NEW/REVISED SYLLABUS FOR
M.A. / M. Sc. Mathematics (Part I) (Semester II) CBCS
(W.E.F. June 2016)

(i) Paper: MT 204
(ii) Title of Paper: Numerical Analysis
(iii) Specific Objectives: To analyze methods used to solve mathematical problems numerically.

(iv) Units and No. of Lectures
Unit 1
Algebraic and transcendental equations:
Rate of Convergence of Secant method, Regula Falsi method and Newton-Raphson method. Bairstow method.
System of linear equations: Matrix factorization methods (Doo little reduction, Crout reduction), Eigen values and eigenvectors, Gerschgorin theorem, Brauer theorem, Jacobi method for symmetric matrices.
15 Lectures

Unit 2
Numerical Integration: Error estimates of trapezoidal and Simpson's numerical integration rule.
Gauss-Legendre integration methods (n=1, 2), Lobatto integration method (n=2), Radau integration method (n=2) and their error estimates. **15 Lectures**

Unit 3
Runge–Kutta Methods: Second order methods, The coefficient tableau, Third order methods (without proof), order conditions, Fourth order methods (without proof), Implicit Runge–Kutta methods, Stability characteristics
Taylor Series Methods: Introduction to Taylor series methods, Manipulation of power series, An example of a Taylor series solution. **15 Lectures**

Unit 4
Linear Multistep Methods: Adams methods, General form of linear multistep methods, Predictor–corrector Adams methods, Starting methods.
Analysis of Linear Multistep Methods: Convergence, Consistency, Sufficient conditions for convergence, Stability Characteristics. **15 Lectures**

Unit 5
Problems, assignments, seminars etc. based on Units 1-4 above. **15 Lectures**

(vi) Recommended Reading:
a) Basic Reading:
1. Numerical methods for scientific and Engineering Computation, M. K. Jain, S. R. K. Iyengar, R. K. Jain, New Age International Limited Publishers, 6th edition. (For Units 1 and 2)

2. Numerical methods for ordinary differential equations, J.C. Butcher, John Wiley & Sons Ltd, 2nd edition. (For Units 3 and 4)

b) Additional Reading : 1. Discrete variable methods in ordinary differential equations, P. Henrici, John Wiley & Sons Ltd.
2. Introductory methods of Numerical Analysis' S. S. Sastry, Prentice Hall of India New Delhi.
3. Numerical Mathematics,
4.Numerical solutions of Differential Equations by M. K. Jain

NEW/REVISED SYLLABUS FOR

M. Sc II (CBCS) Semester IV

(Introduced from June 2016 onwards)

i) Paper : MT 401

ii) Title of Paper : Field Theory

iii) Specific Objectives: The students will be introduced to Field theory and its applications.

iv) A brief note: Theorems and proofs are expected to be prepared from the book by P. B. Bhattacharya, S. K. Jain and S. R. Nagpal,*Basic Abstract Algebra*, 2nd edition, Cambridge university Press, UK.(Asian edition) 2005.

(iv) UNITS:

UNIT-I Algebraic Extensions of fields (No of Lectures 15)

1. Adjunction of roots
2. Algebraic extensions
3. Algebraically closed fields

UNIT-II Normal and Seperable extensions (No of Lectures 15)

1. Splitting fields
2. Normal extensions
3. Multiple roots
4. Finite fields
5. Separable extensions

UNIT-III Galois Theory (No of Lectures 15)

1. Automorphism groups and fixed fields
2. Fundamental theorem of Galois theory
3. Fundamental theorem of algebra
4. Roots of unity and cyclotomic polynomials
5. Cyclic extensions

UNIT-IV Applications of Galois theory (No of Lectures 15)

1. Polynomials solvable by radicals
2. Constructions by ruler and compass
3. Symmetric functions

Unit- V Problems (No of Lectures 15)

(v) Recommended Reading:

a) Basic reading

1.. Bhattacharya, Jain and Nagpal, Basic Abstract Algebra, 2nd edition, Cambridge university Press, UK.(Asian edition) 2005.

b) Additional Reading:

1) Nathan Jacobson , Basic Algebra I, second edition, , W. H. Freeman and company, New York
2) I. N. Herstein, Topics in Algebra, Wiley Eastern Ltd.
3) U. M. Swamy, A. V. S. N. Murthy, Algebra: Abstract and Modern, Pearson Education, 2012
4) John Fraleigh, A first course in Abstract Algebra (3rd edition) Narosa publishing house, New Delhi
5) I. T. Adamson, Introduction to Field Theory, second edition, Cambridge University Press,1982.
6) M. Artin, Algebra, PHI, 1996.
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