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MATHEMATICS I SEM. 2018
M.A. M.Sc. Exam. Dec., 2018
First/Third Semester
Pages (01) to (04)

Jiwaji University- M.Sc. Mathematics (2015-17)-2018

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Math 101

ADVANCED ABSTRACT ALGEBRA

Unit-I

Sylows First, Second and Third theorems, p-sylow Subgroups, Double cosets conjugate groups, Normal and Subnormal series, Composition series, Jordan Holder theorem, Solvable groups, and commutator subgroups.

Unit-II

Modules, Cyclic modules, Simple modules, finitely generated modules, Fundamental structure theorem for finitely generated modules.

Unit-III

Field theory, Extension fields, Algebraic Extensions, Roots of polynomials, Simple extension, Splitting fields.

Unit-IV

Elements of Galois Theory, Fixed Fields, Normal extensions, Group of automorphisms, Galois group, Fundamental theorem of Galois theory.

Unit-V

Canonical forms, Similarity of Linear Transformations, Invariant Subspaces, Nilpotent transformations, Reduction of triangular form, Invariants, Jordan blocks & Jordan normal forms, Rational Canonical form, Elementary divisors.

Text Books :

1. Topics in Algebra by I.N. Herstein, Wiley Eastern Ltd., New Delhi, 1975.
2. Basic Abstract Algebra (2nd Edition), Cambridge University Press, Indian Edition, 1997.
3. Algebra by M. Artin, Prentice-Hall of India 1991.

Reference Books:

1. Algebra by P.M. Cohn, Vols. I, II & III, John Wiley & Sons, 1982, 1989, 1991.
2. Basic Algebra, Vols. I & II by N. Jacobson, W.H. Freeman, 1980 (also published by Hindustan Publishing Company).
3. Galois theory by J.P. Escotier, GTM, Vol. 204, Springer, 2001.
4. Lectures on Modules and Rings by T.Y. Lam, GTM Vol. 189, Springer-Verlag, 1999.

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Math 102

ANALYSIS

Unit-I

Metric spaces: compact sets, perfect sets, connected sets, compactness and completeness, limit and continuity of function defined on metric spaces, limits of functions, continuous functions.

Unit-II

Continuity and Compactness, continuity and connectedness, monotonic functions: definition and existence of Riemann – Stieltjes integral, properties of the integral, integration and differentiation, the fundamental theorem of calculus, integration of vector-valued functions.

Unit-III

Sequence & Series of function point wise & uniform Convergence, Cauchy Criterion for uniform Convergence, Weierstrass M-Test for uniform Convergence of Series, Uniform Convergence & Continuity, Uniform Convergence & R-S integral Uniform Convergence & differentiation, Weierstrass approximation Theorem.

Unit-IV

Lebesgue outer measure, Measurable sets & its properties, Borel set & their measurability, Non-measurable set, measurable functions, characteristic function & simple function, Littlewood's three Principles.

Unit-V

Lebesgue integral of bounded function over a set of finite measure, Integration of Non-negative function, The general Lebesgue integral, Monotonic Convergence Theorem, Lebesgue convergence Theorem, Fatou's Lemma.

Text Books:

1. Principles of Mathematical Analysis by Walter Rudin.
2. Real Analysis (UNIT IV & V) by H. L. Royden.

Reference Books:

1. Mathematical Analysis by Malik & Arora, New Age International Publisher.
2. Lebesgue Measure & Integration by Jain & Gupta, New Age International Publishers.

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Math 103

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Integral Transforms

Unit-I

Laplace Transform, Properties of Laplace Transform, Laplace Transform of the derivatives of function, Inverse Laplace transform, Properties of inverse Laplace transform, Inverse Laplace transform of derivatives, convolution theorem, Heaviside's expansion theorem.

Unit-II

Application of Laplace Transform to solution of differential equations; solutions of initial Value problems, Solution of differential equations with constant coefficients, Solution of system of two simultaneous differential equations, Application of Laplace Transform to the solution of integral equations with convolution type kernel.

Unit-III

Applications of Laplace Transform to the solution of initial -boundary value problems:- Solution of Heat equation, Solution of wave equation, Solution of Laplace equation.

Unit-IV

Fourier Transforms, Fourier sine transform, Fourier cosine transform, inverse Fourier Transform, Inverse Fourier sine Transform, Inverse Fourier cosine Transform, Properties of Fourier Transforms, Modulation theorem, Convolution theorem, Fourier Transform of the derivatives of functions, Parseval's identity.

Unit-V

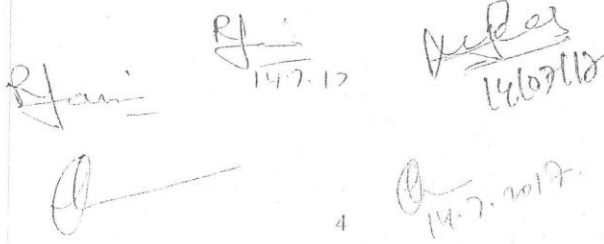
Application of Fourier Transforms to the solution of initial -boundary value problems:- Solution of Heat equation, Solution of diffusion equation, Solution of wave equation, Solution of Laplace equation.

Text Books

1. Integral Transforms by Vashishtha and Gupta.
2. Integral Transforms by Goyal and Gupta.

Reference Books

1. Integral Transforms by Sneddon.



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Math 104

COMPUTER FUNDAMENTALS AND PROGRAMMING IN C

UNIT-I

An overview of functioning of a computer system, Components of a computer system, I/O and auxiliary storage devices, machine and high level languages, assembler, compiler and interpreters, flow charts and pseudo codes, Basic concepts of operating system.

Unit-II

Introduction to C Essentials – Programs development, Functions. Anatomy of a Function. Variables and Constants Expressions. Assignment Statements, Scalar Data types – Declarations, Different Types of integers. Different kinds of Integer Constants Floating – point type Initialization, mixing types Explicit conversions – casts Enumeration Types. the void data type, Type definitions.

Unit-III

Operators and expression in C-Precedence and associativity, Control flow statements Conditional branching, the switch statement, looping, nested loops, the break and continue statement, the go to statement, infinite loops.

Unit-IV

Arrays and multidimensional arrays. Storage classes-fixed vs. automatic duration scope, global variable the register specifier, Functions –user defined and library function, Introduction to pointers, structures and unions.

Unit-V

Introduction to C++: Declaration & Definition of Variables, Data Types, Operators. OOPS Fundamentals: OOPS Versus procedural programming, OOPS terminology, Data abstraction, Data hiding, Encapsulation, Class, Object, Inheritance, Polymorphism.

Text books:

1. Computer fundamental by Rajaraman
2. Operating systems concepts by Peterson
3. Programming in ANSI C by E. Balaguruswamy, Tata-McGraw Hill, New Delhi.
4. Programming in C++ by E. Balaguruswamy, Tata-McGraw Hill, New Delhi.
5. Schaum's outline series.

Reference Books:

1. Let us C by Y. Kanetkar.
2. Brian W Kernigham & Dennis M Ritchie the C Programmed language 2nd edition (ANSI features), Prentice Hall 1989.

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