4. Details of course-wise Syllabus

DETAILS OF COURSE-WISE SYLLABUS

B.A/ B.Sc	Semester-I	Credits:4
Course:1	**DIFFERENTIAL EQUATIONS**	**Hrs/Weak:5**

Course Outcomes:

After successful completion of this course, the student will be able to;

- Solve linear differential equations
- Convert non exact homogeneous equations to exact differential equations by using integrating factors
- Know the methods of finding solutions of differential equations of the first order but not of the first Degree.
- Solve higher-order linear differential equations, both homogeneous and non homogeneous, with constant coefficients.
- Understand the concept and apply appropriate methods for solving differential equations.

UNIT I: (12 Hours)

Differential Equations of first order and first degree:

Linear Differential Equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors.

UNIT II: (12 Hours)

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

Equations solvable for p; Equations solvable for y; Equations solvable for x; Equations homogeneous in x and y; Equations of the first degree in x and y – Clairaut's Equation.

UNIT III: (12 Hours)

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

General Solution of $f(D)y=Q$ when Q is a function $1/f(D)$ is expressed as partial fractions of x,

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

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

UNIT IV: (12 Hours)

Higher order linear differential equations-II:

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.

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

UNIT V: (12 Hours)

Higher order linear differential equations-III :

Method of variation of parameters; Linear differential Equations with non-constant coefficients(Solution when a part of CF is known method only); The Cauchy-Euler Equation, Legendre's linear equations.

Co-Curricular Activities(15 Hours)

Seminar/ Quiz/ Assignments/ Applications of Differential Equations to Real life Problem /Problem Solving.

TEXT BOOK :

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

REFERENCE BOOKS :

1. A text book of Mathematics for B.A/B.Sc, Vol 1, by N. Krishna Murthy & others, published by S.Chand & Company, New Delhi.

2. Ordinary and Partial Differential Equations by Dr. M.D,Raisinghania, published by S. Chand & Company, New Delhi.

3. Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradha Universities Press.

4. Differential Equations -Srinivas Vangala & Madhu Rajesh, published by Spectrum University Press.

BLUE PRINT FOR QUESTION PAPER PATTERN
COURSE-I, DIFFERENTIAL EQUATIONS

Unit	TOPIC	S.A.Q (including choice)	E.Q (including choice)	Total Marks
I	Differential Equations of 1st order and 1st Degree	2	2	30
II	Differential Equations of 1st order but not of 1st degree	1	2	25
III	Higher Order Linear Differential Equations (with constant coefficients) – I	2	2	30
IV	Higher Order Linear Differential Equations (with constant coefficients) – II	2	2	30
V	Higher Order Linear Differential Equations (with non constant coefficients)	1	2	25
	TOTAL	8	1	140

S.A.Q.   = Short answer questions   (5 marks)

E.Q.   = Essay questions   (10 marks)

Short answer questions   : 5 X 5 M   = 25 M

Essay questions   : 5 X 10 M = 50 M

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    Total Marks   = 75 M

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MODEL QUESTION PAPER (Sem-End)
B.A./B.Sc. DEGREE EXAMINATIONS

Semester - I

Course-1: DIFFERENTIAL EQUATIONS

Time: 3Hrs   **Max.Marks:75M**

SECTION - A

Answer any FIVE questions.   **5 X 5 M=25 M**

1. Solve $\left(1 + e^{x/y}\right)dx + e^{x/y}\left(1 - \frac{x}{y}\right)dy = 0$
2. Solve $\left(y - e^{\sin^{-1}x}\right)\frac{dx}{dy} + \sqrt{1 - x^2} = 0$
3. Solve $\sin px \cos y = \cos px \sin y + p$.
4. Solve $[D^2 - (a + b)D + ab]y = 0$
5. Solve $(D^2 - 3D + 2) = \cosh x$
6. Solve $(D^2 - 4D + 3)y = \sin 3x \cos 2x$.
7. Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 13\,y = 8\,e^{3x}\sin 2x$.
8. Solve $x^2 y'' - 2x(1 + x)y' + 2(1 + x)y = x^3$

SECTION - B

Answer ALL the questions.   **5 X 10 M = 50 M**

9. (a) Solve $x\frac{dy}{dx} + y = y^2 \log x$.

   (Or)

   (b) Solve $\left(y + \frac{y^3}{3} + \frac{x^2}{2}\right)dx + \frac{1}{4}(x + xy^2)dy = 0$

10. (a) Solve $p^2 + 2py\cot x = y^2$.

    (Or)

    (b) Solve $y + Px = P^2 x^4$

11. (a) Solve $(D^3 + D^2 - D - 1)y = \cos 2x.11$

    (OR)

    (b) Solve $(D^2 - 3D + 2)y = \sin e^{-x}$.

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

    (Or)

    (b) Solve $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = xe^x \sin x$

13. (a) Solve $(D^2 - 2D)\,y = e^x \sin x$ by the method of variation of parameters.

    (Or)

B.A/E   (b) Solve $3x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = x$