SEMESTER IV (Core Courses)

MAT511\AMAT 511   -   Linear Integral Equations

MAT512\AMAT 512   -   Mechanics

Elective Courses For M. Sc. (Mathematics) (Any three of the following)

MAT531 530   -   Difference Equations

MAT532   -   Fluid Mechanics -II

MAT534   -   Fuzzy Mathematics

MAT535   -   Linear Algebra

MAT536   -   Operations Research -II.

Elective Courses For M. Sc. (Applied Mathematics)

AMAT 532   -   Fluid Mechanics -II

AMAT 534   -   Fuzzy Mathematics

AMAt 539   -   Wavelet analysis and applications - II

Revised From 2013-14

Semester –I

Course No: MAT401/ AMAT 401 Advanced Abstract Algebra- I   Credits: 6

Objective: To learn some basics from algebra.

Unit- I Binary relation, binary operation, function, group, subgroup and their properties. Order of a group. Generator, cyclic group, Lagranges theorem, Fermats and Eulers theorem and their consequences.

Unit- II Normal subgroup, quotient group and their properties and examples. Homomorphism, kernel, image of a homomorphism. Isomorphism and related theorems, Fundamental theorem of group homomorphism, automorphism, conjugacy and G-sets.

Unit- III Permutation groups and related concepts and results. Center, normalizer,commutator of a group, derved group, Cayles theorem.

Unit – IV Normal series, solvable and nilpotent group and their properties, direct products, simplicity of alternating group.

Unit- V Fundamental theorem of finitely generated abelian group, invariants of a finite abelian group, Sylow theorems and applications.

Outcome: After learning this paper, the student will become familiar with abstract concepts.

Professor and Head
Department of Mathematics
Dr. Babasaheb Ambedkar
Marathwada University,
Aurangabad-431004

Text Book:
Basic Abstract Algebra, by P. B. Bhattacharya, S. K. Jain and S. R. NagPaul
Cambridge (Indian Edition) 2007, Chapter Number:4,5,6,7,8 related topics.

Reference Books:

1. Topics in algebra, I. N. Herstein: Wiley (Indian Edition), 1999.

2. Contemporary Abstract Algebra by J.A. Gallian, Narosa, 2010..

Semester – I
Course No. MAT 402 / AMAT401 Real Analysis- I   **Credits 6**

Objective: The objective of this paper is to learn basics of mathematical analysis

Unit – I Definition and existence of Riemann-Stieltjes integral, Properties of the integral, Integration and Differentiation, The fundamental theorem of calculus, Examples.

Unit – IIIntegration of vector valued functions. Rectifiable curve. Examples. Sequences and series of functions. Point wise and uniform convergence. Cauehy criterion for uniform convergence. Weierstrass M-test, uniform convergence and continuity, uniform convergence and Riemann-Stielljes integration. Examples.

Unit – III Uniform convergence and Differential, The Stone – Weierstrass theorem, Examples. Power series, Abel's and Taylor's theorems, Uniqueness theorem for power series. Examples.

Unit – IVFunctions of several variables, Linear transformations, Derivatives in an open subset of R^n, Chain rule, Examples

Unit – VPartial derivations. Interchange of the order of differentiation, The inverse function theorem, The implicit function theorem Jacobins, Derivatives of higher order, Differentiation of integrals. Examples,

Outcome: The student will be able to apply the knowledge in areas which use continuity of a function, uniform convergence, partial derivatives etc.

Text Book: Walter Rudin, Principles of Mathematical Analysis, (3rd Edition) McGraw Hill, Kogakusha 1976.
Articles:
6.1 to 6.27, 7.1 to 7.18, 7.26, 7.27, 8.1 to 8.5, 9.1 to 9.21, 9.24 to 9.29, 9.38 to 9.42

Reference Books:

1. T. M. Apostol, mathematical Analysis, Narosa, New Delhi, 1985.
2. J. C. Burkill and H. Burkill, A second course in Mathematical Analysis, Cambridge University Press, 1970.
3. S. L. Lang, Analysis- I and II, Addison Wesley, 1969.

Semester – ICourse No :MAT403 / AMAT 403   Topology - I Credits :6

Semester –I
Paper- I (A) - Advanced Abstract Algebra- I

Unit- I
Preliminaries and related concepts from algebra and field theory.   (15 lectures)

Unit- II
Irreducible polynomials, Eisenstein criterion, adjunction of roots, algebraic extension of a field, algebraically closed field and related results.   (15 lectures)

Unit- III
Splitting fields, normal extensions, multiple roots, finite fields and separable extensions and their properties.   (15 lectures)

Unit – IV
Galois theory, automosphism groups and fixed fields, fundamental theorem of Galois theory, fundamental theorem of algebra.   (15 lectures)

Unit- V
Applications of Galois theory to classical problems roots of unity and cyclotomic polynomials, cyclic extensions, polynomial solvable by radicals, ruler and compass constructions   (15 lectures)

Text Book:
P. B. Bhattacharya, S. K. Jain and S. R. NagPaul, Basic Abstract Algebra,
Cambridge University Press, Indian Edition, 1997
Chapter 15, 16, 17 and 18 complete

Reference Books:

1.   I. N. Herstein: Topics in algebra, Wiley Eastern Ltd., New Delhi, 1975.

2.   S. Lang: Algebra, 3rd edition, Addison-Wesley, 1993.

3.   I. S. Luther and I.B.S. Passi: Algebra, Vol. I and Vol. II Narosa, New Delhi.

4.   D. S. Malik, J. N. Mordeson and M. K. Sen: Fundamentals of Abstract Algebra, Mc Graw-Hill, and International Edition, 1997.

5.   S. K. Jain, A. Gunawardena and P. B. Bhattacharya: Basic Linear Algebra with MATLAB, Key College Publishing (Springer-Verlag), 2001.

7.   J. B. Fraleigh, a first curse in Abstract Algebra, Narosa Publications.