TB203660V **Reg. No :...............................**

Name :.................................

INTEGRATED M.A . PROGRAMME IN SOCIAL SCIENCES - ECONOMICS EXAMINATION, NOVEMBER 2022

(2020 Admission 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 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?
2. Find the partial derivatives of the function, $z = (x^3 + 7y^2)^4$.
3. Define income elasticity of demand.
4. If total cost function is given as, $c = 3x^2 + 7x + 1.5xy + 6y + 2y^2$, determine the marginal cost of x when x = 5, y= 3.
5. For $Q = x^3 - xy^2 + 3y^3 + x^2 y$, find the level of homogeneity and returns to scale.
6. Define returns to scale.
7. Compute $\int 5x^4 dx$.
8. Find out the integral of x^{-1}.
9. Differentiate between a primal and a dual.
10. Explain the role of LP in financial management.

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. Given $Q = 4\sqrt{KL}$, find (a) MP_K and MP_L, and (b) determine the effect on Q of a 1-unit change in K and L, when K = 50 and L = 600.
13. Explain the origins and application of Cobb Douglas production function.
14. Find out the first and second partial derivatives for $q = AK^{\alpha} L^{\beta}$.
15. Evaluate the integral $y = \int 2dx$, given the boundary condition, y=11 when x=3.
16. Compute $\int_5^5 (2x + 3)\, dx.$
17. Minimize $30x_1+50x_2$, subject to $6x_1+2x_2 \geq 30$; $3x_1+2x_2 \geq 24$; $5x_1+10x_2 \geq 30$; x_1 and $x_2 \geq 0$.
18. A tailor has 80 metres of cotton and 120 metres of wool with him. If suit requires 1 metre cotton and 3 metres of wool and dress requires 2 metres of cotton and 2 metres of wool, how many of each garment to be produced if each product sells for Rs. 30? Mark the feasible region in graph.

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. Verify the three conditions of linear homogeneity in case of CD production function.
22. Solve (a) $\int_1^3 (x^3 + x + 6)dx$ (b) $\int_1^4 \left(x^{-\frac{1}{2}} + 3x^{\frac{1}{2}}\right)dx$ (c) $\int_0^3 4e^{2x}dx$ (d) $\int_1^{64} x^{-\frac{2}{3}}dx$ (e) $\int_1^{10} 3x^2dx$.