

First Semester M.Sc. (Math)

Examination Aug/Sep-2015

Differential Equations

Time:-3Hours

Max. Marks:-80

SECTION-A

Answer any five questions.

(6*5)

1. Find the complete integral of the equation $pq - p - q = 0$.
2. Verify Lagrange's Identity for the equation $y'' + y = 0$.
3. Define Terminal Problems.
4. Write a short note on Linear System of Ordinary Differential Equations.
5. Clarify Eigen function expansion Formula.
6. Write a short note on Critical Point and Path.
7. Find the Liapunov Function for the Non-Linear System and determine the stability of Critical Point $(0, 0)$.

$$\frac{dy}{dx} = -2xy, \quad \frac{dy}{dx} = x^2 - y^3.$$

SECTION-B

Answer any two questions.

(10*2)

8. Solve by the method of Variation of Parameters
$$X^2y'' - xy' - 3y = x^3.$$
9. Solve the Cauchy Problem $u=pq$ with the Cauchy data $u = y^2$ on $x = 0$ by the method of Characteristics.
10. Discuss the Orthogonality of Laguerre Polynomials in detail.

SECTION-C

Answer any two questions.

(15*2)

11. Explain the Series Solution about Regular Singular Point with the help of an example.
12. Discuss the Method of Variation of Parameters.
13. Solve the Cauchy Problem by the method of characteristics $u_x + u_y + u = 1$ with the initial data $u = \sin x$ on $y = x + x^2$.