Yashwantrao Chavan Warana Mahavidyalaya, Waranangar
Department of Marathi
Course Outcomes (CO), Program outcomes (PO), and Program Specific Outcomes (PSO)

A) U.G. Course / Programme (2017-18)

Title of Course	Course Outcomes (Statements)
Semester-V	**Knowledge Domain**
B.Sc.III	1.to acquire the knowledge of the basic ideas of Real Analysis.
1. Real Analysis	2. to acquire the knowledge of sequence of real numbers
	3. to understand the concept of series of real numbers
	4. to know the idea of Riemann Integration
	5. to enable the process of Improper Integrals
	Skill Domain
	1.to develop the skills to identify countable sets.
	2. to acquire the skill of convergence of the sequence of real numbers
	3. to develop the skill of convergence of series of real numbers
	4. to develop the skill of evaluation of Riemann Integration
	5. to enable the skill of process of Improper Integrals
2.Modern Algebra	**Knowledge Domain**
	1. to classify the various types of groups and subgroups.
	2. to acquire the knowledge of normal subgroup, homomorphism and permutation of group
	3. to understand the concept of ring
	4. to acquire the knowledge of homomorphism and imbedding ring
	5. to enable the properties of groups.
	Skill Domain
	1.to develop the skill of identification of group and subgroup.
	2. to acquire the skill of solution of permutation of groups.
	3. to develop the skill of homomorphism and imbedding ring
	4. to develop the skill of evaluation of the properties of groups.
	5. to enable the skill of identification of properties of normal subgroups.
3.PDE	**Knowledge Domain**
	1. to classify the various types of PDE.
	2. to acquire the knowledge of Linear and Nonlinear PDE
	3. to understand the concept of Homogeneous and Non homogeneous LPDE
	4. to acquire the knowledge of solution of PDE
	5. to enable the knowledge of properties of PDE
	Skill Domain
	1.to develop the skill of identification of PDE.
	2. to acquire the skill of solution of PDE.
	3. to develop the skill of various methods of solution of PDE
	4. to develop the skill of evaluation of complete solution of PDE.
	5. to enable the skill of identification of properties of PDE.
4.Numerical Methods-I	**Knowledge Domain**
	1. to acquire the knowledge of nonlinear equations.
	2. to acquire the knowledge of system of linear equations
	3. to understand the concept of eigen values and eigen vectors.
	4. to acquire the knowledge of methods of solution of nonlinear equations

	5. to enable the knowledge of methods of finding eigen values and eigen vectors.
	Skill Domain
	1.to develop the skill of solving nonlinear equations.
	2. to acquire the skill of solution of system of linear equations
	3. to develop the skill of various methods of solution of nonlinear equations
	4. to develop the skill of various methods of solving system of linear equations
	5. to enable the skill of identification of eigen values and eigen vectors.
Semester-VI **B.Sc.III** **5.Metric Spaces**	**Knowledge Domain**
	1.to acquire the knowledge of the basic ideas of Metric Spaces.
	2. to acquire the knowledge of continuous functions on metric spaces
	3. to understand the concept of connectedness of metric spaces.
	4. to know the idea of completeness of metric spaces
	5. to enable the process of compactness of metric spaces
	Skill Domain
	1.to develop the skill to identify metric spaces.
	2. to acquire the skill of solving problems in metric spaces.
	3. to develop the skill of solving connectedness of metric spaces.
	4. to develop the skill of evaluation of completeness of metric spaces
	5. to enable the skill of process of compactness of metric spaces
6.Linear Algebra	**Knowledge Domain**
	1.to acquire the knowledge of the basic ideas of Vector Spaces.
	2. to acquire the knowledge of Linear Transformation
	3. to understand the concept of Inner Product Spaces.
	4. to know the idea of Eigen Values and Eigen Vector
	5. to enable the process of linear algebra
	Skill Domain
	1.to develop the skill to identify vector spaces.
	2. to acquire the skill of solving problems in linear transformation.
	3. to develop the skill of solving inner product spaces.
	4. to develop the skill of evaluation of eigen values and eigen vectors
	5. to enable the skill of various methods in linear algebra.
7.Complex Analysis	**Knowledge Domain**
	1.to acquire the knowledge of the basic ideas of analytical functions.
	2. to acquire the knowledge of complex integration.
	3. to understand the concept of singularities and residues.
	4. to know the idea of entire meromorphic functions
	5. to enable the process of complex analysis.
	Skill Domain
	1.to develop the skill to identify analytical functions.
	2. to acquire the skill of solving problems in complex integration.
	3. to develop the skill of solving singularities and residues.
	4. to develop the skill of evaluation of entire meromorphic functions
	5. to enable the skill of various methods in complex analysis.
8.Numerical Methods-II	**Knowledge Domain**
	1.to acquire the knowledge of the basic ideas of equal interpolation.
	2. to acquire the knowledge of unequal interpolation.

	3. to understand the concept of numerical differentiation & integration
	4. to know the idea of numerical solution of ODE.
	5. to enable the process of numerical methods.
	Skill Domain
	1.to develop the skill to identify equal interpolation examples
	2. to acquire the skill of solving problems in unequal interpolation..
	3. to develop the skill of solving numerical differentiation & integration.
	4. to develop the skill of evaluation of numerical solution of ODE.
	5. to enable the skill of various methods in numerical methods.

c) P.G. Course / Programme (2018-19)

Title of Course	Course Outcomes (Statements)
Semester-III M.Sc.II 1.Analysis	**Knowledge Domain**
	1.to acquire the knowledge of the basic ideas of Functional Analysis.
	2. to acquire the knowledge of normed spaces, Banach spaces, Hilbert space,
	3. to understand the concept of continuous linear transformations between such spaces,
	4. to know the idea of bounded linear functionals
	5. to enable the process of finite dimensional spectral theorem.
	Skill Domain
	1.to develop the skills to identify normed spaces, Banach spaces, Hilbert space,
	2. to acquire the skill of concept of continuous linear transformations between such spaces,
	3. to develop the skill of bounded linear functionals
	4. to develop the skill of evaluation of finite dimensional spectral theorem
	5. to enable the skill of process of Functional Analysis
2.Advanced Discrete Mathematics	**Knowledge Domain**
	1. to classify the graphs and apply to real world problems
	2. to acquire the knowledge of simplification of the graphs using matrix.
	3. to understand the concept of Binomial theorem and use to solve various combinatorial problems.
	4. to acquire the knowledge of the Boolean identities and apply to switching circuits.
	5. to enable the knowledge of discrete mathematics and its applications.
	Skill Domain
	1.to develop the skill of identification of graphs and its apllications.
	2. to acquire the skill of simplification of the graphs using matrix.
	3. to develop the skill of Binomial theorem and use to solve various combinatorial problems..
	4. to develop the skill of evaluation of the Boolean identities
	5. to enable the skill of identification of properties of discrete mathematics and its applications..
3.Number Theory .	**Knowledge Domain**
	1. to classify the advanced properties of primes and pseudo primes.
	2. to acquire the knowledge of Mobius Inversion formula to number theoretic functions.
	3. to understand the basic idea of cryptography.
	4. to acquire the knowledge of primitive roots and index of an integer relative to a given primitive root.
	5. to enable the knowledge of derivation of Quadratic reciprocity law

	Skill Domain
	1.to develop the skill of identification of advanced properties of primes and pseudo primes.
	2. to acquire the skill of Mobius Inversion formula to number theoretic functions.
	3. to develop the skill of primitive roots and index of an integer relative to a given primitive root.
	4. to develop the skill of evaluation of cryptography.
	5. to enable the skill of identification of Quadratic reciprocity law.
4.Integral Equations	**Knowledge Domain**
	1. to acquire the knowledge of IVP and BVP
	2. to acquire the knowledge of integral equations.
	3. to understand the concept of solution of Fredholm integral equations with separable kernel.
	4. to acquire the knowledge of application of Hilbert Schmidt Theorem.
	5. to enable the knowledge of solving integral equations by successive approximations, using Laplace and Fourier transforms
	Skill Domain
	1.to develop the skill of solving integral equations by successive approximations, using Laplace and Fourier transforms.
	2. to acquire the skill of application of Hilbert Schmidt Theorem.
	3. to develop the skill of solving integral equations by successive approximations, using Laplace and Fourier transforms
	4. to develop the skill of solving Fredholm integral equations with separable kernel.
	5. to enable the skill of identification of IVP and BVP.
5.Fuzzy Mathematics	**Knowledge Domain**
	1.to acquire the knowledge of notion of crisp sets and fuzzy sets,
	2. to acquire the knowledge of operation on fuzzy sets and fuzzy arithmetic.
	3. to understand the basic concept of fuzzy set
	4. to know the idea of fuzzy numbers.
	5. to enable the process of fuzzy operations.
	Skill Domain
	1.to develop the skill of operation on fuzzy sets and fuzzy arithmetic.
	2. to acquire the skill of solving fuzzy arithmetic.
	3. to develop the techniques of fuzzy sets and fuzzy numbers.
	4. to develop the skill of application of evaluation of the notion of fuzzy set, fuzzy number in various problems.
	5. to enable the skill of solving fuzzy set problems.
Semester VI 6.Field Theory	**Knowledge Domain**
	1.to acquire the knowledge of basis and degree of a field over its subfield
	2. to acquire the knowledge of splitting field
	3. to understand the concept of primitive nth roots of unity and nth cyclotomic
	4. to know the idea of Fundamental Theorem of Galois Theory and Fundamental Theorem
	5. to enable the process of construction with straight edge and compass.
	Skill Domain
	1.to develop the skill to identify basis and degree of a field over its subfield.
	2. to acquire the skill of solving problems in linear transformation.

	3. to develop the skill of constructing splitting field for the given polynomial over the given field.
	4. to develop the skill of finding primitive nth roots of unity and nth cyclotomic polynomial.
	5. to enable the skill of making use of Fundamental Theorem of Galois Theory and Fundamental Theorem.
7.Partial Differential Equations .	**Knowledge Domain**
	1.to acquire the knowledge of Partial Differential Equations..
	2. to acquire the knowledge of classification of PDE
	3. to understand the concept of transformation into canonical form.
	4. to know the idea of solution of linear partial differential equations of both first and second order.
	5. to enable the process of BVP.
	Skill Domain
	1.to develop the skill to identify PDE.
	2. to acquire the skill of solving PDE.
	3. to develop the skill of transformation into canonical form
	4. to develop the skill of solution of linear partial differential equations of both first and second order.
	5. to enable the skill of various methods in solving BVP.
8.Fractional Differential Equations	**Knowledge Domain**
	1.to acquire the knowledge of fractional differential equations.
	2. to acquire the knowledge of Mittag-Leffler functions
	3. to understand the concept of data dependency of solution of fractional differential equations.
	4. to know the idea of properties of solution of fractional differential equations with initial boundary conditions.
	5. to enable the process of stability of fractional differential equations.
	Skill Domain
	1.to develop the skill of solution of FDE.
	2. to acquire the skill of solving problems using Mittag-Leffler functions.
	3. to develop the skill of solving data dependency of solution of FDE.
	4. to develop the skill of evaluation fractional differential equations with initial boundary conditions.
	5. to enable the skill of stability of fractional differential equations.
9.Fuzzy Relations and Logic	**Knowledge Domain**
	1. to.acquire the knowledge of fuzzy relations.
	2. to acquire the knowledge of the basic concepts of fuzzy logic and fuzzy algebra.
	3. to understand the concept of solving fuzzy relation equations.
	4. to know the idea of construction of approximate solutions of fuzzy relation equations.
	5. to enable the process of solving problems in Engineering and medicine
	Skill Domain
	1.to develop the skill of solution of fuzzy relations.
	2. to acquire the skill of fuzzy logic and fuzzy algebra..
	3. to develop the skill of solving fuzzy relation equations..
	4. to develop the skill of construction of approximate solutions of fuzzy relation equations.

	5. to enable the skill solving problems in Engineering and medicine
10. Combinatorics	**Knowledge Domain**
	1. to.acquire the knowledge of Pigeonhole principle.
	2. to acquire the knowledge of the basic definitions and theorems.
	3. to understand the concept of Burnside Frobenius Theorem in counting's.
	4. to know the idea of various counting techniques to solve various problems.
	5. enable to apply combinatorial ideas to practical problems.
	Skill Domain
	1.to develop the skill of solution of problem using Pigeonhole principle.
	2. to acquire the skill of construction of solutions of problems using basic definitions and theorems.
	3. to develop the skill of application of Burnside Frobenius Theorem in counting's.
	4. to develop the skill of various counting techniques to solve various problems.
	5. to improve the skill of mathematical verbal communication.

Head
Department of mathematics