D1BMT2503

Name: ....

Reg. No.: ....

FIRST SEMESTER FYUGP EXAMINATION NOVEMBER 2025

(Regular/Improvement/Supplementary)

MINOR

MAT1MN102: DIFFERENTIAL CALCULUS

Time: 2 Hrs. **Maximum Marks: 70**

M – Mark BL - Bloom's Taxonomy Level (1 to 6) CO - Course Outcome

Section A: Answer all questions. Each carries 3 marks.
Ceiling: 24 Marks

No.	Question	M	BL	CO
1.	Define vertical asymptote and give an example.	3	3	CO1
2.	Find $\lim_{x\to 2} \frac{5x^3+4}{x-3}$.	3	5	CO1
3.	State intermediate value theorem.	3	2	CO1
4.	Define horizontal asymptote and give an example.	3	3	CO1
5.	Find $\frac{dy}{dx}$ if $y = tan(x^2+1)$.	3	4	CO2
6.	Find $\frac{dy}{dx}$ if $y = tan^{-1}(x^3)$.	3	2	CO2
7.	Find $\frac{dy}{dx}$ if $y = sin^{-1}(\frac{1}{x})$.	3	4	CO2
8.	Define concave up and concave down on an open interval.	3	1	CO3
9.	Define critical point and stationary point.	3	1	CO3
10.	Find relative extrema of $f(x) = x^2$.	3	4	CO3

Section B: Answer all questions. Each carries 6 marks.
Ceiling: 36 Marks

No.	Question	M	BL	CO
11.	Explain why $\lim_{x\to 0} \frac{\boxed{x}}{x}$ does not exit.	6	6	CO1
12.	For what values of x is there a discontinuity in the graph of $y = \frac{x^2-9}{x^2-5x+6}$.	6	3	CO1
13.	Find the slopes of the tangent lines to the curve $y = \sqrt{x}$ at $x_0 = 1, x_0 = 4, x_0 = 9$.	6	2	CO1
14.	At what points, if any, does the graph of $y = x^3 - 3x + 4$ have a horizontal tangent line?	6	5	CO2
15.	Use implicit differentiation to find $\frac{dy}{dx}$ if $5y^2 + siny = x^2$	6	4	CO2
16.	Find the slopes of the tangent lines to the curve $y^2 - x + 1 = 0$ at the points (2,-1) and (2,1)	6	6	CO2
17.	Find $\lim_{x\to 0+} \frac{ln(sinx)}{ln(tanx)}$	6	5	CO2
18.	Find all critical points of $f(x) = 3x^{\frac{5}{3}} - 15x^{\frac{2}{3}}$	6	5	CO2 CO3

Section C: Answer any one question. Each carries 10 marks. (1 x 10 = 10 Marks)

No.	Question	M	BL	CO
19.	(a) Find $\frac{dy}{dx}$ if $y = (x^2 - x + 2)^{\frac{3}{4}}$ (b) Find $\frac{d\mu}{dt}$ if $\mu = sec\sqrt{wt}$ (Where w is constant) .	10	1	CO2
20.	Find the intervals on which $f(x) = x + 2\sin x$ is increasing, decreasing, concave up and concave down over the interval $[0, 2\pi]$. Also find inflection points.	10	3	CO2 CO3