

National Institute of Technology, Delhi

Name of the Examination: B. Tech.

Branch	: EEE	Semester	: 3rd
Title of the Course	: Ordinary Differential Equations and Transforms	Course Code	: MAL 201

Time: 2 Hours

Maximum Marks: 25

Note : All questions are compulsory

Q.1. Solve the differential equation **(03 Marks)**

$$(3y + 2x + 4)dx - (4x + 6y + 5)dy = 0$$

Q.2. State and Prove the necessary and sufficient conditions for the first order differential equation to be exact. **(03 Marks)**

Q.3. Find the orthogonal trajectories to the family of confocal and coaxial parabolas

$$r = \frac{2a}{1 + \cos\theta} \quad \text{span style="float: right;">**(04 Marks)**$$

Q.4. Solve the following Differential Equations **(02+03 Marks)**

(a) $y''' - 4y'' - 3y' + 18y = 0$

(b) $(D^2 - 2D + 4)y = e^x \cos x$

Q.5. Solve the non homogeneous Cauchy Euler Differential Equation **(04 Marks)**

$$x^3 y''' - 3x^2 y'' + 6xy' - 6y = x^4 \ln x$$

Q.6. Solve the initial value problem by the power series solution in powers of x **(06 Marks)**

$$(1 - x^2)y'' - 2xy' + 30y = 0, \quad y(0) = 0, \quad y'(0) = 1.875$$