Name:			
Enrolment No:			

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UPES

End Semester Examination, December 2024

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Course: Mathematics I	**Semester : I**
Program: : B.Tech. (Biotech./ BioMed./Food Tech.)	**Duration : 3 Hours**
Course Code: MATH1048	**Max. Marks: 100**

Instructions:

I

S. No.	Section A Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)	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 $y = x^2$; 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 $y = x^2$; x > 0, then what is the value of dy/dx ?	1.5	CO2
Q 10	If y = 1 ; x > 0, then what is the value of dy/dx ?	1.5	CO2
Q 11	Evaluate the integral $\int_0^1 x^2\, dx$	1.5	CO2
Q 12	Evaluate the integral $\int_0^1 1\, dx$	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) = $\frac{1}{x-2}$; $x \neq 2$ at $x = 2$	1.5	CO1

Q 16	If all conditions for Rolle's theorem are verified for the function $f(x) = x^2 - 1$ 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 $f(x) = x^2 - 2$ 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 $f(x) = \frac{x^2 - 4}{x - 2}$; $x \neq 2$ 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 $y = x^2 + 1$; $x \epsilon$ [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) $x^3 + 1$; x > 0 ii) $3x^3 + 5x + 1$; x > 0 iii) $\log(x + 1)$; x > 0 iv) $1/x^3$; x > 0 v) $1 + e^x$; x > 0 (2 marks each)	10	CO1
Q 2	Evaluate the following Integrals. i) $\int_0^1 (x^2 + 1) dx$ ii) $\int_0^1 \frac{1}{x^2} dx$	10	CO2

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