(PAGES: 2)

D1BAM2501 **Name: ....**

Reg. No.: ....

FIRST SEMESTER B.Sc. FYUGP EXAMINATION NOVEMBER 2025

(Regular/Improvement/Supplementary)

APPLIED MATHEMATICS

MAJOR

AMA1CJ101: CALCULUS 1

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 critical number. Give an example.	3	3	CO1
2.	Find critical numbers of the function $f(x) = x^2 - 6x$.	3	5	CO1
3.	Show that the function $f(x) = x^3$ is always increasing.	3	2	CO1
4.	Show that the function $f(x) = x - \cos x$ is always increasing. Give an example of a function which is always increasing.	3	5	CO1
5.	Find the intervals in which the function $f(x) = x^3 - 6x$ is concave up and where it is concave down.	3	5	CO1
6.	Show that $F(x) = 2 - \cos x$ is an antiderivative of $f(x) = \sin x$	3	3	
7.	Give three different antiderivatives of $f(x) = \dfrac{2x}{x^2 \quad 1}$.	3	5	CO2
8.	Evaluate $\int_0^1 (3 - 2x)^4 \, dx$	3	5	CO2
9.	Use definite integrals to find the area between the curves $y = x^2 + 3, \ y = x + 1, \ x = -1, \ x = 1.$	3	3	CO2 CO4
10.	Find the area between the curves $y = 3x, \ y = 0, \ x = 0, \ x = 1.$	3	5	CO2

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

No.		Question	M	BL	CO
11.		State and prove Fermat's Theorem on relative extremum.	6	1	CO1
12.		Find the extreme values of the function $f(x) = 3x^4 - 4x^3 - 8$ on $[-1, 2]$.	6	3	
13.		A man has 200 meters of fencing to enclose a rectangular garden. Find the dimensions of the garden of largest area he can have if he uses all of the fencing.	6	2	CO1
14.		Find the horizontal asymptotes of the graph of the function $f(x) = \dfrac{3x}{\sqrt{x^2 + 1}}$	6	5	CO1
15.		Evaluate	6	2	
	a	$\int (3x^5 - 2x^3 + 2 - 3x^{-1/3}) \, dx$.	2	2	CO2
	b	$\int (x + 1)(x^2 - 2) \, dx$.	2	2	CO2
	c	$\int \dfrac{2x^2 - 1}{x^2} \, dx$.	2	2	CO2
16.		Find the area of the region bounded by the curves $y = (x - 2)^2, \ y = 4 - x^2$.	6	3	CO2

(PTO)

17.		Calculate the volume of the solid generated by revolving the region bounded by the graphs of $y=-x^2+2x$ and $y=0$ about the $x-$ axis.	6	3	CO3 CO4
18.		Apply the method of cross sections to find the volume of a right pyramid with a square base of side b and height h.	6	5	CO3 CO4

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

No.	Question	M	BL	CO
19.	Sketch the graph of $f(x)=x^3-6x^2+9x+2$.	10	4	CO1
20.	State and prove the fundamental theorem of calculus, part 1.	10	2	CO2