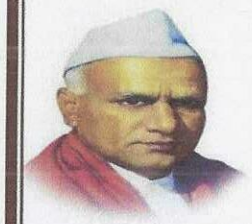

"Education for Knowledge, Science, and Culture"
- Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

Vivekanand College, Kolhapur (Autonomous)

KOLHAPUR (AUTONOMOUS)

Department of Mathematics

Content with Cross-cutting Issues

Sr. No.	Name of the Course	Course Code	Year of Introduction	Professional Ethics	Gender	Human Values	Environment and Sustainability	Sustainable Development Goals	NEP - 2020
B. Sc I Mathematics (Newly Introduced between 2018-19)									
1	Differential Calculus	DSC-1003A	2018-19				Higher order derivative, Mean value theorem		
2	Differential Equations	DSC-1003B	2018-19				First order and first degree differential equation Second order differential equations, Partial differential equations		
B.Com I Mathematics (Newly Introduced between 2018-19)									
3	Business Mathematics Paper I	GEC-1045A	2018-19			Arithmetic and geometric progression,		Linear programming problem	

						Compound interest, ratio			
4	Business Mathematics Paper II	GEC-1045B	2018-19				Application of differentiation. Integration and its application		
M.Sc. I Mathematics (Newly Introduced between 2018-19)									
5	Algebra	CP-1170A	2018-19	Jordan-Holder theorem		homomorphism and isomorphism theorem		Group action on a set, isometry	
6	Advanced Calculus	CP-1171A	2018-19	Uniform convergence and Riemann integration			Multivariable differential Calculus, integral, Green's theorem, Stoke's theorem.		
7	Complex Analysis	CP-1172A	2018-19	Laurent series development				radius of convergence, analytic functions	
8	Ordinary Differential Equations	CP-1173A	2018-19				Existence and uniqueness of solutions, Existence and Uniqueness for linear systems, Equations of order n, Initial value problems for the nth order equations, The non-homogeneous		

							equation of nth order		
9	Classical Mechanics	CP-1174A	2018-19				D' Alembert's Principle, the principle of least action, Hamilton's canonical equations of motion	Lagrange's equations of motion,	
10	Linear Algebra	CP-1175B	2018-19				Eigen values and eigenvectors of a linear transformation	Hermitian, Self adjoint, Eigen values and eigenvectors of a linear transformation	
11	Measure and Integration	CP-1176B	2018-19	Littlewood's Three Principles, Egoroff's Theorem and Lusin's Theorem,					
12	General Topology	CP-1177B	2018-19	Urysohn lemma and Urysohn metrization theorem.					
13	Partial Differential Equations	CP-1178B	2018-19				Boundary Value Problems, Stability theorem., Solution of Laplace equation, wave equations, Heat equation		

14	Numerical Analysis	CP-1179B	2018-19	convergence and stability of numerical methods, Interpolation, differentiation and integration			Interpolation, Error analysis, convergence and stability of numerical methods, Numerical solution of ordinary differential equations	Error analysis,	
B.Sc II Mathematics (Newly Introduced between 2019-20)									
15	Differential Calculus	DSC-1003C	2019-20	Asymptotes			Vector differential operator Del., Divergence, Gradient and curl of vector, Jacobian		
16	Integral Calculus	DSC-1003C	2019-20				Fourier series		
17	Discrete Mathematics	DSC-1003D	2019-20	Generating functions and Recurrence relation		Generating function and recurrence relation	Graph theory	Boolean Algebra	
18	Integral Transform	DSC-1019D	2019-20				Laplace transform	Laplace transform , Fourier transform	
M.Sc II Mathematics (Newly Introduced between 2019-20)									
19	Functional Analysis	CC -1180C	2019-20	The Hahn-Banach theorem and its consequences.				Banach Space, Hilbert space, self adjoint operator	

20	Advanced Discrete Mathematics	CC -1181C	2019-20	Inclusion exclusion principle		Generating function and recurrence relation	Graph theory	Pigeonhole principle, Lattice, minimum spanning tree	
21	Number Theory	CBC -1182C	2019-20			GCD, Division algorithm		Chinese remainder theorem, fermat's theorem	
22	Graph Theory I	CBC -1183C	2019-20					Vertex coloring, spanning tree, travelling salesman problem	
23	Operational Research –I	CBC -1184C	2019-20				Dynamic programming, Linear Programming problem	Linear Programming problem	
24	Lattice Theory - I	CBC -1185C	2019-20					Lattice, Boolean Algebra	
25	Dynamical System I	CBC -1186C	2019-20				Discrete dynamical systems	Planer systems-Qualitative Analysis	
26	Commutative Algebra	CBC -1187C	2019-20					Tensor product of modules	
27	Field Theory	CC-1190D	2019-20					Applications of Galois theory	
28	Integral Equations	CC-1191D	2019-20				Solutions of Volterra integral equations	Fredholm integral equations, Solutions of Volterra integral equations	
29	Algebraic number theory	CBC-1192D	2019-20						

30	Graph theory II	CBC-1193D	2019-20				spanning tress and binary trees.	Kruskal' s Algorithm for shortest spanning trees	
31	Operation Research II	CBC-1194D	2019-20	Replacement Problems, Inventory – Cost involved in inventory problems,		Queuing Theory	Replacement Problems, Queuing Theory	Queuing Theory, Inventory – Cost involved in inventory problems,	
32	Fluid Dynamics	CBC-1195D	2019-20				Equation of conservation of mass	Bernoullis equation for irrotational flows, Equation of conservation of mass, equation of conservation of momentum, Navier-Stokes equation	
33	Dynamical System II	CBC-1196D	2019-20					Application of chaos to secure communication, data visualization-2D and 3D plots	
34	Combinatorics	CBC-1197D	2019-20	Fibonacci sequence.		Permutations and combinations, Fibonacci sequence.		The Pigeonhole Principle	
35	Fractional Differential Calculus	CBC-1198D	2019-20	Existence and uniqueness theorem				The Mellin transform method,	
B.Sc III Mathematics (Newly Introduced between 2020-21)									

36	Real Analysis	DSC-1003E1	2020-21	The algebraic and ordered properties of R				Sequence and series	
37	Modern Algebra	DSC -1003E1	2020-21					Group, ring theory	
38	Matrix Algebra	DSC-1003E2	2020-21					Eigenvalue and eigenvector	
39	Numerical Methods I	DSC-1003E2	2020-21					Newton's method	
40	Metric Space	DSC – 1003F1	2020-21					Metric space	
41	Linear Algebra	DSC – 1003F1	2020-21					Vector spaces, Basis of vector space	
42	Complex Analysis	DSC – 1003F2	2020-21					Application of residue theorem	
43	Numerical Methods II	DSC – 1003F2	2020-21	Numerical differentiation				Numerical differentiation, Numerical integration	
B.Sc I Mathematics (Newly Introduced between 2021-22)									
44	Calculus	DSC-1003A	2021-22				Higher order derivative, Mean value theorem		
45	Algebra and Geometry	DSC -1003A	2021-22	The Fundamental theorem of algebra		Principles of mathematical induction and well ordering, The division algorithm		The rank of a matrix and applications, Eigen values and eigenvectors,	
46	Multivariable Calculus	DSC-1003B	2021-22				Vector differential operator Del., Divergence, Gradient and curl of vector, Jacobian		

47	Ordinary Differential Equations	DSC-1003B	2021-22				First order and first degree differential equation Second order differential equations, Partial differential equations		
B.Com I Mathematics (Newly Introduced between 2021-22)									
48	Business Mathematics Paper I	GEC-1045A	2021-22			Arithmetic and geometric progression, Compound interest, ratio		Linear programming problem	
49	Business Mathematics Paper II	GEC-1045B	2021-22				Application of differentiation. Integration and its application		
M.Sc I Mathematics (Newly Introduced between 2021-22)									
50	Algebra	CP-1170A	2021-22	Jordan-Holder theorem		homomorphism and isomorphism theorem		Group action on a set, isometry	
51	Advanced Calculus	CP-1171A	2021-22	Uniform convergence and Riemann integration			Multivariable differential Calculus, integral, Green's theorem, Stoke's theorem.		
52	Complex Analysis	CP-1172A	2021-22	Laurent series development				radius of convergence, analytic functions	

53	Ordinary Differential Equations	CP-1173A	2021-22				Existence and uniqueness of solutions, Existence and Uniqueness for linear systems, Equations of order n, Initial value problems for the nth order equations, The non-homogeneous equation of nth order		
54	Classical Mechanics	CP-1174A	2021-22				D' Alembert's Principle, the principle of least action, Hamilton's canonical equations of motion		
55	Linear Algebra	CP-1175B	2021-22				Eigen values and eigenvectors of a linear transformation	Hermitian, Self adjoint, Eigen values and eigenvectors of a linear transformation	
56	Integral Equations	CP-1176B	2021-22					Fredholm integral equations, Volterra integral equations	
57	General Topology	CP-1177B	2021-22	Urysohn lemma and Urysohn					

				metrization theorem.					
58	Partial Differential Equations	CP-1178B	2021-22				Boundary Value Problems, Stability theorem., Solution of Laplace equation, wave equations, Heat equation		
59	Numerical Analysis	CP-1179B	2021-22				Interpolation, Error analysis, convergence and stability of numerical methods, Numerical solution of ordinary differential equations	Error analysis,	
B.Sc II Mathematics (Newly Introduced between 2022-23)									
60	Number Theory	DSC-1003C	2022-23	The Fundamental Theorem of Arithmetic, Well ordering principle		Greatest Common Divisor, Least common multiple,			
61	Integral Calculus	DSC-1003C	2022-23				Fourier series		
62	Discrete Mathematics	DSC – 1003 D	2022-23	Fibonacci Numbers		Generating function and recurrence relation	Graph theory	Boolean Algebra	

63	Integral Transform	DSC – 1003D	2022-23					Inverse Laplace Transform and application :	
M.Sc II Mathematics (Newly Introduced between 2022-23)									
64	Functional Analysis	CC -1180C	2022-23					Banach Space, Hilbert space, self adjoint operator	
65	Advanced Discrete Mathematics	CC -1181C	2022-23			Generating function and recurrence relation	Graph theory	Pigeonhole principle, Lattice, minimum spanning tree	
66	Lattice Theory - I	CBC -1182C	2022-23					Lattice, Boolean Algebra	
67	Number Theory	CBC -1183C	2022-23			GCD, Division algorithm		Chinese remainder theorem, fermat's theorem	
68	Operational Research –I	CBC -1184C	2022-23				Dynamic programming, Linear Programming problem	Linear Programming problem	
69	Fuzzy Mathematics I	CBC -1185C	2022-23					Fuzzy sets and crisp sets, Fuzzy numbers	
70	Dynamical System I	CBC -1186C	2022-23				Discrete dynamical systems	Planer systems-Qualitative Analysis	
71	Commutative Algebra	CBC -1187C	2022-23					Tensor product of modules	
72	Field Theory	CC-1190D	2022-23					Applications of Galois theory C	
73	Measure and Integration	CC-1191D	2022-23					The General Lebesgue Integral,	

74	Algebraic number theory	CBC-1192D	2022-23					Field extensions, Algebraic number fields,	
75	Fuzzy Mathematics II	CBC-1193D	2022-23					Nonspecificity of Crisp Sets, Nonspecificity of Fussy Sets	
76	Operation Research II	CBC-1194D	2022-23	Replacement Problems, Inventory – Cost involved in inventory problems,		Queuing Theory	Replacement Problems, Queuing Theory	Queuing Theory, Inventory – Cost involved in inventory problems,	
77	Introduction to Data Science	CBC-1195D	2022-23					Machine learning, Handling large data	
78	Dynamical System II	CBC-1196D	2022-23					Application of chaos to secure communication, data visualization-2D and 3D plots	
79	Combinatorics	CBC-1197D	2022-23	Fibonacci sequence.		Permutations and combinations, Fibonacci sequence.		The Pigeonhole Principle	
80	Fractional Calculus	CBC-1198D	2022-23					Linear fractional differential equation	
B.Sc IIIMathematics (Newly Introduced between 2023-24)									
81	Real Analysis	DSC – 1003E1	2023-24					Sequence and series	
82	Modern Algebra	DSC – 1003E1	2023-24					Group, ring theory	

83	Partial Differential Equations	DSC -1003E2	2023-24					Laplace's equation, Poisson's equation. HIGHER ORSER PARTIAL DIFFERENTIAL EQUATIONS	
84	Numerical Methods	DSC – 1003E2	2023-24	Numerical differentiation				Equal and unequal interpolation	
85	Metric space	DSC -1003F1	2023-24					Metric space	
86	Linear Algebra	DSC -1003F1	2023-24					Vector spaces, Basis of vector space	
87	Complex Analysis	DSC – 1003F2	2023-24					Application of residue theorem	
88	Optimization Technique	DSC –1003F2	2023-24					Assignment Problem, Transportation problem, Simplex method	
B.Sc. I Mathematics introduced under NEP 2020 from the year 2023-24									
89	Differential Calculus	DSC03MAT11	2023-24				Higher order derivative, Mean value theorem	Leibnitz theorem and its application, successive differentiation	
90	Basic Algebra and Complex Numbers	DSC03MAT12	2023-24				matrices	Eigenvalue and eigenvector, rank of matrix	
91	Differential Calculus	MIN03MAT11	2023-24				Higher order derivative, Mean value theorem	Leibnitz theorem and its application, successive differentiation	

92	Basic Algebra and Complex Numbers	MIN03MAT12	2023-24				Matrices	Eigenvalue and eigenvector, rank of matrix	
93	Logical Reasoning	OEC03MAT11	2023-24			Series, Analogy, Coding/ Decoding, Syllogism			
94	Quantitative Aptitude	OEC03MAT12	2023-24			Permutation, Percentage, Progression and Sequence Profit and Loss Combination			
95	Indian Knowledge System	IKS03GEC11	2023-24	Property of right angled triangle in sulbha sutra, value of π, Pingala and binary system					Great Mathematician and their contribution
96	Differential Equations I	DSC03MAT21	2023-24				Linear Differential Equation:	Linear Differential Equation, Equations of first order but not first degree, Orthogonal trajectories	
97	Geometry	DSC03MAT22	2023-24					Sphere, polar co-ordinate, cone	
98	Differential Equations I	MIN03MAT21	2023-24				Linear Differential Equation:	Linear Differential Equation, Equations of first order but not	

								first degree, Orthogonal trajectories	
99	Geometry	MIN03MAT22	2023-24					Sphere, polar co-ordinate, cone	
100	Quantitative Analysis	OEC03MAT21	2023-24			Simple Interest. Compound Interest, Time, Speed and distance, Time and Work	Line Chart, Pie chart Bar Chart	Line Chart, Pie chart Bar Chart	
101	Introduction to Applied Mathematics	OEC03MAT22	2023-24					Linear Programming Problem, Cramer's Rule for Matrix Solutions and The Gaussian Method of Inverting a Matrix.	
102	Foundation of Mathematics	SEC03MAT29	2023-24	The strong induction principle, Well-ordering principle					
M.Sc. I Mathematics introduced under NEP 2020 from the year 2023-24									
103	Modern Algebra	DSC13MAT11	2023-24	Jordan-Holder theorem		homomorphism and isomorphism theorem		Group action on a set, isometry	
104	Ordinary Differential Equations	DSC13MAT12	2023-24				Existence and uniqueness of solutions, Existence and	Sturm Liouville theory	

							Uniqueness for linear systems, Equations of order n, Initial value problems for the nth order equations, The non-homogeneous equation of nth order		
105	Measure and Integration	DSC13MAT13	2023-24	Littlewood's Three Principles, Egoroff's Theorem and Lusin's Theorem,					
106	Numerical Analysis I	DSC13MAT14	2023-24					Iteration methods based on First degree equation, Eigen values and eigenvectors	
107	Operational Research	DSE13MAT11	2023-24				Dynamic programming, Linear Programming problem	Linear Programming problem	
108	Introduction to data science	DSE13MAT12	2023-24					Machine learning:	
109	Dynamical System I	DSE13MAT13	2023-24				Discrete dynamical systems	Planer systems-Qualitative Analysis	
110	Research Methodology	MIN13MAT11	2023-24	Mathematical Writing,				Latex and Beamer for	

				Publishing a Paper				paper typing and presentations	
111	Linear Algebra	DSC13MAT21	2023-24				Eigen values and eigenvectors of a linear transformation	Hermitian, Self adjoint, Eigen values and eigenvectors of a linear transformation	
112	General Topology	DSC13MAT22	2023-24	Urysohn lemma and Urysohn metrization theorem.					
113	Advanced Calculus	DSC13MAT23	2023-24	Uniform convergence and Riemann integration			Multivariable differential Calculus, integral, Green's theorem, Stoke's theorem.		
114	Numerical Analysis II	DSC13MAT24	2023-24				Explicit Runge-Kutta methods of order two and four, Euler method		
115	Number theory	DSE13MAT21	2023-24	GCD, Division algorithm		GCD, Division algorithm		Chinese remainder theorem, fermat's theorem	
116	Fuzzy Mathematics	DSE13MAT22	2023-24					Nonspecificity of Crisp Sets, Nonspecificity of Fussy Sets	
117	Dynamical System II	DSE13MAT23	2023-24					Application of chaos to secure	

								communication, data visualization-2D and 3D plots	
B.Com. I Mathematics introduced under NEP 2020 from the year 2023-24									
118	Business Mathematics Paper I	GEC-1045A	2023-24	Compound interest, ratio, percentage, A.P, G.P.		Compound interest, ratio, percentage, A.P, G.P.		Linear Programming Problem	
119	Business Mathematics Paper II	GEC-1045B	2023-24	Permutation and combination		Permutation and combination		Application of differentiation, Transportation and assignment problem	

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