Name: **Enrolment No:**	UPES

UPES

End Semester Examination, December 2023

Program Name: B.Sc. Computer Science | **Semester : I**
Course Name: Mathematical Sciences-I | **Time : 3 hrs**
Course Code: MATH-1060 | **Max. Marks : 100**
Nos. of page(s): 2

Instructions:

1. Section A has 5 questions. All questions are compulsory.
2. Section B has 4 questions. All questions are compulsory. Question 9 has internal choice to attempt any one.
3. Section C has 2 questions. All questions are compulsory. Question 11 has internal choice to attempt any one.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Prove that $\int_0^3 \int_1^2 xy(1+x+y)dy\,dx = \int_1^2 \int_0^3 xy(1+x+y)dx\,dy$	**4**	**CO1**
Q 2	Expand $\log x$ in powers of $(x-1)$.	**4**	**CO1**
Q 3	Find the divergence and curl of $\vec{F} = e^{xyz}(xy^2\hat{\imath} + yz^2\hat{\jmath} + zx^2\hat{k})$ at (1,2,3).	**4**	**CO2**
Q 4	Solve $(D^2+6D+9)y = 5e^{3x}$.	**4**	**CO3**
Q 5	Determine the solution of $a_n = 4(a_{n-1} - a_{n-2})\,, n \geq 2$.	**4**	**CO4**

SECTION B
(4Qx10M= 40 Marks)

S. No.		Marks	CO
Q 6	If $u(x,y,z) = (x^2+y^2+z^2)^{m/2}$, then find the value of m which will make $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0$.	**10**	**CO1**
Q 7	Evaluate $\int\int \sqrt{4x^2-y^2}\,dx\,dy$ over the triangle bounded by $y=0, y=x$ and $x=1$.	**10**	**CO1**
Q 8	If $\vec{A} = (3x^2+6y)\hat{\imath} - 14yz\hat{\jmath} + 20xz^2\hat{k}$, evaluate $\int_C \vec{A}.\,d\vec{r}$, where C is the curve $x=t, y=t^2, z=t^3$ from (0,0,0) to (1,1,1).	**10**	**CO2**
Q 9	Find the solution of $(D^3-3D^2+4D-2)y = e^x + \cos x$ **OR** Solve the following exact differential equation: $(ax+hy+g)dx + (hx+by+f)dy = 0$	**10**	**CO3**

SECTION-C (2Qx20M=40 Marks)			
Q 10	Solve the equation $a_{n+2} - 4a_{n+1} + 4a_n = 2^n$, $a_0 = 0, a_1 = 1$.	**20**	**CO4**
Q 11	Solve $\frac{d^2y}{dx^2} + y = \sec x$ using method of variation of parameter. **OR** Given that $y = e^x$ is a solution, determine the solution of $$xy'' - (2x-1)y' + (x-1)y = 0$$	**20**	**CO3**