

Reg. No.:



Name:

University of Kerala

Y8034

Fourth Semester FYUGP Degree Examination, May 2026

Discipline Specific Core Course

ECONOMICS

UK4DSCECO201 - Mathematics for Economics-I

Academic Level: 200-299

2024 Admission

Time: 2 Hours(120 Mins)

Max. Marks: 56

**Part A. 6 Marks:Time 5 Minutes.(Cognitive Level :Remember(RE)/Understand(UN)) Objective Type.1 mark each,
Answer all questions**

Qn No.	Question	CL	CO
1	1. A matrix with equal number of rows and columns is called a ----- matrix Options : A)Coloumn B)Singular C)Square D)Non Singular	RE	1
2	Partial differentiation is applied in Options : A)a) Univariate Function B)b) Bivariate Function C)c) Multivariate Function D)d) All the above	RE	3
3	In $Y=a+bX$, b is called Options : A)a) Constant B)b) Intercept C)c) Statistic D)d) Slope	UN	2
4	In a square matrix Options : A)a) the number of rows is greater than the number of columns B)b) the number of rows equals the number of columns C)c) the number of rows is less than the number of columns D)d) All the above	UN	1
5	The integral of x^2 is: Options : A) x^3 B) $x^3/3$ C) $2x$ D) $x^2/2$	UN	2
6	A function $f(x)$ is said to be maximum at $x=a$, if $f'(a)$ is zero and $f''(a)$ is	UN	2

Qn No.	Question	CL	CO
	Options : A)Zero B)Negative C)Positive D)One		

Part B. 10 Marks.Time:20 Minutes (Cognitive Level:Understand(UN)/Apply(AP))Two-three sentences.2 marks each.Answer all questions

Qn No.	Question	CL	CO
7	Explain with a diagram the geometric meaning of the derivative of a function at a point. How does it relate to the slope of a tangent line to a demand curve?	UN	1
8	State the necessary (first-order) and sufficient (second-order) conditions for a maximum or minimum of an unconstrained multivariable function $z = f(x, y)$. Define the discriminant D and interpret each case.	UN	1
9	Discuss any two applications of integral calculus in economics	AP	4
10	Cost function of a firm is given by $C = x(x^2 - 2)$. Find Marginal cost when the production is 2 units	AP	3
11	Apply the Power Function Rule to differentiate: $y = 4x^5 - 7x^3 + 2x - 9$.	AP	2

Part C. 16 Marks.Time:35 Minutes.(Cognitive Level :Apply(AP)/Analyse(AN))Short Answer.4 marks each, Answer all 4 questions,choosing among options * within each question

Qn No.	Question	CL	CO
12	A) Find the critical points of $f(x, y) = x^3 + y^3 - 3x - 3y + 8$ and classify each using the second-order conditions. OR B) A firm produces two goods with profit function $\pi(Q_1, Q_2) = 80Q_1 + 120Q_2 - 2Q_1^2 - Q_1Q_2 - 3Q_2^2 - 50$. Find the output combination (Q_1, Q_2) that maximises profit and verify the second-order conditions are satisfied.	AP	2, 2
13	A) The cost for a monopolist firm producing x televisions per week is given to be $4x^2 - 80x + 500$ rupees. To have minimum cost how many units should be produced per week ? OR B) A commodity was produced by using 3 units of labour and 2 units of capital, the total cost is Rs.62. If the commodity had been produced by using 4 units of labour and one units of capital,	AP	3, 3

Qn No.	Question	CL	CO
	the total cost is Rs.56. What is the cost per unit of labour and capital?		
14	A) A firm's average cost function is $AC(q) = (q^2 - 6q + 20) / q$. Determine whether AC is continuous at $q = 2$ and interpret the economic significance. OR B) State the necessary conditions for finding out the relative maxima and minima of a function	AN	3, 2
15	A) How unknowns in simultaneous equations can be solved using matrices OR B) Analyse the importance of different types of matrices and their applications ?	AN	1, 4

Part D. 24 Marks. Time: 60 Minutes. (Cognitive Level :Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer 6 Marks each. Answer all 4 questions choosing among options * within each question

Qn No.	Question	CL	CO
16	A) A production possibility frontier is described implicitly by $x^2 + 2y^2 = 200$. Use implicit differentiation to find the rate at which production of good y must fall when production of good x increases, at the point (10, 9). OR B) Bring out the difference between implicit and explicit differentiation	AN	3, 2
17	A) Compare the Matrix Inversion Technique, Cramer's Rule, and Gauss Elimination for solving large systems of linear equations. In what situations would each be preferred? OR B) Critically compare integration by substitution and integration by parts. When is each technique preferable? Create a decision rule for choosing between them.	EV	4, 4
18	A) Investigate whether the following integral can be solved using substitution method. a. $(3x+1)^2$	EV	5, 4

Qn No.	Question	CL	CO
	b. $(2x-1)^5$ OR B) A government introduces a ₹10 per unit tax on a commodity with demand $P = 80 - Q$ and supply $P = 20 + Q$. Calculate Consumer Surplus, Producer Surplus, and the deadweight loss after the tax is imposed.		
19	A) A firm's output is $Q = K^{0.5} \cdot L^{0.5}$. Input prices are $r = ₹4$ per unit of K and $w = ₹1$ per unit of L. The firm wishes to produce $Q = 20$ units at minimum cost. Use Lagrange multipliers to find the cost-minimising combination of K and L. OR B) Arun manages a factory producing two products, tables (T) and chairs (C). His profit function is $\pi = 60T + 40C - T^2 - TC - C^2$. Find the profit-maximising output of each product, verify second-order conditions, and calculate maximum profit.	CR	5, 5