

MANGALORE UNIVERSITY

Department of Post-Graduate Studies and Research in Mathematics

Revised Syllabus for Ph. D. Course Work in Mathematics (from the Academic Year 2015-16)

a) The Course Pattern and Scheme of Examination:

Papers	Particulars	Hours of Instruction per week	Duration of Examination (hrs)	Marks			
				IA	Theory	Total	Credits
Paper 1	Research Methodology	4	3	30	70	100	4
Paper 2	Review of Literature						
	Review Report	16	-	-	-	150	8
	Viva	-	-	-	-	50	2
Total:							14

- b) The research candidate has to undergo course work for a minimum period of one semester.
- c) Internal Assessment (IA) mark for Paper 1 shall be based on at least one written test and one seminar.

Pattern of Semester Examination Question Paper for Paper 1:

The question paper shall contain Part A and Part B. Part A shall contain 10 short answer questions of 2 marks each out of which 7 questions are to be answered. Part B shall contain 8 questions of 14 marks each out of which 4 questions are to be answered.

Paper 1 : Research Methodology (common to all candidates)

Course Outcome: Candidates will have the knowledge of updated theory, problem solving skills, skills to explain and apply the fundamental concepts in Algebra, Real and Complex Analysis, and Topology for their research. They also learn the construction of theories, results and their proofs with the help of fundamental concepts.

Course Specific Outcome: Candidates can have updated knowledge of theory and they can apply the following concepts in Algebra, Real and Complex Analysis, and Topology for their research and also in diverse situations:

- Groups, Rings, Fields, vector spaces, Linear transformations, Matrices
- Calculus of Functions (one variable and several variables), Sequences, Series, Products, Fourier Series, Complex Analytic functions
- Topology of R^n , General theory, Fixed point theorem.

Unit 1: Review and update of theory and problem solving skill in Algebra :

Examples of Groups and General Theory, S_n , A_n , D_n . Direct products, Free Groups, Products, Generators and Relations, Finite Groups. Rings and Ideals, Polynomials, Fields and their Extensions, Elementary Number theory.

Vector Spaces, Rank and Determinants, Systems of Equations, Linear Transformations, Eigen values and Eigen vectors, Canonical forms, Similarity, Bilinear, Quadratic forms and Inner product spaces, General theory of matrices. [20 hours]

Unit 2 : Review and update of theory and problem solving skill in Real and Complex Analysis :

Limits and Continuity, Sequences, Series and Products, Differential Calculus, Integral Calculus, Sequences of functions, Fourier Series, Convex Functions.

Conformal mappings, Integral representation of analytic functions, Functions on the unit disc, Analytic and Meromorphic functions. Zeros and singularities, Harmonic functions and Residue theory. [20 hours]

Unit 3 : Review and update of theory and problem solving skill in Topology :

Topology of R^n , General theory, Fixed point theorem. [10 hours]

References:

1. Paulo Ney de Souza, Jorge-Nuno Silva, *Berkeley Problems in Mathematics*, Springer-Verlag, 2004.
2. Michael Artin, *Algebra*, Prentice-Hall of India, 1996.

3. Walter Rudin, *Principles of Mathematical Analysis*, McGraw Hill, 3rd edition, 1976.
4. Walter Rudin, *Real and Complex Analysis*, McGraw Hill International Edition, New Delhi, 1987.
5. J. R. Munkres, *Topology*, Prentice-Hall of India, 2nd edition, 2000.

