University of Information Technology & Sciences (UITS)
Faculty of Science and Engineering
Department of Computer Science and Engineering
Program: B.Sc. in CSE
Term Final Examination, Autumn 2025
Course Title: Ordinary and Partial Differential Equation
Course Code: MATH 0541121

Marks: 50   Time: 3(three) hours

(Answer all questions)

Q. No.	Questions	Marks
1. a)	Define linear differential equation with constants coefficients? Evaluate the following non-homogeneous differential equation: $$y'' - 2y' - 3y = 2e^x - 10sinx$$	[06]
b)	Determine the following system of linear differential equations : $$\left.\begin{array}{l} \frac{dx}{dt} = 5x - 2y \\ \frac{dy}{dt} = 4x - y \end{array}\right\}$$	[04]
2.	Write down the general form of the higher order Cauchy Euler equation and solve the following equation : $$x^2 \frac{d^2y}{dx^2} - 4x\frac{dy}{dx} + 4y = 4x^2 - 6x^3, \quad y(2) = 4, \quad y'(2) = -1$$	[10]
3. a)	Explain partial differential equation with example. Find the partial differential equation by eliminating constant from: $$z = Ae^{-p^2 t}cospx$$	[04]
b)	Find the partial differential equations by eliminating of f and F from: i) $z = f(x + iy) + F(x - iy)$ ii) $z = f(x^2 - y) + F(x^2 + y)$	[06]
4. a)	Define Lagrange's method? Solve the following partial differential equation: i) $zp = -x$ ii) $z(z^2 + xy)(px - qy) = x^4$ $\frac{1}{2}$	[06]

b) Using multipliers find the following linear partial differential equation, [04]

$$(y-zx)\frac{\partial z}{\partial x}+(x+yz)\frac{\partial z}{\partial y}=(x^2+y^2)$$

5. a) Evaluate the following linear partial differential equations with constants [07] coefficient:

i) $\left(D_x^3-3D_y^2D_x-2D_y^3\right)z=\cos(x+2y)$

ii) $\left(D_x^3+6D_x^2D_y+11D_x+6D_y^3\right)z=e^{5x+6y}$

iii) $\left(4D_x^2-4D_xD_y+D_y^2\right)z=16\ln(x+2y)$

b) A 20 volt battery is connected to a series circuit in which the inductance is 0.5 [03] Henry and the resistance is 10 ohms. Determine the current i if the initial current is zero.