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D1BMT2502

Name: .....

Reg. No.: .....

FIRST SEMESTER FYUGP EXAMINATION NOVEMBER 2025

(Regular/Improvement/Supplementary)

MINOR

MAT1MN101: 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.	Find the rate of change of $y = -2x^2 + x + 1$ with respect to x at $x = 2$.	3	2	CO1
2.	Find the points on the graph of $f(x) = x^4 - 2x^2 + 2$ where the tangent line is horizontal.	3	5	CO1
3.	Find $\frac{dy}{dx}$ if $y = (2x + 4)^3$.	3	3	CO1
4.	Define Critical number of a function.	3	2	CO2
5.	Find the rate of change of y with respect to x at $x = 1$ and $y = -1$ of $xy^2 - x^2y - 2 = 0$	3	5	CO1 CO2
6.	Evaluate $\int_2^2 (x^2 - 2x + 4)dx$.	3	1	CO3
7.	Find $\int \sin^3 x \cos x dx$.	3	5	CO3
8.	Evaluate $\int_2^3 7dx$.	3	1	CO3
9.	Expand $\sum_{k=1}^{n} \frac{1}{n}(1 + \frac{k^3}{n})$.	3	4	CO3
10.	Find the derivative of $\int_0^x \sqrt{3t + 5}dt$.	3	1	CO3

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

No.	Question	M	BL	CO
11.	a) State Product rule for differentiation. b) Find the derivative of $f(x) = x^3(\sqrt{x} + 1)$	6	2	CO1
12.	Find the extreme values of the function $f(x) = 3x^4 - 4x^3 - 8$ on the interval [-1,2].	6	3	CO1 CO2
13.	a) State First Derivative Test. b) Find the relative extrema of $f(x) = x^4 - 4x^3 + 12$	6	2	CO2
14.	Sketch the graph of the function and find its absolute maximum and absolute minimum values of $f(x) = -3x + 2$ *on* $(-1,2)$.	6	6	CO1 CO2
15.	Solve the initial value problem $f'(x) = 2x + 1$, $f(1) = 3$.	6	5	CO3
16.	Evaluate $\sum_{k=2}^{8}(k + 3k^3)$.	6	5	CO3
17.	Find the volume of the solid obtained by revolving the region bounded by the graphs of $y = x^3$,$y = 8$ and $x = 0$ about the y-axis	6	3	CO3
18.	Find the area of the surface obtained by revolving the graph of $f(x) = \sqrt{x}$ on the interval [0,2] about the x- axis. **(PTO)**	6	6	CO3

Section C Answer any one question. Each carries 10 marks. (1 x 10 = 10 marks)				
No.	**Question**	**M**	**BL**	**CO**
19.	a) State Chain Rule for Differentiation. b) Find the derivative of $f(x) = (x^2 + 1)^{120}$. c) Find $\frac{dy}{dx}$ if $y = u^3 - u^2 + u + 1$ and $u = x^3 + 1$.	10	4	CO1
20.	a) Find the area of the region between the graphs $y = x^2 + 2$ and $y = x - 1$ and vertical lines $x = -1$ and $x = 2$. b) Find the area of the region bounded by the graphs of $y = 2 - x^2$ and $y = -x$.	10	4	CO3