

*Swami Ramanand Teerth Marathwada  
University, Nanded.*

***B.A. /B.Sc. Second Year  
Syllabus (Mathematics)  
(Semester System)***

***Effective from June -2010***

**B.A/B.Sc. S.Y. Semester- III**

**Paper VI :( MT 201): Real Analysis**

**No. of periods: 60**

**Max.Marks:50**

**Unit I:**

Sequences of Real numbers: Limit of sequence; uniqueness of the limits, bounded sequences, monotonic sequences, sequences of functional values, limits superior and inferior limit points in terms of sequences.

**Unit II:**

Infinite series of constants, Cauchy's convergence criterion for series, series of nonnegative terms, the ratio test, absolute and conditional convergence.

**Unit III:**

Sequences and series of functions, uniform convergence, infinite series of functions, tests of uniform convergence of series continuity, differentiability and integrability of series, power series, properties of functions defined by power series, Taylor's series, arithmetic operations with power series, Abel's theorem.

**Text Book:** Introduction of Real Analysis –

William F. Trench,

Pearson Education Publications.

**Scope:**

**Unit I :** 4.1, 4.1.1 to 4.1.13, 4.2, 4.2.1 to 4.2.7

**Unit II :** 4.3, 4.3.1 to 4.3.25

**Unit III :** 4.4, 4.4.1 to 4.4.12, 4.4.13 to 4.4.20 4.5.3 to 4.5.12

**B.A./B.Sc. S.Y. Semester III**

**Paper VII: (MT 202): Modern Algebra**

**No. of periods: 60**

**Max.Marks:50**

**Unit I:**

Mapping, Examples of Mappings, The Integers, Group Theory, Definition of a Group, Some Examples of Groups, Cyclic Group, Some Preliminary Lemmas.

**Unit II:**

Subgroups, Properties of subgroups, Lagrange's Theorem, Normal subgroup and quotient groups, Properties and Examples.

**Unit III:**

Homomorphisms, Examples and Properties, Applications, Cauchy's theorem for Abelian groups, isomorphism (definitions and basic examples)

**Recommended Text Book:**

Topic in Algebra

By I.N. Herstein (Second Edition)

**Scope:**

**Chapter 1:** 1.2, 1.2.1, 1.2.2 (Lemma), 1.2.3, 1.2.1 (Theorem),

**Chapter 2:** 2, 2.1, 2.2, 2.3, 2.4, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.4.5, 2.4.5, 2.6, 2.7 (Excluding Sylow's Theorem)(Delete art. 2.7.5,2.7.2), 2.8

**Reference Books:**

- 1) A first course in abstract algebra by J.B. Fraleigh,  
Narosa Publications.
- 2) Contemporary Abstract Algebra by Joseph Gallion,  
Narosa Publications.
- 3) Modern Algebra by A.R. Vasishtha,  
Krishna Prakashan Media.

- 4) Modern Algebra by R.P. Rohtatgi,  
Dominant Publishers and Distributors, New Delhi.
- 5) Modern Algebra, By Goyal and Gupta, Pragato Prakashan Meerut
- 6) College Mathematics by N.R. Jayaram and R.V. Prabhakara,  
Himalaya Publishing House.
- 7) Elements of Logic and Modern Algebra by M.V. Bhat and M.L.  
Bhave, S. Chand and Company Ltd. Ramnagar, New Delhi 110055
- 8) Abstract Algebra by Vijay K. Khanna, Vikas Publication Company

**B.Sc. S.Y. SEMESTER –III**

**PAPER-VIII: (MT203): NUMBER THEORY.**

**No. of periods: 60**

**Max.Marks:50**

**UNIT I:** Preliminaries: Mathematical Induction .The Binomial theorem  
Divisibility Theory in the integers: Division algorithm GCD Euclidean  
algorithm Diophantine equation

**UNIT II:** Primes and their distribution: The fundamental theorem of  
Arithmetic the Sieve of Eratosthenes the Goldbach conjecture

**UNIT III:** The theory of Congruences: Basic properties of congruence.  
Binary and Decimal representations of integers Linear congruences and the  
Chinese remainder theorem.

Fermat's Theorem: Theorems and pseudo primes Wilson's theorem The  
Fermat-Kraitchik factorization method

**Text Book:-** Elementary Number theory

-David M Burton

Tata McGraw-Hill Co. New Delhi.

**Scope:** - Chap 2: Complete

Chap 3: 3.1 to 3.3.

Chap 4: 4.2 to 4.4.

Chap.5: 5.1 to 5.4.

**Note:** - Paper is only for B.Sc. students.

**B.Sc. S.Y. Semester: IV**

**Paper-IX: (MT 204): Ordinary Differential Equations**

**No. of periods: 60**

**Max.Marks:50**

**Unit I:**

Preliminaries: Polynomials, Determinants, Introduction – Linear Equations of the First Order: Differential Equation, Linear Equations of the First Order, The Equation  $y'+ay = 0$ , the equation  $y'+ay = b(x)$ , The General Linear Equations of the First Order.

**Unit II:**

Linear equations with constant coefficients: The second order homogeneous equations, IVPs for second order homogeneous equations, Linear dependence and independence, A formula for the Wronskain, The non homogeneous equations of order two, The homogeneous equation of order n, IVPs of order n, Special methods for solving the non- homogeneous equation

**Unit III:**

Linear equations with variable coefficients: IVPs for homogeneous equation, Solution of the homogeneous equation, The Wronskain and linear independence, reduction of order, homogeneous equations with analytic coefficients.

Existence and uniqueness of solutions to first order: equations with variables separated, exact equations, the method of successive approximations.

**Text Book:**

Introduction to Ordinary Differential Equations,

By E.A. Coddington

Prentice Hall of India.

**Scope:**

**Unit 1:** Chap 0: Art 4, 6

Chap 1: Complete, **Unit 2:** Chap 2: Art 1 to 8, 10, 11

**Unit 3:** Chap 3: Art 1 to 5, 7, Chap 5: Art 1 to 4

**Note:** - Paper is only for B.Sc. students.

**B.A./B.Sc. S.Y. Semester IV**  
**Paper X :(MT 205): Ring Theory**

**No. of periods: 60**

**Max.Marks:50**

**Unit I:**

Definition and examples of rings, Some special classes of rings, Homomorphisms, Isomorphism

**Unit II:**

Ideals and quotients rings, More ideals and quotients rings, The field of quotients of an integral domains

**Unit III:**

Euclidean rings, A particular Euclidean ring, Polynomial rings, Polynomial over the national fields.

**Scope:**

**Unit 1:** 3.1, 3.2, 3.3

**Unit 2:** 3.4, 3.5, 3.6

**Unit 3:** 3.7, 3.8, 3.9, 3.10

**Text Book:**

Topics in Algebra,

I.N. Herstein , John Wiley and Sons (New York)

**Reference Books:**

- 1) A first course in abstract algebra by J.B. Fraleigh,  
Narosa Publications.
- 2) Contemporary Abstract Algebra by Joseph Gallion,  
Narosa Publications.
- 3) Modern Algebra by A.R. Vasishtha, Krishna Prakashan Media.
- 4) Modern Algebra by R.P. Rohtatgi,  
Dominant Publishers and Distributors, New Delhi.
- 5) Modern Algebra, By Goyal and Gupta, Pragato Prakashan Meerut

- 6) College Mathematics by N.R. Jayaram and R.V. Prabhakara,  
Himalaya Publishing House.
- 7) Elements of Logic and Modern Algebra by M.V. Bhat and M.L.  
Bhave,  
S. Chand and Company Ltd. Ramnagar, New Delhi 110055



**B.A./B.Sc. S.Y. Semester- IV**

**Paper XI :(MT 206): Calculus of Several Variables**

**No. of periods: 60**

**Max.Marks:50**

**Unit I:**

Real valued functions of several variables: structure of  $\mathbb{R}^n$ , length, distance and inner product, line segments in  $\mathbb{R}^n$ , neighborhood and open sets in  $\mathbb{R}^n$ , Heine–Borel theorem, connected sets and regions.

**Unit II:**

Continuous Real-valued functions of n variables: vector valued functions and composite functions, intermediate value theorem, uniform continuity.

Partial derivatives and the differential: Differentiable functions of several variables, the differential, Geometric interpretation of differentiability, maxima and minima.

**Unit III:**

The Chain rule and Taylor's theorem: The chain rule, higher derivatives of composite functions, higher differentials and Taylor's theorem,

**Text Book:** Introduction of Real Analysis –

William F. Trench,

Pearson Education Publications.

**Scope:**

**Unit I:** Art 5.1, 5.1.1 to 5.1.21

**Unit II:** Art 5.2, 5.2.1 to 5.2.54, 5.3, 5.3.1 to 5.3.11

**Unit III:** Art 5.4, 5.4.1 to 5.4.11

**B.Sc. S.Y. SEMESTER –III & IV**

**PAPER-XII (MP207): PRACTICAL PAPER.**

**No. of periods: 90**

**Max.Marks:100**

**PRACTICALS USING MATHEMATICAL SOFTWARES.**

SECTION A: Plotting of Graphs.

SECTION B: Solving of Ordinary differential equations.

SECTION C: Solving problems in Calculus.

SECTION D: Introduction to symbolic methods and solving problems.

**NOTE:-** 1) No. of periods per week :**03**.

2) Examination pattern: **Yearly**

3) Practical paper is only for **B.Sc.** students.

4) Softwares: **Freeware, MATLAB**.etc.

5) Minimum **Five** practicals from each section should be covered in Record book.

***Jogdand S.M.***  
Chairman,  
B.O.S. in Mathematics,  
S.R.T.M.University,Nanded.  
Dt.-26/04/2010.

**To,**  
The Director,  
B.C.U.D.,  
S.R.T.M. University,  
Nanded.

**Subject:** - *Submission of syllabus of B.A./B.Sc. (Second Year), III & IVth Semester.*

**R/Sir,**

With reference to subject cited above, the Board of Studies in Mathematics prepared the New Syllabus for of B.A. /B.Sc. (second Year), III & IVth Semester, which to be effective from June-2010. The same is submitting for the information and necessary action. Kindly do the needful in this regard.

The question paper pattern of theory examination and practical examination will be provided afterward.

Thanking You,

Yours faithfully,

**(Jogdand S.M.)**