

MALABAR CHRISTIAN COLLEGE, CALICUT

First Semester Internal Examination, September 2026

MAJOR COURSE IN MATHEMATICS

MULTIVARIABLE CALCULUS

MAT3CJ201

Time: 1 Hr

Max Marks: 35

Name: Class:	Marks Scored	Section A		Total Marks
		Section B		
		Section C		

Section A

(Each question carries 3 Marks, Max Marks for section 7)

1. Find the domain and range of the given function $f(x, y) = y - x$.2. Find $\int_0^3 \int_0^2 (4 - y^2) dy dx$.3. Find the limit $\lim_{(x,y) \rightarrow (3,4)} \sqrt{x^2 + y^2 - 1}$.

Section B

[Each question carries 6 Marks, Max Marks for the section - 18]

4. Find $\int_1^3 \int_x^{x^2} \int_0^{\ln z} x e^y dy dz dx$.5. Evaluate $\iint_R e^{x^2+y^2} dy dx$, where R is the semicircular region bounded by the curve $y = \sqrt{1 - x^2}$ and the x -axis.6. Find $\frac{\partial f}{\partial y}$ if $f(x, y) = y \sin xy$.7. Find the linearization $L(x, y)$ of the given function $f(x, y) = x^3 y^4$ at $(1, 1)$.

Section C

(Answer any one question, each question carries 10 marks)

8. (a) Find the area of the region R bounded by $y = x$ and $y = x^2$ in the first quadrant.(b) Sketch the region of integration for the integral $\int_0^2 \int_{x^2}^{2x} (4x + 2) dy dx$ and write an equivalent integral with order of integration reversed.10) Find the Linearization $L(x, y)$ of the function $f(x, y)$ at P_0 , also find the error approximation $f(x, y) \approx L(x, y)$ over the rectangle R for $f(x, y) = 1 + y + x \cos y$ at $P_0(0, 0)$.