Scheme of M.Sc. Mathematics Program under Semester System
Program Code& Name: DPMS03 - M.Sc. (Mathematics)

Session 2024-25

Semester	Course Code	Course Name	Credit			Total Credit	Marks			
							ESE	CIA	Total	
			L	T	P				MAX	MIN
First	MMAT -101	Advanced Abstract Algebra	3	1	-	4	70	30	100	40
	MMAT -102	Mathematical Analysis-I	3	1	-	4	70	30	100	40
	MMAT -103	Topology -I	3	1	-	4	70	30	100	40
	MMAT -104	Complex Analysis -I	3	1	-	4	70	30	100	40
	MMAT -105	Advanced Discrete Mathematics-I	3	1	-	4	70	30	100	40
					Total	**20**	**350**	**150**	**500**	**200**
Second	MMAT -201	Advanced Abstract Algebra -II	3	1	-	4	70	30	100	40
	MMAT -202	Mathematical Analysis -II	3	1	-	4	70	30	100	40
	MMAT -203	Topology -II	3	1	-	4	70	30	100	40
	MMAT -204	Complex Analysis -II	3	1	-	4	70	30	100	40
	MMAT -205	Advanced Discrete Mathematics-II	3	1	-	4	70	30	100	40
					Total	**20**	**350**	**150**	**500**	**200**
Third	MMAT - 301	Integration Theory and Functional Analysis -I	3	1	-	4	70	30	100	40
	MMAT -302	Partial Differential Equations , & Gravitation	3	1	-	4	70	30	100	40
	MMAT - 303	Fuzzy sets and their Application – I	3	1	-	4	70	30	100	40
	MMAT - 304	Operations Research – I	3	1	-	4	70	30	100	40
	MMAE- 305	Fluid Mechanics- I	3	1	-	4	70	30	100	40
	MMAE- 306	Fundamental of computer science	3	1	-	4	70	30	100	40
	MMAE- 307	Numerical Analysis	3	1	-	4	70	30	100	40
					Total	**20**	**350**	**150**	**500**	**200**
Fourth	MMAT - 401	Integration Theory and Functional Analysis -II	3	1	-	4	70	30	100	40
	MMAT - 402	Classical Mechanics & Gravitation	3	1	-	4	70	30	100	40
	MMAT - 403	Fuzzy sets and their Application - II	3	1	-	4	70	30	100	40
	MMAT - 404	Operations Research – II	3	1	-	4	70	30	100	40
	MMAE- 405	Fluid Mechanics- II	3	1	-	4	70	30	100	40
	MMAE- 406	Number Theoryand Cryptography	3	1	-	4	70	30	100	40
	MMAE- 407	Spherical Harmonic	3	1	-	4	70	30	100	40
					Total	**20**	**350**	**150**	**500**	**200**
					Grand Total	**80**	**1400**	**600**	**2000**	**800**

Program Code and Name	**DPMS03, M.Sc.(Mathematics))**		Semester	**I**
Exam Code and Name	**2031 - M.Sc .MATHEMATICS FIRST SEMESTER**		Paper	**I**
Course Code	MMAT -101		Course Type	**T**
Course Title	ADVANCED ABSTRACT ALGEBRA -1			
Total Credit	**4**			
Total Marks	CIA: 30	ESE: 70	Max Marks: 100	Min. Pass. Marks: 40
Prerequisites (if any)				
Course Outcomes	The end of this course, the students will be able to: 1. Gain skills of solving problems using powerful concepts of group action. 2. Gainknowledge of Normal Series, Solvable groups, Nilpotent groups. 3. Gain ability to deal with module theory which is indispensable in wide ranges of mathematical disciplines. 4. Gain knowledge of Nilpotent and Nil ideals. Gain knowledge of representation and rank of linear mapping.			

Contents of Course		
Unit	**Contents**	**No. of Period**
I	Normal Series- Normal and subnormal series, Composition Series, Jordan Holder theorem, Solvable Group, Nilpotent Groups	15
II	Rings and Ideals - Maximal and Prime Ideals Nilpotent and Nil Ideals	15
III	Modules - Definition and examples Submodules, Quotient Modules, Direct Sums, Modules generated by a subset, Cyclic Module, Homomorphism of modules , Isomorphism Theorem, Exact sequence of modules Simple modules, Semi-simple modules, Schur's lemma, Free module	15
IV	Field Theory - Extension fields, Algebraic and Transcedental extensions, separable and Inseparable extension, Normal extension, Perfect field, Finite fields Primitive Elements	15
	Total no. of Lectures	60

Text books	ADVANCED ABSTRACT ALGEBRA
	Reference Books: • P.B. Bhattacharya S.K.Jain and S. R. Nagpaul, Basic • I.N Herstein, Topics in Algebra WileyEasternLtd. New • M. Artin Algebra Prantice Hall of. India 1991 • D.S. Malik, JN. Mordeson and Mis Sem,Fundamental of Resources: ➢ .https://onlinecourses.nptel.ac.in

Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100 Marks	Continuous Internal Assessment (CIA): 30 Marks	End Semester Exam (ESE) : 70 Marks
Continuous Internal Assessment (CIA)	Internal Test/Quiz- (2): 20 & 20 Assignment / Seminar: 10 Total Marks: 30	Better marks out of the two Test / Quiz + obtained marks is Assignment shall be considered against **30** Marks
End Semester Exam (ESE)	**Three Section - A, B & C** Section A: Q1. Objective- 10 x 1 = 10 Mark; Section B: Long Answer type questions 1 out of 2 from each unit- 4 x 5 = 20 Marks; Section C: Descriptive answer type questions 1 out of 2 from each unit- 4 x 10 = 40 Marks;	

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3.	Dr. Sanjay Kumar Professor G.B.Pant University Uttarkhand	
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5.	Dr.smt. Snehalata Mishra Asst. Prof. Head , Department of Mathematics, D.P.Vipra P.G.College Bilaspur	
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Program Code and Name	**DPMS03, M.Sc.(Mathematics))**		Semester	**I**
Exam Code and Name	**2031 - M.Sc .MATHEMATICS FIRST SEMESTER**		Paper	**II**
Course Code	MMAT -102		Course Type	**T**
Course Title	Mathematical Analysis-I			
Total Credit	**4**			
Total Marks	CIA: 30	ESE: 70	Max Marks: 100	Min. Pass. Marks: 40
Prerequisites (if any)				
Course Outcomes	The end of this course, the students will be able to: 1. Gain the knowledge of Riemann-Stieltjeslntetgral, Sequence and Series of Functions. 2. Gain the knowledge of Differentiability of Function in Several Variables. 3. Implicit and Inverse Function Theorems. 4. its extension to Complex and Vector-Valued Functions on Interval.			

Contents of Course		
Unit	**Contents**	**No. of Period**
I	Sequence and Series of Functions- Point wise and Uniform Convergence, Cauchy Criterion for Uniform Convergence, Weierstrass M-Test, Abel's and Dirichlet's tests for Uniform Convergence,	15
II	Function of several variables: Linear transformation, Derivatives in an open subset of R^n, Contraction Principle, Inverse Function theorem, Implicit function, Derivatives of Higher Order, Differentiation of integrals	15
III	The Riemann-Stieltjes Integral, Definition and existence Riemann- Stieltjes Integral, Properties of the Integral, Integration and Differential, The Fundamental theorem of calculus, integration of vector-valued function.	15
IV	Extremum problems with constraints,Lagrange's multiplier method,Differentiation of integrals,Partitions of unity,Differential forms,Stoke's theorem	15
	Total no. of Lectures	60

Text books	1. Mathematical Analysis
Reference books	Reference Books: Walter Rudin' Principles of Mathematical Analysis (3 edition) Mc Graw Hill kogakusha 1976 International student edition • P.K Jain and V.P. Gupta Lebesgue Measure and Integration, New age International Of Limited published New Delhi 1986 (Reprint) • Mathematical Analysis, T. M. Apostol, Narosa Publishing House, New Delhi, 1985. • Mathematical Analysis, Gabriel Klambauer, Marcel Dekkar, Inc. New York, 1975. • Real Analysis; an Introduction, Addison-Wesley Publishing Co., Inc., 1968. Real and Abstract Analysis, E. Hewitt and K. Stromberg, Berlin, Springer, 1969. E-Resources: https://onlinecourses.nptel.ac.in https://epqp.inflibnet.ac.in https://swayam.qov.in

Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100 Marks	Continuous Internal Assessment (CIA): 30 Marks	End Semester Exam (ESE) : 70 Marks
Continuous Internal Assessment (CIA)	Internal Test/Quiz- (2): 20 & 20 Assignment / Seminar: 10 Total Marks: 30	Better marks out of the two Test / Quiz + obtained marks is Assignment shall be considered against **30** Marks
End Semester Exam (ESE)	**Three Section - A, B & C** Section A: Q1. Objective- 10 x 1 = 10 Mark; Section B: Long Answer type questions 1 out of 2 from each unit- 4 x 5 = 20 Marks; Section C: Descriptive answer type questions 1 out of 2 from each unit- 4 x 10 = 40 Marks;	

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Program Code and Name	**DPMS03, M.Sc.(Mathematics))**		Semester	**I**
Exam Code and Name	**2031 - M.Sc .MATHEMATICS FIRST SEMESTER**		Paper	**III**
Course Code	MMAT -103		Course Type	**T**
Course Title	Topology -I			
Total Credit	**4**			
Total Marks	CIA: 30	ESE: 70	Max Marks: 100	Min. Pass. Marks: 40
Prerequisites (if any)				
Course Outcomes	The end of this course, the students will be able to: 1. countable and uncountable sets. 2. topological spaces, product topology, metric topology, quotient space. 3. T-1, T-2, T-3 and T-4 separation axioms 4. Base sub base, relative topology			

Contents of Course		
Unit	**Contents**	**No. of Period**
I	Defination and Example of Metric SpaceDefinition and Example of topology Neighbourhood, Countable and uncountable sets, Cantor's theorem and the continuous hypothesis.	15
II	Definition and example of topological spaces closed sets closure, Dense subsets, Base and subbases, subspaces and relative topology Continuity and homomorphism	15
III	Connectedness, continuity and connectedness, Components, totally disconnected space	15
IV	Compactness, continues functions and compact sets Sequentially and countably compact sets Compactness for metricspaces	15
	Total no. of Lectures	60

Text books	Topology
Reference books	. Reference Books: • 1 Topology- A First Couse :Jame R. Munkres • Introduction to General Topology: K.D Joshi • Topology: J. Dugunji • Introduction to topdogy: B. Mendelson • Advanced General Topology: K.KJha New Age international (P) Ltd. New Delhi. E-Resources: https:llonlinecourses.nptel.ac.in K. D. Joshi: introduction to General Topology,

Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100 Marks	Continuous Internal Assessment (CIA): 30 Marks	End Semester Exam (ESE) : 70 Marks
Continuous Internal Assessment (CIA)	Internal Test/Quiz- (2): 20 & 20 Assignment / Seminar: 10 Total Marks: 30	Better marks out of the two Test / Quiz + obtained marks is Assignment shall be considered against **30** Marks
End Semester Exam (ESE)	**Three Section - A, B & C** Section A: Q1. Objective- 10 x 1 = 10 Mark; Section B: Long Answer type questions 1 out of 2 from each unit- 4 x 5 = 20 Marks; Section C: Descriptive answer type questions 1 out of 2 from each unit- 4 x 10 = 40 Marks;	

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Program Code and Name	**DPMS03, M.Sc.(Mathematics))**		Semester	**I**
Exam Code and Name	**2031 - M.Sc .MATHEMATICS FIRST SEMESTER**		Paper	**IV**
Course Code	MMAT -104		Course Type	**T**
Course Title	Complex Analysis-I			
Total Credit	**4**			
Total Marks	CIA: 30	ESE: 70	Max Marks: 100	Min. Pass. Marks: 40
Prerequisites (if any)				
Course Outcomes	The end of this course, the students will be able to: 1. Gain knowledge of complex integration, argument principle, Rouches theorem, 2. power series, Schottky's theorem, Residue theorem real integrals. 3. complex integrals using Residue theorem. Rouche's theorem. 4. Gain ability of viewing analytic functions as conformal mappings			

Contents of Course		
Unit	**Contents**	**No. of Period**
I	Algebra of Complex Number,The Complex plane,Power Series,Analytic function of a Complex variable, Limit of a function, continuity Differentiability, Analytic and Regular function Cauchy-Riemann equations	15
II	Complex Integration Cauchy-Goursal Theorem Cauchy's integral formula, Higher order derivative, Morers'stheoram, Cauchy inequality and Liouville theorem, The fundamental theorem of Algebra, Taylor's theorem. Maximum modulus principle, Scwartz lemma, Laurent's series isolated singularities	15
III	Residues,Cauchy'residue theorem,Evaluation of integrals,Branches of many values functions with specil references to argz,and Z°Bilinear transformations their properties and classification, Definitions and Examples of conformal mappings	15
IV	Spaces of Analytic functions,Hurwitz's theorem,Montel's theorem,Riemann mapping theorem	15
	Total no. of Lectures	60

Text books	1. Complex Analysis
Reference books	Reference Books B. S. Tyagi: Functions of a Complex Variable, Kedar Nath, Ram Nath Prakashan, Meerut, 1981. S. Ponnusamy: Foundation of complex Analysis. Narosa publishing house 1997. L. Ahlfors: Complex Analysis, McGraw Hill Education. J.B.Convay: Functions of one complex variable Springer-Veriag international student Edition. Narosa publishing House 1990 S.Ponnusamay: Foundation of complex Analysis Narasa publishing house 1997 □ Functions of a complex variable by J.N.Sharma E-Resources: https://onlinecourses.nptel.ac.in https://epqp.inflibnet.ac.in https://swayam.gov.in

Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
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Continuous Internal Assessment (CIA)	Internal Test/Quiz- (2): 20 & 20 Assignment / Seminar: 10 Total Marks: 30	Better marks out of the two Test / Quiz + obtained marks is Assignment shall be considered against **30** Marks
End Semester Exam (ESE)	**Three Section - A, B & C** Section A: Q1. Objective- 10 x 1 = 10 Mark; Section B: Long Answer type questions 1 out of 2 from each unit- 4 x 5 = 20 Marks; Section C: Descriptive answer type questions 1 out of 2 from each unit- 4 x 10 = 40 Marks;	

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Program Code and Name	**DPMS03, M.Sc.(Mathematics))**		Semester	**I**
Exam Code and Name	**2031 - M.Sc .MATHEMATICS FIRST SEMESTER**		Paper	**V**
Course Code	MMAT -105		Course Type	**T**
Course Title	Advanced DiscreteMathematics -I			
Total Credit	**4**			
Total Marks	CIA: 30	ESE: 70	Max Marks: 100	Min. Pass. Marks: 40
Prerequisites (if any)				
Course Outcomes	The end of this course, the students will be able to: 1. Mathematical logic, semi groups and monoids. 2. Gainability to interpret lattices, Boolean Algebra, Karnaugh map, switching circuits. 3. Gainability to use graphs as unifying theme for various combinatorial problems. 4. Gainability to illustrate tautology, tautological implications, truth tables, normal forms, principal normal forms.			

Contents of Course

Unit	Contents	No. of Period
I	Boolean Algebra Boolean Algebras Duality, sub Algebra Hamo morphism and Isomorphism of Boolean Algebra, Boolean Algebras as lattices Boolean function, Direct products Atoms and mintermsMinterm Boolean forms	15
II	Lattices Lattices a partially ordered set and their Properties, Du Duality, Lattices as Algebrate Systems, Sub lattices, Direct products and homomorphism and Isomorphism, Bounded Lattics complete, Complimented modular and distributive Lattices	15
III	Mathematical logic statements, Symbolic representation, Tautogics Contradiction, Duality, operations Quanti Pers, Arguments, Predicates and validity Propositional	15
IV	Semigroup and Monoids: Definition and Examples of Semigroups and Monoids, Homomorphism of Semigroup and monoids, Congruence relation and Quotient semigroup, Sub Semigroup ,Sub Monoids,	15
	Total no. of Lectures	60

Text books	1. Advanced Discrete Mathematics
	Reference books : • J P. Tremblay & R. Manohar: Discrete Mathematical structure with application to computer sciences. [McGraw Hill Book Co. 1997. • S Wiitala: Discrete Mathematics - A unified approach McGraw Hill Book Co NewYork. • C. L. Liu: Elements of Discrete mathematics McGraw Hill Book Col. J.P Tremblay and R Manohar Discrete Mathematical Structure with application to computer sciences • McGraw Hill 2 C.L Liu Elements of Discrete mathematics Hill Book Col • M.K.GuptaDiscrete Mathematics: Krishna Prakash an Media **E-Resources:** https://onlinecourses.nptel.ac.in https://epqp.inflibnet.ac.in https://swayam.qov.in

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