Real Analysis – II
M.Sc – 2nd sem

January : Lebesgue outer measure, elementary properties of outer measure, Measurable sets and their properties Lebesgue measure of sets of real numbers, algebra of measurable sets, Borel sets and their measurability, characterization of measurable sets in terms of open, closed. F_σ and G_δ sets, existence of a non-measurable set.

Lebesgue measurable functions and their properties. Characterstic functions, simple functions, approximation of measurable function by sequences of simple functions, measurable functions as nearly continuous functions, Borel measurability of a function.

February :- Almost uniform convergence, Egroff's theorem, Lusin's theorem, convergence in measure, F. Riesz theorem that every sequence which is convergent in measure has an almost everywhere convergent subsequence.
Shortcomings of Riemann integral, Lebesgue integral of a bounded function over a set of finite measure and its properties, Lebesgue integral as a generalization of the Riemann integral, Bounded convergence theorem, Lebesgue theorem regarding points of discontinuities of Riemann integrable functions.

March :- Integral of a non-negative function, Fatou's Lemma. Monotone convergence theorem, integration of series, the general Lebesgue integral, Lebesgue integral of a

bdd, Lebesgue convergence theorem.
Differentiation of monotone functions, Vitali's covering lemma, the four Dini derivatives, Lebesgue differentiation theorem of bdd variation

April:-

bdd variation and their representation as difference of monotone functions. Differentiation of an integral. absolutely continuous functions, convex functions Jensen's inequality The L^p space.

The L^p spaces, Minkowski, and Holder inequalities completeness of L^p space, bounded linear functionals on the L^p spaces, Riesz representation theorem.

Programming in C and Numerical Methods

B.A / B.Sc - 2nd year (IV sem)

January:- Programmer's model of a computer. Algorithms Flow charts. Data types, operation, operators and expressions, Input/outputs functions Decisions control structure; Implementation of Loop, Switch statement

February:- Case control structures, Functions, Preprocessors and arrays, Character data type, Standard string handling functions, Arithmetic operations on characters's

March:- Solution of algebraic and Transcedental equations. Bisection method, Regula-Falsi method, Secant method, Newton-Raphson's method. Neloton's iterative method for finding pth root of number, Order of convergence of above methods.

April: Simultaneous linear algebraic equation: Gauss-elimination method, Gauss-Jordan method, Triangularization method (LU decomposition method) Crout's method, cholesky decomposition method Iterative method, Jacobi's method, Gauss-seidel's methods,

B.A / B.Sc 2nd year

Sequences and Series

January :- Boundedness of the set of real numbers, least upper bdd, greatest lower bdd of a set neighbourhoods, interior points, isolated points, limit points, open sets, closed set, interior of a set, Closure of a set in real numbers and their properties. Balzano - Weistrass theorem.

February : Sequence : Real sequences and their convergence, Theorems on limits of sequence, Bounded and monotonic sequences, Cauchy's sequence, Cauchy general principle of convergence, Subsequences,

Convergence and divergence of infinite series, Comparison tests of positive terms infinite series, Cauchy's general principle of convergence of series. Convergence and divergence of geometric series. Hyper Harmonic series or p-series

March :- D'Alemberts Ratio test, Raabe's test, Logarithmic test, de-Morgan and Bertrand's test, Cauchy's nth root test, Gauss Test, Cauchy's integral test. Cauchy's condensation test

April :- Leibnitz's test, absolute and conditional convergence Arbitrary series, Abel's lemma, Abel's test Dirichlet's test, Insertion and removal of parentheses Dirichlet's theorem, Convergence and absolute convergence of infinite products

M.Sc- IInd Sem
Computer programming (Theory)

January :- Numerical constants and variables arithmetic expressions; input/output; conditional flow; looping

February :- Logical expressions and control flow, functions: subroutines, arrays

March :- Format specifications, strings, array arguments. derived data types

April :- Processing files, pointers., modules, Fortran 90 features, Fortran 95 features.