GIET UNIVERSITY, GUNUPUR – 765022
M. Sc. (First Semester) Regular Examinations, February – 2024
22MTPC103 - Ordinary Differential Equation
(Mathematics)

Time: 3 hrs   Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

PART – A   **(2 x 10 = 20 Marks)**

Q.1. Answer **ALL** questions

		CO #	PO
a.	Give an example of linear differential equation with variable coefficient.	CO2	K1
b.	Find the CF for $y_2 + n^2 y = secnx$	CO2	K1
c.	Verify $x_1(t) = \sin t$ and $x_2(t) = \cos t$ is linear independent or linear dependent	CO1	K1
d.	Form the differential equation by eliminating arbitrary constants, $xy = Ae^x + Be^{-x}$ where A & B are arbitrary constants	CO1	K1
e.	Solve $xy\,dy - 2y^2 dx = 0$	CO1	K1
f.	Find the order and degree of the differential equation $5\frac{d^2y}{dx^2} + 2\{1 - \left(\frac{dy}{dx}\right)^3\}^{\frac{1}{2}} - x = 0$	CO1	K2
g.	Write the matrix form of system of linear differential equations with constant coefficients	CO3	K2
h.	Find the CF for $(D^2 - 1)(D^2 + 1)^2 y = 0$	CO2	K2
i.	State strum's separation	CO4	K1
j.	Find the PI for $(D^2 - 2D + 1)y = e^{3x}$	CO2	K2

PART – B   **(10 x 5 = 50 Marks)**

Answer **ANY FIVE** questions

		Marks	CO #	Blooms Level
2. a.	solve $\frac{dy}{dx} = \frac{4x+6y+5}{3y+2x+4}$	5	CO1	K2
b.	Solve $y - x\left(\frac{dy}{dx}\right) = a(y^2 + \frac{dy}{dx})$	5	CO1	K2
3. a.	Find all the solutions of the equation $\dot{x} = \begin{pmatrix} 1 & -1 & -1 \\ 1 & 3 & 1 \\ -3 & 1 & -1 \end{pmatrix} x$	5	CO3	K2
b.	Find the general solution of the system $\frac{dx}{dt} = 3x - y$ & $\frac{dy}{dt} = 4x - y$	5	CO3	K2
4. a.	Solve the DE $p^3 + 2xp^2 - y^2p^2 - 2xy^2p = 0$	5	CO2	K2
b.	Solve $xy'' - (2x - 1)y' + (x - 1)y = 0$ by reducing the order	5	CO3	K2

5.a.	Apply the method of variation of parameters to solve	5	CO2	K2

$$y_2 + 4y = 4tan2x$$

b.	Using the method of undetermined coefficients, solve $(D^2 - 2D)y = e^x sinx$	5	CO2	K2
6. a.	Find the general solution of the system	5	CO3	K2

$\frac{dx}{dt} = 4x - y$ & $\frac{dy}{dt} = 2x + y$

b.	Solve $(x^2 - 4xy - 2y^2)dx + (y^2 - 4xy - 2x^2)dy = 0$	5	CO1	K2
7.a.	Solve $\frac{xdy}{dx} + y = y^2 logx$	5	CO1	K2
b.	Solve $(D^2+3D + 2)y = sin3x. cos2x$ by operative method	5	CO2	K2
8.	State and prove strum's comparison theorem.	10	CO4	K2