

Common to B.A/B.Sc.

1-1-112

Subject: MATHEMATICS

SEMISTER-I

Paper-I: DIFFERENTIAL EQUATIONS

UNIT-I

Differential Equations of first order and first degree:

Linear differential equations; Differential Equations reducible to linear form; Exact differential

equations; Integrating factors; Change of variables; Simultaneous differential equations; Orthogonal Trajectories.

UNIT- II

Differential Equations of first order but not of the first degree:

Equations solvable for p; Equations solvable for y; Equations solvable for x; Equations that do not contain x (or y); Equations of the first degree in x and y - Clairaut's equations.

UNIT -III

Higher Order linear Differential Equations-I

Solution of Homogeneous linear differential equations of order n with constant coefficients. Solution of the non - homogeneous linear differential equations with constant coefficients by means of Polynomial operators.

UNIT -IV

Higher Order linear Differential Equations-II

Method of Variation of parameters; Linear differential equations with non- constant coefficients; The Cauchy- Euler equation.

UNIT -V

Partial Differential Equations-I

Formation of partial differential equations-Equations of first order-Lagrange's Linear Equation Charpit's method- Standard types of first order non linear partial differential equations.

Prescribed Text Books:

1. Scope and treatment as in Differential Equations and Their Applications by Zafar Ahsan, published by Prentice -Hall of India Pvt. Ltd. New Delhi- Second edition.

Reference Book:

1. Differential Equations with applications and programs- S. Balachandra Rao & HR anuradha universities Press

**Signature of the
Chairman (B.O.S.)
(20.....Exams)**

Section – A

Answer any Five of the following

Each question carries 5 marks (Marks: 5 x 5 = 25)

1. Solve $(1+y^2) dx = (\tan^{-1} y - x) dy$.

2. Solve $\cos^2 x \frac{dy}{dx} + y = \tan x$

3. Solve $p^2 x^2 = y^2$ (solvable for p)

4. Solve $(py + x)(px - y) = 2p$ (Clairaut's form)

5. Solve $(D^2 - 3D + 2)y = \cos hx$

6. Solve $x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + 4y = 2x^2$

7. Solve $\frac{dx}{dt} = 3x + 2y$, $\frac{dy}{dt} = 5x + 3y = 0$

8. Form partial differential equation by eliminating constants from
 $(x-a)^2 + (y-b)^2 = z^2 \cot^2 \alpha$

Section – B

Answer all the Five questions

Each question carries 10 marks (Marks: 10 x 5 = 50)

11. (a) Solve $x^2 y dx - (x^3 + y^3) dy = 0$
Or

(b) Find the orthogonal trajectories of the family of curves $r = \frac{2a}{1+\cos\theta}$ where 'a' is the parameter.

12. (a) Solve $y^2 \log y = xyp + p^2$ (solvable for x)

Or

(b) Solve $y = 2xp + x^2 p^4$ (solvable for y)

P.T.O.

Signature of the
Chairman (B.O.S.)
(20.....Exams)

13. (a) Solve $(D^2 - 2D + 4)y = 8(x^2 + e^{2x} + \sin 2x)$

1-1-112

or

(b) Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 13y = 8e^{3x} \sin 2x$

14. (a) Solve $(D^2 + a^2)y = \tan ax$, by the method of variation of parameters.

Or

(b) Solve $(x^2 D^2 - xD - 3)y = x^2 \log x$

15. (a) Find the General Integral of $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$, by Lagrange method.

Or

(b) Find the Complete Integral of $z^2(p^2 + q^2) = 1$, by Charpit's method.

Signature of the
Chairman (B.O.S.)
(20.....Exams)