



SRI Y.N.COLLEGE(Autonomous), Narsapur  
Affiliated to Adikavi Nannayya University  
Thrice accredited by NAAC with 'A' Grade  
Recognized by UGC as 'College with potential for Excellence'  
I B.Sc Mathematics (for 2020-2023 batch, w.e.f 2020-21)  
Paper I, Syllabus for I semester  
Differential Equations

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**UNIT - I:** (12 Hours) **Differential equations of first order and first degree** (10 Marks-2, 5 Marks-2)

Bridge Course- Basics of Differential equations and Integration (No question to be given from this portion)

**Additional Input:** Variables Separable, Homogeneous Differential equations.

Linear differential equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors; Change of variables.

**UNIT – II** (12 Hours) **Differential Equations of first order but not of the first degree :**

(10Marks-2, 5Marks- 1)

Orthogonal Trajectories, 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 Equation.

**UNIT-III:** (12 Hours) **Higher order linear differential equations I** (10Marks-2, 5Marks-1)

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.

General Solution of  $f(D)y=0$

General Solution of  $f(D)y=Q$ , where Q is a function of x.

$\frac{1}{f(D)}$  is Expressed as partial fractions.

P.I. of  $f(D)y = Q$  when  $Q = be^{ax}$

P.I. of  $f(D)y = Q$  when  $Q = b \sin ax$  or  $b \cos ax$ .

**UNIT-IV:** (12 Hours) **Higher order linear differential equations II** (10Marks-2, 5Marks-2)

Solution of the non-homogeneous linear differential equations with constant coefficients.

P.I. of  $f(D)y = Q$  when  $Q = bx^k$

P.I. of  $f(D)y = Q$  when  $Q = e^{ax}V$ , where V is a function of x.

P.I. of  $f(D)y = Q$  when  $Q = xV$ , where V is a function of x.

P.I. of  $f(D)y = Q$  when  $Q = x^mV$ , where V is a function of x.

**UNIT-V:** (12 Hours) **Higher order linear differential equations III** (10Marks-2, 5Marks-2)

Method of Variation of Parameters; Linear Differential Equations with Non-Constant Coefficients, The Cauchy-Euler equation, Legendre's linear equations, miscellaneous differential equations.

**Prescribed Text Book:** (1) A Text Book of B.Sc Mathematics Volume-I (S.Chand & Company)  
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry )

- Reference Books:** (1) Ordinary and Partial Differential Equations Raisinghania, published by S. Chand & Company, New Delhi.
- (2) Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradha- universities press.
- (3) Differential Equations and Their Applications by Zafar Ahsan, published by Prentice-Hall of India Learning Pvt. Ltd. New Delhi- Second edition.

**Suggested Activities:**

Seminar/ Quiz/ Assignments

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SRI Y.N. COLLEGE (AUTONOMOUS)  
(NAAC ACCREDITED 'A' GRADE COLLEGE)  
NARSAPUR - 534 275

**SEMESTER-I**  
**BLUE PRINT**

Time: 3Hrs.

Max. Marks:75

**PART-I(5 x 5 = 25 M)**

**Answer any FIVE Questions, each question carries FIVE marks.**

Differential equations of first order and first degree	: 2 questions
Differential equations of the first order but not of the first degree	: 1 question
Higher order Linear differential equations I	: 1 question
Higher order Linear differential equations II	: 2 questions
Higher order Linear differential equations III	: 2 questions

**PART-II(5 x 10 M= 50 M)**

**Answer any FIVE questions. Choosing atleast TWO questions from each section.**

**Each question carries 10 marks.**

**Note: Under SECTION-A (Q.NO:13) & SECTION-B (Q.NO:14) will be given from UNIT-III.**

**SECTION-A**

Differential equations of the first order and first degree	: 2 questions
Differential equations of the first order but not of the first degree	: 2 questions
Higher order Linear differential equations I	: 1 question

**SECTION-B**

Higher order Linear differential equations I	: 1 question
Higher order Linear differential equations II	: 2 questions
Higher order Linear differential equations III	: 2 questions

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I B.Sc. Mathematics – Paper I  
Differential Equations  
Model Question Paper (for 2020-23 batch w. e. f 2020-2021)

Time: 3Hrs

Max Marks: 75

**PART-I**

Answer any FIVE Questions, each question carries FIVE marks.

5x5M =25M

1. Solve  $\left[ y \left( 1 + \frac{1}{x} \right) + \cos y \right] dx + [x + \log x - x \sin y] dy = 0$ .
2. Solve  $(1 - x^2) \frac{dy}{dx} + 2xy = x\sqrt{1 - x^2}$ .
3. Solve  $x^2(y - px) = p^2y$ .
4. Solve  $(D^2 - 3D + 2)y = \cos hx$ .
5. Solve  $(D^2 - 4D + 3)y = x^3$ .
6. Solve  $(D^2 + 4)y = x \sin x$
7.  $(x \sin x + \cos x) \frac{d^2y}{dx^2} - x \cos x \frac{dy}{dx} + y \cos x = 0$ .
8. Solve  $(x^2D^2 + 2xD - 12)y = x^3(\log x)$ .

**PART-II**

Answer any FIVE questions. Choosing atleast TWO questions from each section.

Each question carries 10 marks.

5x10M = 50M

**SECTION - A**

9. Solve  $(2x^2y - 3y^2) dx + (2x^3 - 12xy + \log y) dy = 0$ .
10. Solve  $\frac{dy}{dx} + \frac{y}{x} = y^2 x \sin x, x > 0$ .
11. Show that the family of confocal conics  $\frac{x^2}{(a^2+\lambda)} + \frac{y^2}{(b^2+\lambda)} = 1$  is self orthogonal, where  $\lambda$  is a parameter.
12. Solve  $p^2 + 2py \cot x = y^2$ .
13. Solve  $(D^2 + a^2)y = \sec ax$ .

**SECTION-B**

14. Solve  $(D^2 + 9)y = \cos^3 x$ .
15. Solve  $(D^2 + 3D + 2)y = xe^x \sin x$ .
16. Solve  $(D^2 - 4D + 1)y = e^{2x} \cos^2 x$ .
17. Solve  $(x + 2) \frac{d^2y}{dx^2} - (2x + 5) \frac{dy}{dx} + 2y = (x + 1)e^x$ , given that  $y = e^{2x}$  is a part of C.F.
18. Solve  $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} - y = x^2 e^x$  by the method of variation of parameters.

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