Swami Ramanand Teerth Marathwada University, Nanded.

***B.A. /B.Sc*. Second Year**
Syllabus (*Mathematics*)
Semester System (MCQ Pattern)
Effective from June -2012

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

Paper VI :(MT 201): Real Analysis
(No. of periods: 60 Max.Marks:50)

***Unit I:*Real Sequences :** Sequences , limit points of a sequence , limits –Inferior and superior , convergent sequences , non convergent sequences, Cauchy's General Principle of convergence, Algebra of sequences, Some Important Theorems , Monotonic sequences.

***Unit II:* Infinite Series:** Introduction , positive term series , comparison tests for positive term series , Cauchy's Root Test , D'Alembert's ratio Test.

Unit III: Rabbe's Test , Logarithmic test, Integral Test , Gauss's Test , Series with arbitrary terms,. Rearrangement of terms.

Text Book:- Mathematical Analysis, By S.C.Malik &Savita Arora (Second revised edition)

Scope : Unit I: Chapter 3 :Complete
Unit II: Chapter 4 : Art 1 to 5
Unit III: Chapter 4: Art 6 to11.

Reference Books:

1) Introduction to Real Analysis ,By R.G. Bartle.(John Wiley and Sons)
2) Differential calculus, By Shanti Narayan.(S. Chand and Co.)
3) Elements of Real Analysis, By Shanti Narayan and M.D. Raisinghania. (S. Chand and Co).
4) Introduction to Real Analysis , By William F. Trench, Pearson Education Pub.

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)

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

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 Congurences: Basic properties of congruence. Binary and Decimal representations of integers Linear congruences and the Chinese reminder theorem.

Following part is for statement and introduction only
(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.(5.2 to 5.4 Statements only)

Reference Books
: 1 A concise Introduction to the Theory of Numbers,By A Baker Cambridge University Press 1984
2A course in arithmetic-. GTM Vol.7,By. J.P. Serre,, Springer Verlag 1973.
3,Introduction to Analytic number theory,By. Tom M. Apostol. Narosa Publishing house 1980.
4., An Introduction to the Theory of Numbers,By.I. Niven and Zuckerman 4th Ed Wiley, NewYork,1980,
5. Elementary Number Theory and its Applications, By Rosen K.H., Pearson Addision Wesely, 5th Edition.

B.Sc. S.Y. Semester: IV
Paper-IX: (MT 204): Ordinary Differential Equations
(No. of periods: 60 Max.Marks:50)

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

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,

Unit III:

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

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

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 6
Unit 3: Chap 3: Art 1 to 4
Chap 5: Art 1 to 3

Reference Books:

1. G. F. Simmons, “Differential Equations with Applications and Historical Notes”,Second Edition, Mc Graw Hill.
2. W. E. Williams, “ Partial Differential Equations”, Claredon Press Oxford.
3. G. Birkhoff and G. C. Rota, “Ordinary Differential Equations”, John Wiley and Sons.
4. E. T. Copson, “ Partial Differential Equations ”, Cambridge University Press.

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 oven the national fields.

Text Book:

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

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

Reference Books:

1) A first course in abstract algebra, by J.B. Fraleigh, Narosa Publications.
2) Contemparary 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:

Functions of several variables : Explicit and implicit functions , Continuity **,** Partial derivatives , differentiability.

Unit II:

Partial derivatives of higher order , differentials of higher order, functions of functions ., change of variables.

Unit III:

Taylor's theorem, extreme values: maxima and minima, functions of several variables.

Text Book:-

Mathematical Analysis, By S.C.Malik &Savita Arora(Second revised edition)

Scope

Unit I: Chapter 15 : Art 1 to 4

Unit II: Chapter 15 : Art 5 to 8

Unit III: Chapter 15 : Art 9 to 11.

Reference Books:

1) Introduction to Real Analysis, By R.G. Bartle.(John Wiley and Sons)
2) Differential calculus, By Shanti Narayan.(S. Chand and Co.)
3) Elements of Real Analysis, By Shanti Narayan and M.D. Raisinghania.
(S. Chand and Co).
4) Introduction to Real Analysis,. By William F. Trench, Pearson Education Pub.

PAPER-XII (MP207): **PRACTICAL PAPER.**
ANNUAL PATTERN (only for B.Sc Students)
(No. of periods 3 Per batch per week 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**. Per Batch of 20 students
2) Examination pattern: **Yearly**
3) Practical paper is only for **B.Sc**. students.
4) Softwares: **Freeware, MATLAB**.etc.
5) Minimum **5** practical's from each section should be covered in Record book(at least 20 practical's)

Reference Books: (for MATLAB Users).

1. Getting Started With MATLAB 7. - Rudra Pratap, Oxford University Press, (Indian Eden)www.oup.com, ISBN-0-19-568001-45

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