



Maratha Vidhya Prasarak Samaj's
Art's, Science and Commerce College, Ozar (MIG)

Course Outcomes

Name of the department: Mathematics

Class	Name of the Course: Semester: (Paper): Code:	Name of the Teacher	Outcomes
F.Y.B.Sc.	Paper I Algebra and Geometry.	A.K. Kamale /P.R. Bhadane	<ol style="list-style-type: none">1. Determine equivalence relations on sets and equivalence Classes.2. Define and interpret the concepts of divisibility, congruence, Greatest common divisor, prime, and prime factorization.3. Apply factor, remainder theorem for polynomials and Use Relation between the roots and the coefficients of a Polynomial to Solve equations.4. Solve systems of linear equations by using Gaussian elimination, Gauss Jordan by reducing the augmented matrix to row Echelon Form or to reduced row echelon form.5. Find the eigen values and eigenvectors of a square matrix using the characteristic polynomial and apply Cayley Hamilton theorem to find the inverse of a matrix.6. Determine the nature of conic and reduce the conic to Standard Form.7. Obtain equation of plane in different forms, according to given Condition.8. Obtain equation of line in different forms. Find the shortest distance between two lines, length of perpendicular from a given Point to a given line, check co planarity of lines .9. Obtain equation of the sphere in various forms, and find Equation of tangent plane.10. Solve examples on cone, cylinder, right circular cone, Right circular Cylinder.
F.Y.B.Sc.	Paper II – Calculus.	S.L. Wagh	<ol style="list-style-type: none">1. State Algebraic properties, Order properties, Completeness Property of \mathbb{R}.2. Evaluate limit of a function, test continuity and state Properties of Continuous functions on closed and bounded interval.3. Give geometric interpretation of a derivative of a real valued Function at a point. Determine differentiability of a function over an Interval.4. Apply Mean Value Theorems and Taylor's and Maclaurin's Theorem With Lagrange's form of remainder.5. Use L-Hospitals rule and apply Leibnitz Theorem.6. Find integration of rational function by using partial fractions.7. Obtain Integration of some irrational functions and also use Reduction formula.8. Apply appropriate method to solve differential equations of first



			<p>order and first degree.</p> <p>9. Obtain Orthogonal trajectories.</p> <p>10. Apply appropriate method to find general solution of Differential Equations of first order and higher degree.</p>
F.Y.B. Com.	104 (A) : Business Mathematics and Statistics.	Smt. V.P. Shelke	<ol style="list-style-type: none"> 1. Use concept of proportion and percentage. 2. Apply simple interest, compound interest in real life. 3. Apply the concept of shares, face value, market value, Equity shares, Preference shares, Dividend, Bonus- shares in day today life . 4. Discuss the various aspects of statistics, it's scope and applications in various fields. 5. Represent and classify the data and construct graphs. 6. Distinguish between different types of averages, compute different Types of averages. 7. Apply the concept of profit and loss in business. Calculate trade Discounts and cash discounts. 8. Formulate and model a linear programming problem from a word Problem and solve LPP graphically. 9. Discuss measures of dispersion and solve the examples on standard Deviation by deviation method and step by deviation method. 10. Use correlation and regression analysis to estimate the relationship between two variables and apply the concept of index numbers.
S.Y.B.Sc.	Semester I : Paper I – Multivariable Calculus I.	S.L. Wagh	<ol style="list-style-type: none"> 1. Compute Limit and Continuity of Multivariable functions. 2. Compute Second and higher order partial derivatives, verify the Mixed derivative theorem. 3. Apply Chain rules for composite function and find Directional derivatives, gradient Vectors, Tangent planes, normal lines and Differentials. 4. Use First and Second derivative test for local extreme values. Apply Lagrange's multipliers method for finding extreme values of Constraint function. 5. Evaluate Double integrals in polar form, Triple integrals in rectangular, cylindrical and spherical coordinates and apply them Appropriately to find area and volumes.
S.Y.B.Sc.	Semester I : Paper II (A): Discrete Mathematics	A.K. Kamale /P.R. Bhadane	<ol style="list-style-type: none"> 1. Express a logic sentence in terms of predicates, quantifiers, and Logical connectives. 2. Apply rules of inference, tests for validity and Formulate short proofs using the methods: direct proof, indirect proof, proof by Contradiction, and proof by cases. 3. Solve counting problems by applying elementary counting techniques using the product and sum rules, permutations, Combinations, generalized permutations and combinations. 4. Apply the logical structure of proofs and work symbolically with connectives and quantifiers to produce logically valid, correct and Clear arguments. 5. Solve problems using the principle of inclusion-exclusion.
S.Y.B.Sc.	Paper II(B) Laplace Transforms and Fourier	S.L. Wagh	<ol style="list-style-type: none"> 1. State Properties of Laplace Transform, solve examples on Laplace Transform. 2. State properties of Inverse Laplace Transform and solve examples on inverse Laplace Transform.



	Series.		<ol style="list-style-type: none"> 3. Use Convolution Theorem to evaluate Integrals. 4. Apply Laplace Transform to solve Ordinary Differential Equations With constant coefficients. 5. Solve examples of Fourier Series.
S.Y.B.Sc.	Semester II: Paper I – Linear Algebra.	S.L. Wagh	<ol style="list-style-type: none"> 1. Recognize the concepts of the terms linear span, linear independence, basis, and dimension, and apply these concepts to Various vector spaces and subspaces. 2. Apply Necessary and sufficient condition for subspace to determine Whether given subset S of vector space V is subspace of V or not. 3. Compute inner products and determine orthogonality on vector Spaces, including Gram-Schmidt orthogonalization. 4. Find the row space, column space and null space of a matrix. Compute null space, range space, rank, nullity, and verify rank Nullity Theorem. 5. Use the definition and properties of linear transformations and matrices of linear Transformations and change of basis, including Kernel, range.
S.Y.B.Sc.	Sem II : Paper II (A) Multivariabl e Calculus II.	A.K. Kamale /P.R. Bhadane	<ol style="list-style-type: none"> 1. Compute limit, continuity, derivative of vector function. 2. Analyze vector functions to find tangent lines, unit normal vectors, Integrals, arc length, and curvature. 3. Evaluate line integrals, and apply it to find work, circulation and flux across smooth curves. 4. Determine gradient vector fields, Conservative fields and find Potential functions. 5. Apply Green's theorem in plane, Stokes theorem and Gauss Divergence theorem.
S.Y.B.Sc.	Sem II : Paper II (B) Numerical Methods.	S.L. Wagh	<ol style="list-style-type: none"> 1. Compute Absolute, relative and percentage errors and Rounding off Numbers to n significant digits, to n decimal places. 2. Apply appropriate numerical methods to solve algebraic and Transcendental equations. 3. Relate Finite Difference Operators and Apply Newton's Forward and Backward Interpolation Formulae, Lagrange's Interpolation Formula. 4. Fit linear, quadratic, power and exponential function and Calculate a definite integral using an appropriate numerical method 5. Solve a differential equation using an appropriate numerical Method.
T.Y.B.Sc	Sem- I Paper I – MT 331 Metric Spaces.	Smt. V.P. Shelke	<ol style="list-style-type: none"> 1. Describe examples on metric spaces, open spheres and closed spheres, equivalent Metrics and find interior points, limit points and isolated points, closure of a set, boundary points, distance between sets and diameter of a set. 2. State relation between Convergent sequences and Cauchy Sequences. 3. Verify uniform continuity and homeomorphism. 4. Discuss properties of Compact, Complete, connected metric spaces. 5. Identify Separated sets, disconnected and connected sets.
T.Y.B.Sc	Sem- I : Paper II– MT 332 :Real	A.K. Kamale /P.R. Bhadane	<ol style="list-style-type: none"> 1. Explain Cantor set, Least upper bounds. 2. Define and solve examples on sequence, subsequence, Convergent sequences, Monotone sequences, Divergent sequences, Cauchy Sequences.



	Analysis -I.		<ol style="list-style-type: none"> 3. Find Limit of a sequence, Limit superior, Limit inferior. 4. Distinguish Convergent and divergent series, alternating series. 5. Test absolute convergence of series.
T.Y.B.Sc	Sem- I : Paper III- MT 332 Problem course on Paper I and II.	Smt. V.P. Shelke & A.K. Kamale /P.R. Bhadane	1. Problems on Paper I and II.
T.Y.B.Sc	Sem- I : Paper IV – Group Theory	Smt. V.P. Shelke	<ol style="list-style-type: none"> 1. Construct examples of groups, Abelian groups, cyclic groups, subgroups, homomorphisms, Isomorphisms etc. that satisfy or Violate specific properties. 2. Compute with permutation group, the alternating group A_n, orbits . 3. Construct all the left and right cosets of a subgroup H of a group G . 4. Use Lagrange's Theorem to analyse the cyclic subgroups of a group. 5. Explain the significance of the notion of a normal subgroup, a simple group, factor group and Produce rigorous proofs of propositions arising in the context .
T.Y.B.Sc	Sem- I : Paper V – MT 335: Ordinary Differential Equations.	S.L. Wagh	<ol style="list-style-type: none"> 1. Solve Linear Differential Equations with constant coefficients. 2. Apply methods to solve Non-Homogeneous Differential Equations. 3. Obtain Power series solutions. 4. Solve linear systems. 5. Determine solution of homogeneous linear systems with constant Coefficients.
T.Y.B.Sc	Sem- I : Paper VI – Problem course on Paper IV and V.	Smt. V.P. Shelke & S.L. Wagh	1. Problems on Paper III and IV.
T.Y.B.Sc	Sem- I : Paper VIII –Paper MT 337 A: Operations Research .	Smt.S.T. Wagh	<ol style="list-style-type: none"> 1. Formulate and model a linear programming problem from a word Problem and solve LPP graphically. 2. Apply Simplex Method to solve LPP. 3. Find the dual, and identify and interpret the solution of the Dual Problem from the table of the Primal problem. 4. Find IBFS and optimal solution of transportation problem. 5. Apply Hungarian method to solve Assignment problem.
T.Y.B.Sc	Sem- I: Paper VII – MT 337 D: Lattice Theory.	A.K. Kamale /P.R. Bhadane	<ol style="list-style-type: none"> 1. Construct and draw ordered sets, Find Down-sets and up-sets. 2. Express Lattice as ordered sets, Lattices as algebraic structures. 3. Solve examples on Sub-lattices, products and homomorphisms, find Ideals and Filters, Join, meet -irreducible elements. 4. Distinguish and compare complete, Modular, distributive and Boolean Lattices. 5. Find disjunctive and conjunctive normal forms.



T.Y.B.Sc	Sem-II : Paper I – MT 341: Complex Analysis.	Smt. V.P. Shelke	<ol style="list-style-type: none"> 1. Apply the concept and consequences of analyticity and the Riemann equations and results on harmonic and entire functions. 2. Evaluate complex contour integrals directly and by the fundamental theorem 3. Apply the Cauchy integral theorem in its various versions. 4. Represent functions as Taylor, power and Laurent series. 5. Classify singularities and poles, find residues and evaluate complex Integrals using the residue theorem.
T.Y.B.Sc	Sem- II : Paper II – MT 342: Real Analysis II.	A.K. Kamale /P.R. Bhadane	<ol style="list-style-type: none"> 1. Identify Sets of measure zero and State properties of Riemann Integral. 2. Apply Fundamental theorem and mean value theorems of integral Calculus. 3. Differentiate between improper integrals of first, second and third Kind. 4. Apply appropriate tests to determine absolute and conditional Convergence. 5. Discuss Point wise and uniform convergence of sequences of functions, and convergence and uniform convergence of series of Functions.
T.Y.B.Sc	Sem- II : Paper III – MT 343: Problem course on Paper I and II.	Smt. V.P. Shelke & A.K. Kamale /P.R. Bhadane	<ol style="list-style-type: none"> 1. Problem on Paper I and II.
T.Y.B.Sc	Sem- II: Paper IV – MT 344: Ring theory.	Smt. V.P. Shelke	<ol style="list-style-type: none"> 1. Write precise and accurate mathematical definitions of objects in Ring theory. 2. Construct examples of rings, sub-rings, homeomorphisms, Isomorphisms, ideals etc. that satisfy or violate specific properties. 3. Classify important classes of rings including integral domain, division ring, fields, quotient rings, Polynomial rings and ring elements including: unity, units, nilpotent, idempotent, zero divisor, Associates, Irreducible, prime. 4. Identify important classes of ideals including: prime ideal, maximal ideal, principal Ideal . 5. Analyze factorizations of polynomials and Identify important classes of rings associated with factorization: Unique Factorization Domains, Principal Ideal Domains, Euclidean Domains.
T.Y.B.Sc	Sem-II : Paper V – MT 345: Partial Differential Equations	S.L. Wagh	<ol style="list-style-type: none"> 1. Solve Simultaneous Differential Equations of the First Order and the First Degree in Three Variables. 2. Find Orthogonal Trajectories of a System of curves on a Surface. 3. State Pfaffian Differential Forms and Equations and solve Pfaffian Differential Equations in Three Variables. 4. Determine whether the equations are compatible or not. 5. Find complete integral using Charpit's Method, Jacobi's Method.



T.Y.B.Sc	Sem- II : Paper VI – MT 346: Problem course on Paper IV and V.	Smt. V.P. Shelke & S.L. Wagh	1. Problem only on Paper IV and V.
T.Y.B.Sc	Sem-II : Paper VII - MT 347 A: Optimization Techniques.	Smt. S.T. Wagh	<ol style="list-style-type: none">1. Represent network. Differentiate between CPM and PERT, compute Critical Path.2. Solve two person zero sum game, mixed strategy games, obtain Graphical solution of games.3. Conclude the replacement time of items whose efficiency Deteriorates With time.4. Determine the sequence of jobs, compute idle time and total Elapsed time for Processing n jobs through two and three machines.5. Apply Newton Raphson method, and Lagrangian Method to solve Problems.
T.Y.B.Sc	Sem- II : Paper VII – MT 347 F: Computational Geometry .	A.K. Kamale /P.R. Bhadane	<ol style="list-style-type: none">1. Transform Points, Straight Lines, Parallel Lines, Intersecting Lines in Two dimensions.2. Apply 2- D and 3-D transformations Rotation, Reflection, Scaling, Shearing, Translations, Combined Transformations on objects.3. Differentiate between parallel and perspective projection and apply Them.4. Obtain parametric representation of a circle, Ellipse, parabola and Hyperbola.5. State properties of Beizer curves and fit the curve up to $n = 3$.

Head
Department of Mathematics