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:

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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 $y = x^2 + 1$; $x \in$ [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) $x^3 + 1$; 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)		