


Name:			
Enrolment No:			
UPES End Semester Examination, December 2024			
Course: Mathematics I		Semester : I	
Program: : B.Tech. (Biotech./ BioMed./Food Tech.)		Duration : 3 Hours	
Course Code: MATH1048		Max. Marks: 100	
Instructions:			
Section A			
Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)			
S. No.		Marks	COs
Q 1	List down three areas/domain where Mathematics can be applied in real world?	1.5	CO1
Q 2	State the name of the famous mathematician who introduced the term “function”? Please mention the year also?	1.5	CO1
Q 3	If y is a function of x then how we write it mathematically?	1.5	CO1
Q 4	List the important properties of a mathematical function?	1.5	CO1
Q 5	If $y = 1 + x^2$; $x > 0$, then what is the range of function?	1.5	CO1
Q 6	If $y = f(x)$ is a continuous function, then the graph of $y = f(x)$ will be a smooth function or with graph with breaks? Comment.	1.5	CO1
Q 7	Define Left Hand Limit mathematically.	1.5	CO2
Q 8	Define Right Hand Limit mathematically.	1.5	CO2
Q 9	If $y = x^3$; $x > 0$, then what is the value of dy/dx ?	1.5	CO2
Q 10	If $y = 2$; $x > 0$, then what is the value of dy/dx ?	1.5	CO2
Q 11	Evaluate the integral $\int_0^1 x^3 dx$	1.5	CO2
Q 12	Evaluate the integral $\int_0^1 2 dx$	1.5	CO2
Q 13	Define Left Hand Derivative mathematically.	1.5	CO2
Q 14	Define Right Hand Derivative mathematically.	1.5	CO2
Q 15	Evaluate $f(x) = \frac{1}{x-3}$; $x \neq 3$ at $x = 3$	1.5	CO1

Q 16	If all conditions for Rolle's theorem are verified for the function $f(x) = x^2 - 3$ then find a point c such that $f'(c) = 0$	1.5	CO3
Q 17	If all conditions for Rolle's theorem are verified for the function $f(x) = x^2 - 6$ then find a point c such that $f'(c) = 0$	1.5	CO3
Q 18	Define Sequence.	1.5	CO4
Q 19	Define Series.	1.5	CO4
Q 20	Define Power function.	1.5	CO4
Section B (4Qx5M=20 Marks)			
Q 1	State one application of Mathematics in Biology. Explain with suitable example.	5	CO1
Q 2	Evaluate the value of function $f(x) = \frac{x^2-16}{x-4}$; $x \neq 2$ at $x = 1$?	5	CO2
Q 3	Statement: "Rolle's Theorem identifies a point of no change in a function". Is it true? Justify the statement.	5	CO3
Q 4	Expand power series for function $(1 - x)^m$ with conditions.	5	CO4
Section C (2Qx15M=30 Marks)			
Q 1	Verify Rolle's Theorem for the function $y = x^2 + 2$; $x \in [a, b]$ where $a = -1$ and $b = 1$. Explain every step clearly.	15	CO3
Q 2	Find the expansion of following power series. i) $(1 - x)^{-1}$ ii) $(1 + x)^{-1}$ iii) $(1 - x)^{-2}$	15	CO4
Section D (2Qx10M=20 Marks)			
Q 1	Find out the first order differentiation of the following functions. i) $x^4 + 1$; $x > 0$ ii) $3x^4 + 6x + 2$; $x > 0$ iii) $\log(x + 2)$; $x > 0$ iv) $1/x^4$; $x > 0$ v) $3 + e^x$; $x > 0$ (2 marks each)	10	CO1
Q 2	Evaluate the following Integrals. i) $\int_0^1 (x^3 + 1) dx$ ii) $\int_0^1 \frac{1}{x^3} dx$	10	CO2

	iii) $\int_0^1 (e^x + 2) dx$		
	iv) $\int_0^1 1/x^3 dx$		
	v) $\int_0^1 1/x dx$ (2 marks each)		