

FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2024
COMPUTER SCIENCE & MATHEMATICS (DOUBLE MAIN)
GDMA4B07T: DIFFERENTIAL EQUATIONS

Time: 2 Hours

Maximum Marks: 60

SECTION A: Answer the following questions. Each carries *two* marks.
(Ceiling 20 Marks)

1. What is an ordinary differential equation?
2. What is particular solution of a differential equation?
3. Solve : $y' + y \tan x = \sin 2x$.
4. Test for exactness of the ordinary differential equation $x^3 dx + y^3 dy = 0$.
5. Find the orthogonal trajectory of $y = cx$.
6. State existence and uniqueness theorem of solution of an IVP.
7. Find the Wronskian of $e^{4x}, e^{-1.5x}$.
8. Show that the functions $y_1 = x^2, y_2 = 5x, y_3 = 2x$ are linearly dependent on any interval.
9. State linearity principle.
10. What is the characteristic equation of $y'' + 9y' = 20y$?
11. Find a general solution of the equation $yy' + 24x = 0$.
12. Reduce the following differential equation to first order
 $y'' + y = 0$.

SECTION B: Answer the following questions. Each carries *five* marks.
(Ceiling 30 Marks)

13. Solve $4xyy' = y^2 - x^2$.
14. Solve the linear ODE $y' + y = e^{3x}$.
15. Solve $xy' + y = xy^3$.
16. Find a basis of solutions of the ODE $(x^2 - x)y'' - xy' + y = 0$.
17. State and prove fundamental theorem for the homogenous linear ODE.
18. Solve the initial value problem $y'' + y = 0, y(0) = 3, y'(0) = -0.5$.
19. Solve $(D_3 - D_2 - D + 1)y = 0$.

SECTION C: Answer any *one* question. Each carries *ten* marks.

20. Solve the initial value problem $y''' + 3y'' + 3y' + y = 30e^{-x}$,
 $y(0) = 3, y'(0) = -3, y''(0) = -47$.
21. Find a general solution of $y' = \begin{bmatrix} -3 & 1 \\ 1 & -3 \end{bmatrix} y + \begin{bmatrix} -6 \\ 2 \end{bmatrix} e^{-2t}$ by variation of parameters.

(1 x 10 = 10 Marks)