8x + x^2$, where C is cost per unit and x, the number of unit's produced. Find the minimum value of the cost and the corresponding number of units to be produced.

23. Solve it: (a) What is $\int 8a^3 da$? (b) What is $\int (Cos\, a + a) da$? (c) What is $\int (Sin\, a + a)\, da$? (d) What is $\int 4\, a^3 da$?

24. A couple went to a restaurant for dinner. Husband ordered 2 small pizzas where 1 had veggies and the other pizza had double extra cheese. Along with pizza, he ordered a fruit bowl. This was a combo which cost him 200 Rs. Wife ordered from a combo which had 1 veggie pizza and 3 fruit bowls. She decided to take two fruit bowls as a parcel. This combo cost 150 Rs. Can you determine the cost of pizza and fruit bowl. Can this problem he solved using Cramer's rule?

25. Explain the linear programming technique.

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