DEPARTMENT OF MATHEMATICS
INDIAN INSTITUTE OF TECHNOLOGY, PALAKKAD

Test 2

MA2020: Differential Equations Date: 25/10/2025
Max. Marks: 20 Time: 08:00–08:50 AM

Instructions:

1. Cell phones are not allowed within the exam hall.
2. Please state all the results which you use and justify your answers.

1. Let y_1 and y_2 be solutions of the same second order linear homogeneous ordinary differential equation such that $y_1(x_0) = y_2(x_0) = 0$ for some point x_0. Can y_1 and y_2 be linearly dependent? Justify. [3]
2. Given that $y_1(x) = x$ is a solution to

$$(1 - x^2)y'' - 2xy' + 2y = 0.$$

   Find a second solution which is linearly independent from y_1. [4]
3. Find the general solution of

$$y'' - 6y' + 5y = 0.$$

   [3]
4. Find the general solution of

$$y'' - 3y' - 4y = te^{-t}.$$

   [5]
5. Find the general solution of

$$(1 - x^2)y'' - 2xy' + 6y = 0.$$

   [5]