QP CODE: D1BAM2401

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

FIRST SEMESTER FYUGP EXAMINATION NOVEMBER 2024

MAJOR

AMA1CJ101 CALCULUS 1

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

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

Section A — Ceiling Marks : 24

Answer all questions. Each carries 3 marks.

No.		Question	M	BL	CO
1.		State Fermat's Theorem.	3	1	CO1
2.		Find critical numbers, if any, of the function $f(x) = \frac{x}{x^2+1}$.	3	5	CO1
3.		The function f defined by $f(x) = -x^2 + 4x + 2$. Apply differentiation to find the intervals in which is increasing and the intervals in which f is decreasing.	3	4	CO1
4.		Show that the function $f(x) = x - \cos x$ is always increasing.	3	5	CO1
5.		Calculate $\lim_{x\to 1^-} \frac{1}{x-1}$ and $\lim_{x\to 1^+} \frac{1}{x-1}$. Find the vertical asymptote of the graph of $f(x) = \frac{1}{x-1}$.	3	5	CO1
6.		Use Riemann sums to define the area under the graph of a continuous nonnegative function defined on an interval [a,b].	3	4	CO2
7.		Evaluate	3	5	
	a	$\int 2x\, dx$.	1	5	CO2
	b	$\int \frac{1}{1+x^2}\, dx$.	1	5	CO2
	c	$\int e^{2x}\, dx$.	1	5	CO2
8.		Find the area between the curves $y = x,\ y = 0,\ x = -1,\ x = 1.$	3	3	CO3
9.		Find the area between the curves $x = y^2,\ x = 0,\ y = 2,\ y = 3.$	3	5	CO2 CO4
10.		Calculate the volume of the solid obtained by revolving the region under the graph of $y = \sqrt{2x}$ on $[1,2]$ about the $x-$ axis.	3	5	CO3 CO4

Section B — Ceiling Marks : 36

Answer all questions. Each question carries 6 marks.

No.		Question	M	BL	CO
11.		State and prove Mean Value Theorem.	6	3	CO1
12.		Find the extreme values of the function $f(x) = 2cosx - x$ on $[0, 2\pi]$	6	2	CO1
13.		Find the relative extrema of $f(x) = \frac{1}{3}x^3 - 2x^2 - 5x - 10$ using the second derivative test.	6	2	CO1
14.		Determine the intervals where the graph of $f(x) = \sin 2x$, is concave upward and where it is concave donward. Also find all inflection points of the function.	6	5	CO1

15.		Apply Mean Value Theorem to show that if *F* is and antiderivative of f on an interval *I,* then every antiderivative of f on *I* has the form $G(x) = F(x) + C$, where *C* is a constant.	6	3	CO1 CO2
16.		If $y = \int_0^{x^3} \cos t^2 \, dt$, then find $\frac{dy}{dx}$.	6	2	CO2
17.		Answer the following:	6	5	
	a	If f is an even continuous function on $[-a, a]$, then prove that $\int_{-a}^{a} f(x) \, dx = 2 \int_0^{a} f(x) \, dx$	3	5	CO2
	b	If f is an odd continuous function on $[-a, a]$, then prove that $\int_{-a}^{a} f(x) \, dx = 0$	3	5	CO2
18.		Make a rough sketch and find the area of the region bounded by the graphs of the curves $y = \sqrt{x},\ y = x^2$.	6	4	CO2 CO4

Section c

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

No.		Question	M	BL	CO
19.		Let $f(x) = (x-2)^4 + 1$. Find critical numbers,inflection points,extreme points and draw the graph of the function.	10	2	CO1
20.		The graph of $x = y^2$ on [0,1] is resolved about the y - Axis	10	3	
	a	Find the volume of the solid generated.	5	3	CO3 CO4
	b	Find the area of the curved surface generated.	5	3	CO3 CO4

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