

Department of Mathematics								
Semester	Course Type	Course Code	Course Title	CLASS: I B.Sc. Physics/Statistics				
				Credits	Contact Hours/week	CIA	Ext	Total
II	Allied	20U2MAC2	Allied mathematics-II	5	6	25	75	100

### COURSE OBJECTIVES:

On completion of this course, the learner will

1. Know methods of solving differential equations of first order and higher order.
2. To understand the fundamental ideas of Partial differential equations.
3. Know application of Laplace transforms and method of solving ordinary differential equations using Laplace transforms.

#### Unit-I: (16 hrs)

Differential equation of first order and first degree – Variable-Separable – Homogeneous and Non-homogeneous differential equations – Exact Differential equations – Integrating factors-Problems.

#### Unit-II: (16 hrs)

Introduction – Linear equation with constant coefficients – Methods of finding complementary functions – Methods of finding particular integrals – Problems.

#### Unit-III: (20 hrs)

Formation of partial differential equations – Classification of solution of PDE – Solutions of standard types of first order partial differential equations (Types 1-4) – Lagrange's linear equation -Problems.

#### Unit-IV: (18 hrs)

Laplace transforms – Inverse Laplace transforms – solution of differential equations using Laplace transforms - Problems.

#### Unit-V: (20 hrs)

Finite differences – Newton's forward and backward formula –Lagrange's formula – Problems.

#### Text Book:

1. Allied Mathematics by Dr.S.Arumugam&Issac. Vol III, New Gamma Publishing House,Palayamkottai. (2012) (For UNIT – I – IV) (Chapter1(1.1-1.4),2,3,4(4.1-4.4)).
2. Allied Mathematics by Dr.S.Arumugam&Issac. Vol II, New Gamma Publishing House,Palayamkottai. (2011) (For UNIT-V) (Chapter 7).

#### Books for Reference:

1. Ancillary Mathematics, Volume I, T.K Manikavasagampillai& Others, Viswanathan Printers and Publishers Pvt Ltd.Chennai.
2. Allied Mathematics, Volume II, P.Kandasamy, K.Thilagavathy, S.Chand& Company Pvt. Ltd.

**Web References:**

1. <https://www.math24.net/exact-differential-equations/>
2. <https://www.math24.net/higher-order-linear-homogeneous-differential-equations-constant-coefficients/>
3. [https://www.brainkart.com/article/Lagrange---s-Linear-Equation\\_6488/](https://www.brainkart.com/article/Lagrange---s-Linear-Equation_6488/)
4. <https://lpsa.swarthmore.edu/LaplaceXform/FwdLaplace/LaplaceProps.html>
5. <https://www.geeksforgeeks.org/newton-forward-backward-interpolation/>

**Pedagogy:** Lecture, Seminar, Quiz, Problem Solving, Tutorial, Group Discussion, PPT.

**Course Learning Outcomes**

On the successful completion of the course, students will be able to

Number	Course Learning Outcome	Knowledge level
CLO1	Solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous and non-homogeneous differential equation.	Up to K3
CLO2	Solve 2nd and higher order differential equations with constant coefficients	Up to K3
CLO3	Construct partial differential equations and to solve first order partial differential equations	Up to K4
CLO4	Solve Laplace transform and inverse transform of simple functions and application to differential equations with constant coefficients.	Up to K3
CLO5	Apply various interpolation methods and finite difference concepts.	Up to K3

K1 - Remembering and recalling facts with specific answers

K2 - Basic understanding of facts and stating main ideas with general answers

K3 - Application oriented - Solving Problems

K4 - Examining, analyzing, presentation and make inferences with evidences

**Mapping with Courses Learning Outcomes (CLOs)**

CLO/ PO-PSO	PO					PSO						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO 1	3	2	-	-	1	2	1	2	3	3	-	-
CLO 2	3	2	-	-	1	2	1	2	3	3	-	-
CLO 3	3	2	-	-	1	2	1	2	3	3	-	-
CLO 4	3	2	-	-	1	2	1	2	3	3	-	-
CLO 5	3	2	-	-	1	2	1	2	3	3	-	-

3 - Advanced Application

2 - Intermediate Level

1 - Basic Level

## Lesson Plan

Unit	Description	Hours	Mode
I	Differential equation of first order and first degree: Variable – Separable	3	16 Lecture Problem Solving Problem Solving
	Homogeneous and Non-homogeneous differential equations	5	
	Exact Differential equations – Integrating factors.	8	
II	Introduction – Linear equation with constant coefficients : Methods of finding complementary functions	6	16 PPT, Tutorial PPT, Tutorial
	Methods of finding particular integrals	10	
III	Formation of partial differential equations	2	20 Lecture PPT, Group Discussion Problem Solving Problem Solving Lecture, Tutorial Lecture, Tutorial Problem Solving
	Classification of solution of PDE	2	
	Solutions of standard types of first order partial differential equations Type I	3	
	Solutions of standard types of first order partial differential equations Type II	3	
	Solutions of standard types of first order partial differential equations Type III	3	
	Solutions of standard types of first order partial differential equations Type IV	3	
IV	Laplace transforms	4	18 PPT, Quiz, Lecture PPT, Quiz, Lecture Problem Solving
	Inverse Laplace transforms	6	
	Solution of differential equations using Laplace transforms	8	
V	Finite differences	6	20 Lecture Tutorial, Seminar Tutorial, Seminar
	Newton's forward and backward formula	8	
	Lagrange's formula	6	
<b>Total Hours</b>			<b>90</b>

### Course Designers:

1. Mr. P. NATARAJ, Assistant Professor, Department of Mathematics.
2. Mrs. B. SEETHALAKSHMI, Assistant Professor, Department of Mathematics.