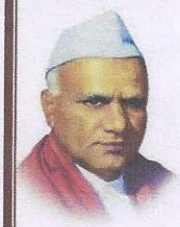

"Education for Knowledge, Science, and Culture"
- Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

Vivekanand College, Kolhapur (Autonomous)

KOLHAPUR (AUTONOMOUS)

Department Of Mathematics

Course Outcomes (COs)

M.Sc. Part II Mathematics (Introduced in the year 2019)

Semester III

Functional Analysis(CP-1180C)

CO No.	On completion of the course, student will be able to:
CO1	To familiarize the students with the fundamental topics, principles and methods of functional analysis
CO2	Understand and apply fundamental theorems from the theory of normed and Banach spaces, including the Hahn-Banach theorem, the open mapping theorem, the closed graph theorem.
CO3	Able to understand Hilbert space and its application and acquire knowledge of orthogonal sets and operators
CO4	Understand Adjoint of an operator on a Hilbert space and concept of projection, self – adjoint, normal and unitary operator.

Advanced Discrete Mathematics(CP-1181C)

CO No.	On completion of the course, student will be able to:
CO1	Solve discrete probability problems and use set to solve problems in combinatorics and probability theory.
CO2	Determine if a given graph is simple or a multigraph, directed or undirected graph, cyclic or acyclic, and determine the connectivity of a graph.
CO3	To determine if graph has a Euler or a Hamiltonian path or circuit, Define Pigeonhole principle and solve problems related to this.
CO4	Identify the types of Lattices and find supremum and infimum.

Number Theory (CP-1182C)

CO No.	On completion of the course, student will be able to:
CO1	learn more advanced properties of primes and pseudo primes.
CO2	Able to apply Mobius Inversion formula to number theoretic functions
CO3	Able to explore basic idea of cryptography.
CO4	Understand concept of primitive roots and index of an integer relative to a given primitive root.

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Graph Theory I (CP-1183C)	
CO No.	**On completion of the course, student will be able to:**
CO1	Understand and explore the basics of graph theory.
CO2	Define vertex colouring and prove theorems on vertex colouring.
CO3	Derive properties of planarity and Euler's formula.
CO4	Evaluate or synthesize any real -world applications using graph theory.
Operational Research –I (CP-1184C)	
CO No.	**On completion of the course, student will be able to:**
CO1	Able to identify convex set and convex functions and construct linear integer programming models discuss the solution techniques
CO2	Able to solve multi –level decision problems using dynamic programming method.
CO3	Able to identify the appropriate methods to solve the different kinds of Optimization Problems.
CO4	Formulate the nonlinear programming models and able to find solution methods for solving the nonlinear and linear optimization problems.
Lattice Theory - I (CP-1185C)	
CO No.	**On completion of the course, student will be able to:**
CO1	Understand the relation between posets and lattices
CO2	Study the basic properties and characterization of lattice
CO3	Understand and apply the distributive complemented lattice
CO4	Design analyse and implement the concepts of stone's theorem and its consequence, pseudo complemented lattices and it's dual
Dynamical System I (CP-1186C)	
CO No.	**On completion of the course, student will be able to:**
CO1	Classify equilibrium points of the dynamical system
CO2	Construct bifurcation diagrams and analyze the system for different values of parameter.
CO3	Relate the qualitative properties of the system with the eigen values of coefficient matrix.
CO4	Construct the exponential of a matrix and apply it to solve the dynamical system.
Commutative Algebra (CP-1187C)	
CO No.	**On completion of the course, student will be able to:**
CO1	Classify the ideals to solve the related problems.
CO2	Understand various radicals and know Hilbert basis theorem and apply it to other development.

CO3	Use Nakayama Lemma for further development in Noetherion Rings.
CO4	Derive the Krull intersection theorem

Semester IV

Field Theory (CP-1190D)

CO No.	On completion of the course, student will be able to:
CO1	Apply the knowledge of algebra to attain a good mathematical maturity and enables to build mathematical thinking and reasoning
CO2	Identify and analyse different types of algebraic structures such as algebraically closed fields, splitting fields, finite field extension to understand and use the fundamental results in Algebra
CO3	Design analyse and implement the concepts of Gauss lemma, separable extension etc.
CO4	Identify the challenging problems in advanced algebra to pursue further research.

Integral Equations (CP-1191D)

CO No.	On completion of the course, student will be able to:
CO1	Solve linear Volterra and Fredholm integral equations using appropriate methods.
CO2	Understand the relationship between integral and differential equations and transform one type into another.
CO3	Find out the iterate kernel and Resolvent kernel of Volterra, Fredholm integral equation.
CO4	Formulate and solve initial and boundary value problems for the heat and wave equations in spherical and cylindrical coordinates

Algebraic Number Theory (CP-1192D)

CO No.	On completion of the course, student will be able to:
CO1	Understand The concept (definition and significance) of algebraic numbers and algebraic integers.
CO2	Understand and clearly define number fields and their ring of integers, in particular quadratic number fields and cyclotomic number fields.
CO3	Able to factorise an algebraic integer into irreducible and find the ideals of an algebraic number ring.
CO4	Able to compute the class groups and the group of units of a number field.

Graph Theory II (CP-1193D)

CO No.	On completion of the course, student will be able to:
CO1	Analyse the significance of graph theory in different engineering disciplines
CO2	Demonstrate algorithms used in interdisciplinary engineering domains
CO3	Explain the properties of trees and connectivity
CO4	Explain major theorems and inventions in the history of graph theory and understand how it made the subject to develop to the present state.

Operational Research –II (CP-1194D)	
CO No.	**On completion of the course, student will be able to:**
CO1	Decide an optimal replacement period/policy for a given item/equipment/machine
CO2	Understand the various selective inventory control techniques and its applications. Capability to develop deterministic inventory models
CO3	Understand the mathematical modeling of queuieng systems To apply and extend queueing models to analyze real world systems.
CO4	Understand application of PERT and CPM techniques and able to construct network diagrams.
Fluid Dynamics (CP-1195D)	
CO No.	**On completion of the course, student will be able to:**
CO1	Apply Bernoulli's equation to fluid flow problems and boundary layer theory to determine lift and drag forces on a submerged body.
CO2	Apply appropriate equations and principles to analyze pipe flow problems.
CO3	solve inviscid flow problems using stream functions and velocity potentials
CO4	Apply concepts of mass, momentum and energy conservation to flows,
Dynamical System II (CP-1196D)	
CO No.	**On completion of the course, student will be able to:**
CO1	Test for the existence and uniqueness of solution of nonlinear system.
CO2	Relate the stability of the system with its linearization.
CO3	Distinguish between stable and unstable sets corresponding to the given system.
CO4	Identify the chaotic behaviour in the system by using Lyapunov exponents
Combinatorics (CP-1197D)	
CO No.	**On completion of the course, student will be able to:**
CO1	Students will familiar with fundamental combinatorial structures than naturally appears in various other field of mathematics.
CO2	Learn how to use those structure to represent mathematical applied questions
CO3	Able to use generating function to solve a variety of combinatorial problems
CO4	Identify the challenging problems in arrangement and selections
Fractional Differential Equations (CP-1198D)	
CO No.	**On completion of the course, student will be able to:**
CO1	Understand G-L and RL-fractional integral and evaluate fractional integrals of some common functions
CO2	RL and Caputo-fractional derivatives and evaluate fractional derivatives of some common functions

CO3	To Solve Linear Fractional Differential Equation using the Laplace and Mellin transform
CO4	The study of fractional differential

(S. P. Patankar)
HEAD
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