JYOTI NIVAS COLLEGE AUTONOMOUS
SYLLABUS FOR 2018 BATCH AND THEREAFTER

Programme: B.Sc.   **Semester: IV**

MATHEMATICS PAPER IV

Course Code: 18IVMA4   **No. of Hours: 60**

COURSE OBJECTIVES:

• Capable of using appropriate software to solve differential equations.

• Able to understand the algebraic concepts of mathematics

• Able to work independently and do in-depth study of various notions of mathematics.

LEARNING OUTCOMES:

• Understand Cayley's theorem in groups and its applications

• Examine homomorphisms and isomorphisms on groups and kernel of the functions

• Find maxima and minima, critical points and inflection points of functions.

• Determine solutions to second order linear homogeneous differential equations with constant coefficients

• Understand the basic knowledge of complimentary function and particular integral

• Determine solutions to second order linear non-homogeneous differential equations with constant coefficients

• Understand the Laplace transform of elementary functions and use the rules of integration & definition of Laplace transform

• Apply Laplace transform to solve linear higher order differential equations.

UNIT 1

CHAPTER 1 ALGEBRA IV   **15 HRS**

Groups: Normal subgroups-examples and problems – Quotient groups-Homomorphism and Isomorphism of groups-Kernel and image of a homomorphism-Normality of the Kernel Fundamental theorem of homomorphism- properties related to isomorphism- Permutation group-Cayley's theorem.

UNIT 2
CHAPTER 1 DIFFERENTIAL CALCULUS IV   **10 HRS**

Continuity and differentiability of a function of two and three variables – Taylor's Theorem and expansion of functions of two variables- Maxima and Minima of functions Of two variables– Method of Lagrange's multipliers

UNIT 3
CHAPTER 1 DIFFERENTIAL EQUATIONS II   25 HRS

Second and higher order ordinary linear differential equations with constant Coefficients-complementary function- particular integrals (standard types) Cauchy-Euler differential equations.Solutions of second order ordinary linear differential equations with variables coefficients by the following methods.

   a) When a part of complementary function is given

   b) Changing the independent variable

   c) Changing the dependent variable

   d) Variation of parameters

   e) Exact equations

UNIT 4
CHAPTER 1 MATHEMATICAL METHODS I   10 HRS

Definition and basic properties Laplace transform of Standard functions – Laplace transform of periodic functions- Laplace transforms of derivatives And the integral of a function-Laplace transforms, convolution theorem (statement only) Inverse Laplace transforms. Solutions to differential equations using Laplace Transforms

PRACTICALS:
LIST OF PROBLEMS

1. Illustrating homomorphism of groups.
2. Illustrating isomorphism of groups
3. Finding the kernel of the given homomorphism
4. Finding the normal subgroup of the given group
5. Verify Cayley's theorem and isomorphism theorems.
6. Illustrating permutation groups.
7. Finding maxima/minima of functions of two variables.
8. Finding the Laplace transforms of some standard functions.
9. Finding the inverse Laplace transform of simple functions.
10. Implementing Laplace transform method of solving ordinary linear differential equations of first and second order with constant coefficients.

11. Finding complementary function and particular integral of constant coefficients second and higher order ordinary differential equations and plot the solution.

REFERENCES:

1. Frank Ayres and Elliott Mendelson, *Schaum's Outline of Calculus*, 5th ed. USA: Mc. Graw Hill., 2008.

2. G B Thomas and R L Finney, *Calculus and analytical geometry, Pearson Publications 2006*

3. G F Simmons, *Differential equation with Applications and historical notes*, 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.

4. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 2003.

5. M D Raisinghania, Advanced Differential Equations, S Chand and Co. Pvt. Ltd., 2013.

6. N P Bali, *Differential Calculus*, Laxmi Publications (P) Ltd.., 2010.

7. Narayanan & T. K. Manicavachagam Pillay, *Calculus*.: S. Viswanathan Pvt. Ltd., vol. I & II1996.

8. R Balakrishan and N.Ramabadran, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.

9. M.D Raisinghania., *Laplace and Fourier Transforms*. New Delhi, India: S. Chand and Co. Ltd. , 1995.

10. S Narayanan and T K Manicavachogam Pillay, *Differential Equations*.: S V Publishers Private Ltd., 1981.