QP CODE: XXXXXX

Name: .....
Reg.No.: .....

FIRST SEMESTER FYUGP EXAMINATION NOVEMBER 2024

MAJOR

MAT1CJ101 DIFFERENTIAL CALCULUS

Time : 2 Hrs BL : Bloom's Taxonomy Level (1 to 6) CO : Course Outcome **Maximum Marks : 70**

Section A

Ceiling Marks : 24

Answer all questions. Each carries 3 marks.

No.	Question	M	BL	CO
1.	Determine whether the function $f(t) = t/(t^2 - 1)$ is even, odd or neither.	3	1	CO1
2.	Give the equation of the function $y = x^3$ shifted 3 units up and 1 unit left.	3	3	CO1
3.	Write the definition of right hand and left hand limits.	3	2	CO1
4.	Evaluate $\lim_{h\to 0^+} \dfrac{\sqrt{h^2+4h+5}-\sqrt{5}}{h}$.	3	5	CO1
5.	Define the derivative of a function.	3	1	CO1
6.	Define $g(3)$ in a way that extends $g(x) = \dfrac{x^2-9}{x-3}$ to be continuous at $x = 3$.	3	4	CO1
7.	Find $\dfrac{dy}{dx}$ if $2y = x^2 + \sin y$.	3	4	CO1
8.	State Rolle's theorem.	3	1	CO2
9.	Define decreasing function. Give an example.	3	1	CO2
10.	Find the function whose derivative is $2x + \frac{1}{x^2}$ and whose graph passes through the point (-1, 1).	3	3	CO2

Section B

Ceiling Marks : 36

Answer all questions. Each carries 6 marks.

No.	Question	M	BL	CO
11.	Graph the parabola $y = -x^2 + 4x$. Label the vertex, axis and intercepts.	6	4	CO1
12.	Evaluate $\lim_{h\to 0^-} \dfrac{\sqrt{6}-\sqrt{5h^2+11h+6}}{h}$.	6	5	CO1
13.	Using the definition calculate the derivative of the function $f(x) = mx + b$.	6	3	CO1
14.	Let $f\'(x) = (x-7)(x+1)(x+5)$. a) What are the critical points of f? b) On what intervals is f increasing or decreasing? c) At what points, if any, does f assume local extreme values?	6	6	CO2
15.	Let $y' = 2 + x - x^2$. Identify the intervals on which the function is concave up and concave down. Find the point of inflection, if any.	6	4	CO3
16.	Let $y' = (8x - 5x^2)(4 - x)^2$. Identify the intervals on which the function is concave up and concave down. Find the point of inflection, if any.	6	4	CO3
17.	Find the asymptotes of the curve $y = \frac{x+3}{x+2}$.	6	5	CO3
18.	Find the asymptotes of the graph of $y = \frac{x^2-3}{2x-4}$.	6	5	CO3

Section C

Answer any one question. Each carries 10 marks. (1x10=10 marks)

No.	Question	M	BL	CO
19.	State and prove the quotient rule for differentiation.	10	2	CO1
20.	State and prove Mean Value Theorem.	10	5	CO2

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