K25FY3220 Pages: 2 Reg No:.....
Name:.....

Third Semester FYUGP Degree (Reg) Examination November 2025

KU3DSCCMT202 - ORDINARY DIFFERENTIAL EQUATIONS

2024 Admission onwards

Time : 2 hours Maximum Marks : 70

Section A

Answer any 6 questions. Each carry 3 marks.

1. What is the equation $y' = Ay - By^2$ called? Is it a Bernoulli equation?
2. What is population dynamics? Which equation is used in population dynamics?
3. Write the characteristic equation of the differential equation $3y'' - 5y' + 9 = 0$
4. Define the Wronskian of two functions.
5. Write the standard form of an Euler-Cauchy equation.
6. Find the degree and order of the ODE $(y'')^2 + 3(y')^3 = 2yx^2$.
7. Verify that $y = c/x$ (c an arbitrary constant) is a solution of the ODE $xy' = -y$ for all $x \neq 0$.
8. Write an expression for finding an integrating factor for the first order linear equation.

Section B

Answer any 4 questions. Each carry 6 marks.

9. Find a solution after reducing to the first order $y'' = 1 + y'^2$
10. Find a basis of solutions of the ODE $(x^2 - x)y'' - xy' + y = 0$ if one of the solutions is $y = x$
11. Identify the type of equation, find the auxiliary equation and then solve $x^2y'' + 3xy' + 0.75y = 0, \quad y(1) = 1, \quad y'(1) = -1.5$
12. Solve the ODE $2xyy' = y^2 - x^2$
13. Solve $y' cosx + (3y - 1)sèc x = 0 \quad y(\frac{\pi}{4}) = \frac{4}{3}$
14. Solve $y' + y\,tanx = e^{-0.01}cosx, \quad y(0) = 0$

Section C

Answer any 2 questions. Each carry 14 marks.

15. (a) Obtain a particular solution of $y'' + 3y = 18x^2, \quad y(0) = -3, \quad y'(0) = 0.$
    (b) Obtain a particular solution of $x^2y'' - 3xy' + 3y = 3lnx - 4, \quad y(1) = 0, \quad y'(1) = 1$, given that $y_p(x) = lnx$.
16. Find a general solution of $x^2y'' - 2xy' + 2y = x^3 sinx$, using the method of variation of parameters.
17. (a) Obtain a solution of the equation $\frac{dy}{dx} = \frac{(x^2+y^2+1)}{2xy}$
    (b) Find an orthogonal trajectory to the family of ellipses $x^2 - 2y^2 = 2$