TB253457C

Reg. No :.....

Name :.....

Integrated M.A . Programme in Social Sciences (C.S.S) EXAMINATION, NOVEMBER 2024

2023 ADMISSIONS REGULAR

SEMESTER III - CORE COURSE ECONOMICS

EC03C11IM20 - Introductory Mathematical Economics

Time : 3 Hours **Maximum Weight : 30**

Part A

I. Answer any Eight questions. Each question carries 1 weight **(8x1=8)**

1. What is partial derivative of a function?
2. Find partial derivatives of the function $z = 3x^2 y^3$.
3. Examine how cross price elasticity can be used to determine whether the goods are related or not.
4. Find the marginal productivity of the different inputs or factors of production for $Q=6x^2 + 3xy + 2y^2$.
5. Define returns to scale.
6. State the condition for increasing returns to scale.
7. Calculate $\int 2^{3x} dx$.
8. Find the integral of a power function x^n.
9. Examine the main limitations of linear programming.
10. Define duality.

Part B

II. Answer any Six questions. Each question carries 2 weight **(6x2=12)**

11. Find the first-order partial derivatives for each of the following functions: a) $z = 8x^2 +14xy + 5y^2$ (b) b) $z = 4x^3 + 2x^2 y - 7y^5$
12. Given $Q = 10K^{0.4} L^{0.6}$, (a) find the marginal productivity of capital and labour and (b) determine the effect on output of an additional unit of capital and labour at K = 8, L = 20.
13. Compute the marginal product of capital and labour in a Cd production function.
14. Calculate average physical productivity of capital and labour in CD production function.
15. Compute $\int_1^3 (4x^3 + 6x) dx$.
16. Determine the integral $\int 4x(x+1)^3 dx$.
17. Write dual of the following:
    Minimize 20x+30y+40z, subject to the constraints, x+y≥10; y+z≥20, x+z≥30 and x, y, z ≥0.
18. Write dual of the following:
    Maximize $p_1x_1+p_2x_2$, subject to the constraints $a_{11}x_1+a_{11}x_2 \leq b_1$; $a_{21}x_1+a_{22}x_2 \leq b_2$; $x_1, x_2 \geq 0$.

Part C

III. Answer any Two questions. Each question carries 5 weight **(2x5=10)**

19. Find the second-order direct partial derivatives z_{xx} and z_{yy} for each of the following functions:
    (a) $z = x^2+2xy+y^2$
    (b) $z= (7x +3y)^3$

20. Find the critical values for minimizing the costs of a firm producing two goods x and y when the total cost function is $c = 8x^2 - xy + 12y^2$ and the firm is bound by contract to produce a minimum combination of goods totalling 42, that is, subject to the constraint $x + y = 42$.

21. Show that the elasticity of factor substitution in a Cobb Douglas production function is unity.

22. Integrate the following definite integral by means of the substitution method: $\int_0^3 \frac{6x}{(x^2+1)}\, dx.$