DIFFERENTIAL EQUATION MA2041-B

THE SECOND Mid.-Exam.

1. Verify that the given functions e^{-3x} and e^{4x} with $x \in (-\infty, \infty)$ form a fundamental set of solutions of the differential equation $y^{''} - y^{'} - 12y = 0$ on the indicated interval. Form the general solution.

2. Given that $y_1 = x^4$ is a solution of $x^2y^{''} - 7xy^{'} + 16y = 0$. Find a second solution y_2 by reduction of order. (Note: In order to find the second solution, students can also use fomular given in Differential Equations book.)

3. Solve the given boundary-value problem.

$$y^{''} + y = 0, \quad y^{'} = 0, y^{'}(\pi/2) = 0.$$

4. Solve the differential equation by undetermined coefficients.

$$y^{'''} - 6y^{''} = 3 - \cos x$$

5. Solve the given differential equation by undetermined coefficients (Annihilator approach).

$$y^{''} + 6y^{'} + 8y = 3e^{-2x} + 2x$$

6. Solve each differential equation by variation of parameters.

$$y^{''} - 4y' + 4y = (12x^2 - 6x)e^{2x}$$

7. Solve the given differential equation by using Green's function.

$$x^2y^{''} + 8xy^{'} + 6y = 0$$

8. Solve the initial-value problem

$$y^{''} + 4y = \cos 2x, \quad y(0) = -2, y^{'}(0) = 1$$

9. Solve

$$x^{'} - 2x + y^{''} = t^2$$
$$x^{'} + x - y^{'} = 0$$

10. Find Taylor series solution of the initial-value problem.

$$y^{''} = x + y - y^2, \quad y(0) = 1, y^{'}(0) = -1$$