

**JYOTI NIVAS COLLEGE AUTONOMOUS  
SYLLABUS FOR 2018 BATCH AND THEREAFTER**

**Programme: B.Sc.**

**Semester: II**

**MATHEMATICS PAPER II**

**Course Code: 18IIMA2**

**No. of Hours: 60**

**COURSE OBJECTIVES:**

- Capable of inquiring and understanding wide range of concepts in mathematics.
- Able to solve linear system of equations, differential and integral calculus problems
- Able to develop codes using FOSS to solve all mathematical problems

**LEARNING OUTCOMES:**

- Assess properties implied by the definitions of groups and use various canonical types of groups (including cyclic groups and groups of permutations)
- Represent the problem as a real-valued function of one variable. and apply differential calculus to solve the problem.
- Apply the concepts of integral calculus for computation of length of arc, plane area and surface area and volume of solids of revolutions
- Solve basic application problems described by first order linear differential equations

**UNIT 1**

**CHAPTER 1 ALGEBRA II**

**15 HRS**

Group Theory Binary operation, algebraic structure-problems on finding identity and inverse. Definitions of semi group and group, abelian group – problems on finite and infinite groups. Properties of group with proof – standard problems on groups – A finite semigroup with both the cancellation laws is a group – Any group of order less than five is abelian – permutation groups. Subgroups- theorems on subgroups (with proof) - problems.

**UNIT 2**

**CHAPTER 1 DIFFERENTIAL CALCULUS II**

**20 HRS**

Polar coordinates - Angle between the radius vector and the tangent - Angle of intersection of curves (polar form) polar sub-tangent and polar subnormal -perpendicular from pole on the tangent - Pedal equations. Derivative of an arc in Cartesian, parametric and polar forms. Curvature of plane curves - formula for radius of curvature in Cartesian, parametric, polar and pedal forms - centre of curvature -Singular points– Asymptotes. General rules for tracing of curves (questions to be done in Practicals)

**CHAPTER 2 INTEGRAL CALCULUS II**

**10 HRS**

Applications of Integral Calculus- computation of length of arc, plane area and surface area and volume of solids of revolutions for standard curves in Cartesian and Polar forms.

### **UNIT 3**

#### **CHAPTER 1 DIFFERENTIAL EQUATIONS 1**

**15 HRS**

Differential equations of first order and first degree – Equations in which Variables are Separable – Equations reducible to Variable Separable form – Homogeneous equations – Solutions of ordinary differential equations of first order and first degree:

- (i) Linear equations, Bernoulli equation and those reducible to these.
- (ii) Exact equations (excluding reducible to Exact)
- (iii) Equations of first order and higher degree – Clairaut's equation

#### **PRACTICALS:**

#### **LIST OF PROBLEMS**

1. Creating a FOSS program (simple examples).
2. Creating a FOSS program (simple examples).
3.
  - i. To verify whether given operator is binary or not.
  - ii. To find identity element of a group.
  - iii. To find inverse element of a group.
4. Finding all possible subgroups of a finite group.
5. Plotting of standard Cartesian curves-
6. Plotting of standard Cartesian curves-
7. Plotting of standard Polar curves-
8. Plotting of standard parametric curves-
9. Programs for area and volume.
10. Solution of Differential equation and plotting the solution-I.
11. Solution of Differential equation and plotting the solution- II
12. Solution of Differential equation and plotting the solution-III
13. Solution of Differential equation and plotting the solution- IV

#### **REFERENCES:**

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2. F Ayres, *Schaum's outline of theory and problems of Differential Equations*, I Ed. USA: McGraw-Hill, 2010.

3. Frank Ayres and Elliott Mendelson, *Schaum's Outline of Calculus*, 5th ed. USA: Mc. Graw Hill., 2008.
4. G B Thomas and R L Finney, *Calculus and analytical geometry*, Addison Wesley, 1995.
5. G F Simmons, *Differential equation with Applications and historical notes*, II Edition: McGraw-Hill Publishing Company, Oct 1991.
6. J Edwards, *An elementary treatise on the differential calculus: with applications and numerous example*, Reprint. Charleston, USA: BiblioBazaar, 2010.
7. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 1990.
8. M D Raisinghania, *Advanced Differential Equations*, S Chand and Co. Pvt. Ltd., 2013.
9. Michael Artin, *Algebra*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.
10. N P Bali, *Differential Calculus*, New ed. New Delhi, India: Laxmi Publications (P) Ltd., 2010.
11. R Balakrishnan and N. Ramabadrana, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.
12. S Narayanan & T. K. Manicavachogam Pillay, *Calculus*: S. Viswanathan Pvt. Ltd., vol. I & II, 1996.
13. S Narayanan and T K Manicavachogam Pillay, *Differential Equations*: S V Publishers Private Ltd., 1981.
14. Vashista, *A First Course in Modern Algebra*, 11th ed.: Krishna Prakasan Mandir, 1980.