Scheme for M.Sc. Mathematics NEP 2020

For 2 Year PG programme

First Year

Scheme for M.Sc. Mathematics NEP 2020

For 2 Year PG programme

Scheme sem-1: (For the course of science having major practicum components)

M.Sc. Mathematics I Semester

S.No	Course Code	Course Name	Total Mark	Credit (s)	End Semester Exam Marks		Internal Marks	
					Max	Min.	Max	Min.
1.	MAM2-511	Advanced Abstract Algebra-I	100	6	60	24	40	16
2.	MAM2-512	TOPOLOGY-I	100	6	60	24	40	16
3.	MAM2-513	REAL ANALYSIS	100	4	60	24	40	16
4.	MAM2-514	COMPLEX ANALYSIS	100	4	60	24	40	16
5.	MAM2-515	Internship/Seminar/Field Project	100	2	-	-	100	40
		Grand Total	500	22				

BRANCH	Subject	Subject Code
M.Sc. (Mathametics)	**Advanced Abstract Algebra-I**	**MAM2-511**

Unit – I

Indian Knowledge System:
Contribution and biography of following Indian Mathematicians in Advanced Abstract, Algebra:
Dr.Harish-Chandra, Dr.V.V.N'arlikar, Dr.S.S.Abhvankar

Unit – II

Class equation of a finite group, Centre for Group of prime power order, Cauchy's and Sylow's theorems for finite groups, Isomorphism theorems, Maximal normal groups, Simple groups.

By analyzing conjugacy c1asses, determine the center of the group and identify normal subgroups. Determining the structure of groups based on Sylow p-subgroups.

Unit – III

Normal and Subnormal Series, Composition series or a group, Jordan Holder theorem, Commutator subgroup or a group, Solvable groups, Nilpotent groups .

Used in the classification of finite simple group, providing a foundation for understanding a group structures .Applying the commutator subgroup to analyzing the fundamental group of topological space.

Unit – IV

Euclidean ring, Polynomial ring, Polynomials over a Ring, Division algorithm. Polynomial over the rational field.

Discuss how Euclidian ring and Division Algorithm be used in cryptography

Unit – V

Euclidean domain, Principal ideal domain, Unique factorization domain, Quotient field.

Discuss how Euclidian domain and unique factorization domain can be used in cryptography.

Extension of a fields, Roots of polynomials, Algebraic and transcendental extensions, Primitive Elements. Algebraically closed field.

Discuss the application of field extension and primitive elements in real words problems.

Test Books:-

1. P.B. Bhattacharya,S. **K.** Jain &S. R. Nagpaul: Basic Abstract Algebra,2nd edition, Cambridge University Press, 2003.
2. I.N.Herstein: Topicsin Algebra,Wiley Eastern Ltd. New Delhi.1977.

BRANCH	Subject	Subject Code
M.Sc. (Mathematics)	TOPOLOGY-I	MAM2-512

Unit I

Indian Knowledge System:

- Contribution and biography of following Indian Mathematicians in Topology:
- **Dr.M.S.Narasimhan,Dr.V.S.Varadaraian**

Unit – II

Metric Space: D'efinition, examples and types of Metric spaces. Neighborhoods, Limit points, Interior points and Boundary points. Open and closed sets. Closure and interior of a set. Subspace of a Metric space.

Sequences in a Metric space: Convergent sequence, Cauchy sequences. Completeness of a Metric space. Cantor's intersection theorem. Contraction principle. Dense subsets, Baire Category theorem. Continuous functions.

Discuss about the application of closer of a set, Interior point, Boundary point and Baire Category theorem.

Unit – III

Topological Spaces: Definition and examples of topological spaces. Neighbourhood of a point, limit point and derived set. Closed set and Closure of a set. Dense set and nowhere dense set. Interior, exterior and boundary points of a set.

Discuss about the application of closer of a set, Interior point, Boundary point of a set in topological space

Unit – IV

RelativeTopology,andBases.

Topological subspace and relative topology. Basis and sub basise .First and Second countable spaces and separable spaces.

Discuss how Topological Subspaces be used in Computer Graphics,GIS, robotics.

Unit –V

Continuity in topological spaces, Sequential Continuity at a point, Open and closed functions, Homeomorphism of topological spaces, Topological property.

Discuss application of Homeomorphism in Robotics.

Discuss how Sequential Continuity be used in Machine Learning.

Connectedness:-

Separated sets Connected and Disconnected sets, Continuity and Disconnectedness, Component of space, Totally Disconnected spaces, Locally connected spaces.

Discuss the applications of Separated sets, Connected and disconnected sets to solve the real word problems.

BRANCH	Subject	Subject Code
M.Sc. (Mathematics)	REAL ANALYSIS	MAM2-513

Unit - I

Indian Knowledge System:

Contribution and biography of following Indian Mathematicians in Real Analysis:

Dr.K.Chandrasekharan, Dr.D.S.Kothari

Unit – II

Real Number System:

Introduction, Denseness property, Neighbourhood, Limit Points of a set,

Open and Closed Set, Interior and Closure of a Set, Bolzano-Weierstrass Theorem.

Discuss Limit Points of a set, Open and Closed Set, Interior and Closure of a Set.

Unit – III

Riemann Integral:

Integration and Differentiation: Riemann Integral, Properties of' Riemann sums, Riemann integrability, Properties of Riemann integrable functions, Riemann integration and continuity, Integral as a limit of sums. Integration and Differentiation Fundamental theorems of calculus, Mean value theorems of integral calculus, Integration by parts, Change of variables

Unit – IV

Riemann-Stieltjes Integral:

Definition, existence and properties of Riemann-Stieltjcs integral, Relation Between Riemann and Riemann-Sticltjes integral, Mean value theorem. Integration and differentiation, Fundamental theorem of calculus for Riemann-Stieltjcs integral, Integration of vector valued functions Rectifiable curves.

Unit – V

Improper Integral and Fourier Series:

Improper integrals and their convergence, Comparison tests and μ-test, Abel's and Dirichlet's tests. Absolute and Conditional convergence of Improper integrals, Frullani's integral as a function of a parameter, Diffcmtiability & integrability –of an integral of a function of a parameter, Fourier series for half and full intervals.

Uniform Convergence and Power Series:

Poinwise and uniform convergence of sequences of functions, Cauchy's general principle of uniform convergence, Weierstrass Mn-Test, Unifonn convergence of series of functions: Weierstrass M-test,Uniform Convergence, continuity, differentiability and Riemann integrability. Algebra of power series:Uniform convergence of power Series,Uniqueness of power_series ,Abel's theorem, Properties of power series, Tauber's theorem.

TextBooks:

1. Walter Rudin: Principles of Mathematical Analysis, McGraw Hill Education, Third edition, 2017.
2. S.C.Malikand Savita Arora: Mathematical analysis, New Age Publication.De_lhi,2017.
3. G.F.Simmons : Introduction of Topology and Modern Analysis, McGraw Hill Education,20I 7.

BRANCH	Subject	Subject Code
M.Sc. (Mathematics)	COMPLEX ANALYSIS	MAM2-514

UNIT-I

Indian Knowledge System:

Contribution and biography of following Indian Mathematicians in Complex Analysis; Dr. C.T.Rajagopal, Dr.S.Minakshi sundaram.

UNIT-II

Complex Number and Functions:

Introduction of complex numbers and thi.ir geometrical representation: Extended complex plane, Stereographic projection of complex numbers. Continuity and differentiability of complex functions, Analytic functions, Cauchy-Riemann equations, Harmonic functions, Polar form of Cauchy Riemann equations.

UNIT-III

Complex Integration:

Definition and examples of complex integration, Absolute value of a complex integral, Cauchy's Theorem, Cauchy's-Goursat theorem, Cauchy's integral formula, Higher order derivatives, Morera's theorem, Cauchy's inequality, 'Liouvillc's theorem, Taylor's theorem, Laurent theorem.

UNIT-IV

Poles, Zeros and Singularities:

Introduction of poles, zeros and singularities, Meromorphic function, Argument principle, Rouche's theorem, Fundamental theorem of algebra, Maximum modulus principle, Schwarz lemma.

UNIT-V

C:ilculusof Residues:

Residue, Cauchy's Residue theorem, Evaluation of integrals $\int_0^{2\pi} f(\cos\theta,\sin\theta)d\theta, \int_{-\infty}^{\infty} f(x)dx, \cos mx and \sin mx$ as a factor in the integrand and, Integration of many valued functions.

Mobius Transformation and Conformal Mapping:

Mobius Transformation, their properties and classification, Conformal Mapping and their properties.

TextBooks:

I.L.V. Alhfors:Complex Analysis,McGraw Hill Education; Third edition,2017.
2. T.Pati: Functions of a ComplexVariables, Pothishala Pvt.Ltd,1986.

BRANCH	Subject	Subject Code
M.Sc. (Mathematics)	**Internship/Seminar/Field Project**	MAM2-515

Project /Dissertation work (Six weeks) in the form of small thesis based upon the topic related to the M.Sc. Mathametics syllabus . The topics of the dissertation with synopsis will be decided by the

Departmental Research Advisory Committee (DRAC).