

Swami Ramanand Teerth Marathwada University Nanded

B.A./ B.Sc. Second Year New Syllabus (Mathematics) Semester III And IV Effective From June-2014

B.A./ B.Sc. Second Year Semester-III Paper VI (MT 201) : Real Analysis-I (No. of Periods : 60 ; Max.Marks : 50)

Unit-I: Sets and Functions

Sets and Elements; Operations on sets, Functions, real valued functions, Equivalence, Real numbers, Least upper bounds.

Unit-II : Sequence of Real Numbers.

Definition of sequence and subsequence, Limit of a sequence, Convergent sequences, Divergent sequences, Bounded sequences, Monotone sequences, Cauchy sequences.

Unit-III : Series of Real Numbers.

Convergence and divergence, Series with non-negative terms, Alternative series, Conditional convergence and absolute convergence, Tests for absolute convergence.

Recommended Text Book:-

Methods of Real Analysis : By Richard R.Goldberg. Pub Oxford and IBH Publishing Company

Scope : **Unit-I : Chapter 1** : 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7

Unit-II : Chapter 2: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10

Unit-III : Chapter 3: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6

Reference Books:

- 1) Introduction to Real Analysis ,By R.G. Bartle.(John Wiley and Sons)
- 2) Mathematical Analysis , By S.C.Malik, Savita Arora Pub New Age (Delhi)
- 3) Elements of Real Analysis, By Shanti Narayan and M.D. Raisinghanian. (S. Chand and Co).
- 4) Introduction to Real Analysis, By William F. Trench, Pearson Education Pub.
- 5) Mathematical Analysis , By Tom Apostol,Narosa Pub. House , New Delhi.
- 6) Undergraduate Analysis, By Serage Lang Pub. Springer .
- 7) Real Analysis ,By H.L. Royden Third Edition , Pub. PHI.

- 8) Principles of Real Analysis , By S. L. Gupta and N.R. Gupta ,Pub. Pearsons Education.
- 9) Real Analysis, By Dr Harikishan and Dr. Megha Rani , Pub. Pragati Prakshan .
- 10) An Introduction to Sequences, Series and improper Integrals, By O. E. Stanaitis , Pub. Holden-Dey , Inc. San Francisco, California.
- 11) Infinite series ,By Earl D. Rainville, Pub, The Macmillan Co., New York.
- 12) A Course of Mathematical Analysis, By Shanti Narayan , Pub. S. Chand & Co., New Delhi.
- 13) A First course in Mathematical Analysis, By D. Somasundaram and B. Choudhary:, Pub Narosa Publ. House.
- 14) Real Analysis, By Carothers , Pub. Cambridge University Press .

Effective From June-2014

B.A./ B.Sc. Second Year Semester–III
Paper VII (MT 202) : Group Theory
(No. of Periods : 60 ; Max.Marks : 50)

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Unit–I : Mapping, examples of mappings, the integers, group theory, definition of a group, some examples of groups, some preliminary lemmas.
- Unit–II :** Subgroups, cyclic groups, cyclic subgroups, A counting principle (Statement only of Lemma 2.5.1, Corollary and Theorem 2.5.1), Normal Subgroups and Quotient groups, Properties and examples.
- Unit–III :** Homomorphism's, Definitions, Examples and Properties, Cauchy's Theorem for Abelian groups, Sylow's, Theorem for Abelian groups (Statement Only), Automorphisms, definitions, Cayley's theorem, permutation groups.

Recommended Text Book : Topic in Algebra.

By : I.N. Herstein (Second Edition)

Scope : –

- Unit–I** : 1.2, 1.3, 2.1, 2.2, and 2.3
Unit–II : 2.4, 2.5, 2.6
Unit–III : 2.7 (Delete applications, Cauchy's theorem on wards), 2.8 2.9, 2.10, 2.11

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. Vasistha, Krishna Prakashan Media.
- 4) Modern Algebra, By R.P. Rohtatgi, Dominant Publishers and Distributors, New Delhi.
- 5) Modern Algebra, By Goyal and Gupta, Pragati 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
- 9) Basic Algebra, Vol. I and II, By N. Jacobson : W.H. Freeman, 1980 (Hindustan Publishing Co.

- 10) A Text Book Of Modern Abstract Algebra ,By Shanti Narayan :, S. Chand and Co. ,New Delhi
- 11) Matrix and Linear Algebra,,By K.B.Datta: Prentice Hall of India Pvt.Ltd.New Delhi,2000
- 12) Basic Abstract Algebra, By P.B.Bhattacharya, S.K.Jain and S.R.Nagpal : (IInd Edition)Cambridge University Press Indian Edition,1997.
- 13) Algebra, By Vivek Sahai and Vikas Bisht :, Narosa Publishing House ,1997.
- 14) Fundamentals of Abstract Algebra, By D.s.Malik,J.N.Mordeson and M.K.Sen :,McGraw Hill International Edition 1997
- 15) Lectures on Abstract Algebra, By T.M.Karade, J.N.Salunke, K.S.Adhav, M.S.Bendre , Sonu Nilu Publication.Nagpur(IInd Publication)
- 16) Algebra, By M Artin , Pub, PHI New Delhi 1994.
- 17) University Algebra, By N. S. Gopalakrishnan, New Age. Delhi

B.Sc. Second Year Semester–III
Paper VIII (MT 203): Ordinary Differential Equations
(No. of Periods: 60; Max.Marks : 50)

NOTE:-This Paper is Only For B Sc Students. (Effective From June-2014)

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Unit–I: Preliminaries:

Polynomials, Determinants. Linear Equations of the First Order Differential Equation, Linear Equation 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, 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.

Text Book: Introduction to Ordinary Differential Equations, By. E.A. Coddington, Prentice Hall of India.

Scope: Unit–1 : Chapter .0 : Articles . 4, 6. Chapter.1 : Complete

Unit–2 : Chapter .2 : Articles 1 to 6.

Unit–3 : Chapter .3 : Articles. 1 to 4.

Reference Books:

- 1) Differential Equations with Applications and Historical Notes,By G. F. Simmons
Second Edition, Mc Graw Hill.
- 2) Ordinary Differential Equations,By Purna Chandra Biswal,pub.PHI Learning
private Ltd.,New Delhi
- 3) Ordinary Differential Equations,By G. Birkhoff and G. C. Rota, John Wiley and
Sons.
- 4) Introductory Course on Differential Equations , By D.A. Murray ,Orient Longman
India
- 5) Differential Equations, By Raisinghanian , S. Chand. Co.
- 6) Differential Equations, By J N Sharma , Krishna Prakashan , Meerut
- 7) Theory and Problems of Differential Equations ,By Frank Ayres, Mc Graw Hill
- 8) Lectures on Differential Equations, By T.M. Karade , Sonu-Nilu Pub. Nagpur.

B.A./ B.Sc. Second Year Semester–IV
Paper IX (MT 204) : Real Analysis–II
(No. of Periods : 60 ; Max.Marks : 50) (Effective From June-2014)

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Unit–I: The Riemann Integral.

Definitions and Existence of the integral, Refinement of partitions; Darboux's theorem, Conditions of integrability, Integrability of the sum and difference of Integrable functions, The integral as a limit of sums (Riemann Sums).Some Integrable Functions ,

Unit–II Integration and Differentiations, Fundamental Theorem of Calculus , Mean value Theorem.

:Improper Integrals.

Introduction, Integration of unbounded functions with Finite Limits of Integration, Comparison Test, for Convergence at a of $\int_a^b f(x)$. Absolute Convergence.

Unit III Fourier Series .

Trigonometric Series, Fourier Series , Some Preliminary Theorems, Periodic Function, Some Definitions, Some Theorems The Main Theorem ,Fourier Series of Even and Odd Functions , Half Range Series

Text Book : Mathematical Analysis, By S.C.Malik, Savita Arora. New Age. (Delhi)

Scope : Chapter 9 Articles 1, 1.1, 1.2, 2, 3 ,4 ,5, 5.1, 6, 6.2, 7, 8, 9,

Chapter 11 Articles 1, 2 3 3.1, 3.2 3.3 3.4 , 3.5

Chapter 14 Articles 1. 1.1, 2, 2.1, 2.2, 2.3, 3, 3.1, 3.2

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.
- 5) Mathematical Analysis, By Tom Apostol, Narosa Pub. House , New Delhi.
- 6) Undergraduate Analysis, By Serge Lang Pub. Springer .
- 7) Real Analysis ,By H.L. Royden Third Edition , Pub. PHI.

- 8) Principles of Real Analysis , By S. L. Gupta and N.R. Gupta ,Pub. Pearsons Education.
- 9) Real Analysis, By Dr Harikishan and Dr. Megha Rani , Pub. Pragati Prakshan .
- 10) An Introduction to Sequences, Series and improper Integrals, By O. E. Stanaitis , Pub. Holden-Dey , Inc. San Francisco, California.
- 11) Infinite series ,By Earl D. Rainville, Pub, The Macmillan Co., New York.
- 12) A Course of Mathematical Analysis, By Shanti Narayan , Pub. S. Chand & Co., New Delhi.
- 13) First course in Mathematical Analysis ,By D. Somasundaram and B. Choudhary:, Pub Narosa Publ. House.
- 14) Real Analysis, By Carothers , Pub. Cambridge University Press .
- 15) Methods of Real Analysis , By Richard R.Goldberg. Pub Oxford and IBH Publishing Company

B.A./ B.Sc. Second Year Semester–IV
Paper X (MT 205) : Ring Theory
(No. of Periods: 60; Max. Marks : 50)(Effective From June-2014)

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- Unit–I** : Ring, Definition and examples of rings, some special classes of Rings. Homomorphisms, Isomorphism.
- Unit–II** : ideals and Quotient Rings, More Ideals and Quotients rings, The field of quotients of an integral domains. Euclidean Rings.
- Unit–III** : A particular Euclidean Ring, Polynomial Rings, Polynomial over the Rational field, Polynomial Rings over commutative Rings.
- Text Book** : Topics in Algebra.
By : I.N. Herstein, John, Wiley and Sons (New York) (Second Edition)
- Scope** : – **Unit–I** : 3.1, 3.2, 3.3
Unit–II : 3.4, 3.5, 3.6, 3.7
Unit–III : 3.8, 3.9, 3.10, 3.11 (Lemma 3.11.1 and its corollary only)

Reference Books :

- 1) Modern Algebra, By A.R. Vasishtha, Krishna, Prakashan Media.
- 2) A first course in abstract Algebra ,By J.B. Fraleigh, Narosa Publication.
- 3) Contemporary Abstract Algebra, By Joseph Gallion, Narosa Publications.
- 4) Modern Algebra ,By R.P. Rohtagi, Dominant Publishers and Distributors, New Delhi.
- 5) Modern Algebra, By Goyal and Gupta, Pragati Prakashan Meerut.
- 6) Basic Algebra ,Vol. I and II, By N.Jacobson, W.H.Freeman,1980(Hindustan Publishing Co.
- 7) A Text Book Of Modern Abstract Algebra, By Shanti Narayan, S. Chand and Co. ,New Delhi
- 8) Matrix and Linear Algebra,,By K.B.Datta: Prentice Hall of India Pvt.Ltd.New Delhi,2000
- 9) Lectures on Abstract Algebra, By T.M.Karade, J.N.Salunke, K.S.Adhav, M.S.Bendre , Sonu Nilu Publication.Nagpur(IInd Publication)
- 10) Algebra, By M Artin , Pub, PHI New Delhi 1994.
- 11) University Algebra ,By N. S. Gopalakrishnan, New Age. Delhi .
- 12) Rings and Modules , By C. Musili , Narosa Publishing House , 1992

B.Sc. Second Year Semester–IV
Paper XI (MT 206): Partial Differential Equation
(No. of Periods: 60; Max. Marks : 50)
NOTE:-This Paper is Only For B. Sc. Students
(Effective From June-2014)

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Unit–I : Partial differential equations, order, method of forming partial differential equations, solution of equations by direct integration, Lagrange's linear equation, working rule, method of multipliers.
- Unit–II** : Partial differential equations nonlinear in p and q Charpit's method, linear homogeneous partial differential equations of n^{th} order with constant coefficients, rules for finding the complementary function, rules for finding the particular integral, nonlinear homogeneous, linear equations, Monge's method.
- Unit–III** : Introduction, method of separation of variables, equation of vibrating string, solution of wave equation by D' Alembert's method, one dimensional heat flow, two dimensional heat flow, Laplace equation in polar coordinates, transmission line equations.
- Text Book :** Advanced Engineering Mathematics **By :** H.K.Dass, S.Chand & Company Ltd.
- Scope :-** **Unit 1 ;** Article 9.1 to 9.7
Unit II: Articles 9.8 to 9.14
Unit III: Articles 9.15 to 9.21

Reference Books :

- 1) Differential Equations with Applications and Historical Notes,By G. F. Simmons,
Second Edition, Mc Graw Hill.
- 2) Partial Differential Equations, By W. E. Williams, Clarendon Press Oxford.
- 3) Partial Differential Equations,By E. T. Copson, Cambridge University Press.
- 4) Introductory Course on Differential Equations , By D.A. Murray ,Orient Longman
- 5) Differential Equations, By Raisinghania , S. Chand. Co.
- 6) Differential Equations , By J N Sharma , Krishna Prakashan , Meerut
- 7) Theory and Problems of Differential Equations ,By Frank Ayres, Mc Graw Hill

- 8) Lectures on Differential Equations, By T.M. Karade , Sonu-Nilu Pub. Nagpur.
- 9) Elements Of Partial Differential Equations, By I.N. Sneddon, Mc Graw Hill. Co.
- 10) Partial Differential Equations, By A.R. Vasishtha & V. VasishthaPub. Krishana Prakashan , Meerut.
- 11) Partial Differential Equations, ByPhoolan Prasad & Renuka Ravindran, New Age Inter. Pub.

PAPER-XII (MP207): PRACTICAL PAPER.
ANNUAL PATTERN (only for B.Sc Students)
(No. of periods 3 Per batch per week Max.Marks:100)

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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
