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TB243918D

Reg. No :.....

Name :.....

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

2020, 2021, 2022 ADMISSIONS SUPPLEMENTARY

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 are multivariable functions?
2. What are the 3 conditions to be satisfied for a multivariable function such as z = f(x, y) to be at a relative minimum or maximum?
3. Find the marginal productivity of the different inputs or factors of production for $Q=6x^2 + 3xy + 2y^2$.
4. Examine how cross price elasticity can be used to determine whether the goods are related or not.
5. State and explain Cobb-Douglas Production function.
6. State the condition for decreasing returns to scale.
7. Calculate $\int 2^{3x} dx$.
8. Calculate $\int x^2 dx$.
9. List out the role of LP in production management.
10. Examine the main limitations of linear programming.

Part B

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

11. Optimize the function: $f(x, y) = x^3 - 6x^2 + 2y^3 + 9y^2 - 63x - 60y$.
12. (a) Maximize utility $u = Q_1Q_2$ when $P_1=1$, $P_2 = 4$, and one's budget $B = 120$. (b) Estimate the effect of a 1-unit increase in the budget.
13. Comment on the isoquants of a CD production function.
14. Find out the first and second partial derivatives for $q = AK^{\alpha} L^{\beta}$.
15. Compute $\int_5^5 (2x + 3)\, dx$.
16. Explain the properties of definite integral.
17. Write the economic interpretation of duality. Write the dual of the function, Minimize $C=60y_1+96y_2$, subject to the constraints $2y_1+4y_2\geq40$; $3y_1+3y_2\geq35$ and $y_1, y_2 \geq 0$ and draw the graphical solution of the dual.
18. Write dual of the following:
    Maximize $p_1x_1+p_2x_2$, subject to the constraints $a_{11}x_1+a_{11}x_2\leq b_1$; $a_{21}x_1+a_{22}x_2\leq b_2$; $x_1, x_2\geq0$.

Part C

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

19. Explain the significance of Lagrange multiplier in constrained optimisation. Optimise the function, $z = 4x^2 + 3xy + 6y^2$ subject to the constraint $x + y = 56$. Verify that a 1-unit increase in the constant of the constraint will cause a change in Z, in the light of lagrange value
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. Show $\int_{-4}^{4}(8x^3 + 9x^2)\,dx = \int_{-4}^{0}(8x^3 + 9x^2)\,dx + \int_{0}^{4}(8x^3 + 9x^2)\,dx$.