Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

Teaching Plan of Semester 1 (Session July, 2018 to December, 2018) 1st sem H 2018-19				
CC 01(Calculus, Geometry &Differential Equation)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of type $e^{ax}+b\sin x$, $e^{ax}+b\cos x$, $(ax+b)^n \sin x$, $(ax+b)^n \cos x$, concavity and inflection points, envelopes, asymptotes, curve tracing in cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences.		AUG – TO DEC	3
	Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \tan^n x\,dx$, $\int \sec^n x\,dx$, $\int (\log x)^n dx$, $\int \sin^n x \sin^m x\,dx$ parametric equations, parameterizing a curve, arc length of a curve, arc length of parametric curves, area under a curve, area and volume of surface of revolution, techniques of sketching conics.			

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	Reflection properties of conics, rotation of axes and second-degree equations, classification of conics using the discriminant, polar equations of conics. Spheres. Cylindrical surfaces. Central conicoids, paraboloids, plane sections of conicoids, generating lines, classification of quadrics, illustrations of graphing standard quadric surfaces like cone, ellipsoid.		AUG – TO DEC	3
	Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.		AUG – TO DEC	2
CC 02(Algebra)				
Syllabus		**Teacher**	**Allotted Time**	**Class per week**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Polar representation of complex numbers, n^{th} roots of unity, De Moivre's theorem for rational indices and its applications. Theory of equations: Relation between roots and coefficients, transformation ofequation, Descartes rule of signs, cubic and biquadratic equation. Inequality: The inequality involving AM≥ GM≥ HM, Cauchy-Schwartz inequality.		AUG – TO DEC	**2**
	Equivalence relations. Functions, composition of functions, Invertible functions, One to one correspondence and cardinality of a set. Well-ordering property of positive integers, division algorithm, divisibility and Euclidean algorithm. Congruence relation between integers. Principles of Mathematical induction, Statement of Fundamental Theorem of Arithmetic.		AUG – TO DEC	**1+2**
	Systems of linear equations, Row reduction and echelon forms, Vector equations, The matrix equation $Ax = b$, Solution sets of linear systems, Applications of linear systems, Linear independence.			
	Introduction to linear transformations,			

Teaching Plan

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Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Matrix of a linear transformation, Inverse of a matrix, Characterizations of invertible matrices. Subspaces ofRn, dimension of subspaces of R^n, Rank of a matrix, Eigen values, Eigen vectors and characteristic equation of a matrix. Cayley-Hamilton theorem and its use infinding the inverseof a matrix.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

2018-19 **Teaching Plan of Semester 1** **1st and 2nd DSCsem 2018-19**				
DSC-1A: Differential CalculusBsc gen				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Limit and Continuity (ε and δ definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz's theorem, Partial differentiation,.		AUG - DEC	2
	Euler's theorem on homogeneous functions. Tangents and normals, Curvature, Asymptotes, Singular points, Tracing of curves. Parametric representation of curves and tracing of parametric curves, Polar coordinates and tracing of curves in polar coordinates. Rolle's theorem, Mean Value theorems, Lagrange and cauchy theorems. Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Power series and its convergences. Taylor's series, Maclaurin's series of sin x, cos x, ex, log(l+x), (l+x)m, Maxima and Minima, Indeterminate forms			5
Teaching Plan of Semester 1IDSC1BT(CC-2) : Differential Equations				
	SyllabusDSC1BT(CC-2) : Differential Equations	**Teacher**	**Allotted Time**	**Class per week**
	First order exact differential equations. Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations. Basic theory of linear differential equations,.			**2**

Teaching Plan

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	Wronskian, and its properties. Solving a differential equation by reducing its order. Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation, Simultaneous differential equations, Total differential equations. Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations, Linear partial differential equation of first order, Lagrange's method, Charpit's method. Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only		**JAN - JUNE**	**5**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhagram

2019-20 Teaching Plan of Semester 1 Generic Elective (GE) [Interdisciplinary for other Department				
Generic Elective (GE) [Interdisciplinary for other Department				
	SyllabusGE1T: Calculus, Geometry & Differential Equation	**Teacher**	**Allotted Time**	**Class per week**
	Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of typeeax+bsinx, eax+bcosx, (ax+b)nsinx, (ax+b)ncosx, concavity and inflection points, envelopes, asymptotes, curve tracing in cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences.		AUG TO DEC	2
	Reduction formulae, derivations and illustrations of reduction formulae of the type ∫sinnx dx, ∫cosnx dx, ∫tannx dx, ∫secnx dx, ∫(log x)n dx, ∫sinnxsinmx dx, parametric equations, parameterizing a curve, arc length of a curve, arc length of parametric curves, area under a curve, area and volume of surface of revolution, techniques of sketching conics.			
	Reflection properties of conics, rotation of axes and second degree equations, classification of conics using the discriminant, polar equations of conics. Spheres. Cylindrical surfaces. Central conicoids, paraboloids, plane sections of conicoids, generating lines, classification of quadrics, illustrations of graphing standard quadric surfaces like cone, ellipsoid		AUG TO DEC	2
	Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations		AUG TO DEC	2

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhagram

	GE-2 : Algebra SEM II **Syllabus** GE2T : Algebra	**Teacher**	**Allotted Time**	**Class per week**
	Polar representation of complex numbers, nth roots of unity, De Moivre's theorem for rational indices and its applications. Theory of equations: Relation between roots and coefficients, transformation of equation, Descartes rule of signs, cubic and biquadratic equation. Inequality: The inequality involving AM≥ GM≥ HM, Cauchy-Schwartz inequality		**FEB TO JUNE**	**1**
	Equivalence relations. Functions, composition of functions, Invertible functions, one to one correspondence and cardinality of a set. Well-ordering property of positive integers, division algorithm, divisibility and Euclidean algorithm. Congruence relation between integers. Principles of Mathematical induction, statement of Fundamental Theorem of Arithmetic.,		**FEB TO JUNE**	**3+2**
	Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation Ax=b, solution sets of linear systems, applications of linear systems, linear independence.			
	Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, characterizations of invertible matrices. Subspaces of Rn, dimension of subspaces of Rn, rank of a matrix, Eigen values, eigen vectors and characteristic equation of a matrix. Cayley-Hamilton theorem and its use in finding the inverse of a matrix.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

Teaching Plan of Semester 2 (Session January, 2020 to June, 2020)				
CC 03(Real Analysis) 2nd sem H 2019-20				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Review of algebraic and order properties of R, ε-neighborhood of a point in R. Idea of countable sets, uncountable sets and uncountability of R. Bounded above sets, bounded below sets, bounded sets, unbounded sets. Suprema and infima. Completeness property of R and its equivalent properties. The Archimedean property, density of rational (and Irrational) numbers in R, intervals. Limit points of a set, isolated points, open set, closed set, derived set,illustrations of Bolzano-Weierstrass theorem for sets, compact sets in R, Heine-Borel Theorem.		**Jan to June**	2
	Sequences, bounded sequence, convergent sequence, limit of a sequence, liminf, lim sup. Limit theorems. Monotone sequences, monotone convergence theorem. Subsequences,divergence criteria. Monotone subsequence theorem (statement only), Bolzano Weierstrass theorem for sequences. Cauchy sequence, Cauchy's convergence criterion.			
	Infinite series, convergence and divergence of infinite series, Cauchy criterion, Tests for convergence: Comparison test, Limit comparison test, Ratio test, Cauchy's n^{th} root test, Integral test. Alternating series, Leibniz test. Absolute and conditional convergence.		**Jan to June**	2

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

CC 04(Differential Equations & Vector Calculus)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Lipschitz condition and Picard's Theorem (Statement only). General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications, Linear homogeneous and nonhomogeneous equations of higher order with constant coefficients, Euler's equation,method of undetermined coefficients, method of variation of parameters.		**Jan to June**	**4+2**
	Systems of linear differential equations, Types of linear systems, Differential operators, An operator method for linear systems with constant coefficients, Basic Theory of linear systems in normal form, homogeneous linear systems with constant coefficients: Two Equations in two unknown functions.			
	Equilibrium points, Interpretation of the phase plane Power series solution of a differential equation about an ordinary point, Solution about a regular singular point.	**B.SHAW**	**Jan to June**	**3**
	Triple product, Introduction to vector functions, Operations with vector-valuedfunctions, Limits and Continuity of Vector functions, Differentiation and integration of vector functions.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

2nd sem HONOURS 2021-22

Teaching Plan of Semester 2 (Session January, 2022to June, 2022)				
CC 03(Real Analysis)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Review of algebraic and order properties of R, ε-neighborhood of a point in R. Idea of countable sets, uncountable sets and uncountability of R. Bounded above sets, bounded below sets, bounded sets, unbounded sets. Suprema and infima. Completeness property of R and its equivalent properties. The Archimedean property, density of rational (and Irrational) numbers in R, intervals. Limit points of a set, isolated points, open set, closed set, derived set,illustrations of Bolzano-Weierstrass theorem for sets, compact sets in R, Heine-Borel Theorem.		JAN-JUNE	1+1
	Sequences, bounded sequence, convergent sequence, limit of a sequence, liminf, lim sup. Limit theorems. Monotone sequences, monotone convergence theorem. Subsequences,divergence criteria. Monotone subsequence theorem (statement only), Bolzano Weierstrass theorem for sequences. Cauchy sequence, Cauchy's convergence criterion.	B.SHAW		1
	Infinite series, convergence and divergence of infinite series, Cauchy criterion, Tests for convergence: Comparison test, Limit comparison test, Ratio test, Cauchy's n^{th} root test, Integral test. Alternating series, Leibniz test. Absolute and conditional convergence.			2

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

CC 04(Differential Equations & Vector Calculus)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Lipschitz condition and Picard's Theorem (Statement only). General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications, Linear homogeneous and nonhomogeneous equations of higher order with constant coefficients, Euler's equation,method of undetermined coefficients, method of variation of parameters.		**JAN -JUNE**	**1**
	Systems of linear differential equations, Types of linear systems, Differential operators, An operator method for linear systems with constant coefficients, Basic Theory of linear systems in normal form, homogeneous linear systems with constant coefficients: Two Equations in two unknown functions.			**2**
	Equilibrium points, Interpretation of the phase plane Power series solution of a differential equation about an ordinary point, Solution about a regular singular point.	**B.SHAW**		**1**
	Triple product, Introduction to vector functions, Operations with vector-valuedfunctions, Limits and Continuity of Vector functions, Differentiation and integration of vector functions.	P.BERA		**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

Teaching Plan of Semester 2 (Session January, 2019 to June, 2019) 2nd sem H 2018-19				
CC 03(Real Analysis)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Review of algebraic and order properties of R, ε-neighborhood of a point in R. Idea of countable sets, uncountable sets and uncountability of R. Bounded above sets, bounded below sets, bounded sets, unbounded sets. Suprema and infima. Completeness property of R and its equivalent properties. The Archimedean property, density of rational (and Irrational) numbers in R, intervals. Limit points of a set, isolated points, open set, closed set, derived set,illustrations of Bolzano-Weierstrass theorem for sets, compact sets in R, Heine-Borel Theorem.		JAN-JUNE	3
	Sequences, bounded sequence, convergent sequence, limit of a sequence, liminf, lim sup. Limit theorems. Monotone sequences, monotone convergence theorem. Subsequences,divergence criteria. Monotone subsequence theorem (statement only), Bolzano Weierstrass theorem for sequences. Cauchy sequence, Cauchy's convergence criterion.			
	Infinite series, convergence and divergence of infinite series, Cauchy criterion, Tests for convergence: Comparison test, Limit comparison test, Ratio test, Cauchy's n^{th} root test, Integral test. Alternating series, Leibniz test. Absolute and conditional convergence.		JAN-JUNE	3

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

CC 04(Differential Equations & Vector Calculus)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Lipschitz condition and Picard's Theorem (Statement only). General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications, Linear homogeneous and nonhomogeneous equations of higher order with constant coefficients, Euler's equation,method of undetermined coefficients, method of variation of parameters.		JAN-JUNE	**2**
	Systems of linear differential equations, Types of linear systems, Differential operators, An operator method for linear systems with constant coefficients, Basic Theory of linear systems in normal form, homogeneous linear systems with constant coefficients: Two Equations in two unknown functions.		JAN-JUNE	**3+3**
	Equilibrium points, Interpretation of the phase plane Power series solution of a differential equation about an ordinary point, Solution about a regular singular point.			
	Triple product, Introduction to vector functions, Operations with vector-valuedfunctions, Limits and Continuity of Vector functions, Differentiation and integration of vector functions.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

Teaching Plan of Semester 1 (Session July, 2018 to December, 2018) 1st sem H 2018-19				
CC 01(Calculus, Geometry &Differential Equation)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of type $e^{ax}+b\sin x$, $e^{ax}+b\cos x$, $(ax+b)^n \sin x$, $(ax+b)^n \cos x$, concavity and inflection points, envelopes, asymptotes, curve tracing in cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences.		AUG – TO DEC	3
	Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \tan^n x\,dx$, $\int \sec^n x\,dx$, $\int (\log x)^n dx$, $\int \sin^n x \sin^m x\,dx$ parametric equations, parameterizing a curve, arc length of a curve, arc length of parametric curves, area under a curve, area and volume of surface of revolution, techniques of sketching conics.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhagram

ONLINE CLASS UNDER COVID 19

1st and 2nd dscsem 2020-21

2020-21 Teaching Plan of Semester 1				
DSC-1A: Differential CalculusBsc gen				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Limit and Continuity (ε and δ definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz's theorem, Partial differentiation,.		AUG TO DEC	1

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhagram

	Euler's theorem on homogeneous functions. Tangents and normals, Curvature, Asymptotes, Singular points, Rolle's theorem, Mean Value theorems, Lagrange and cauchy theorems. Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Power series and its convergences. Taylor's series, Maclaurin's series of sin x, cos x, ex, log(l+x), (l+x)m, Maxima and Minima, Indeterminate forms			1
Teaching Plan of Semester 1IDSC1BT(CC-2) : Differential Equations				
SyllabusDSC1BT(CC-2) : Differential Equations		**Teacher**	**Allotted Time**	**Class per week**
	First order exact differential equations. Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations. Basic theory of linear differential equations, Wronskian, and its properties. Solving a differential equation by reducing its order. Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation, Simultaneous differential equations, Total differential equations. Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations, Linear partial differential equation of first order, Lagrange's method, Charpit's method. Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.		**JAN –TO JUNE**	**1+1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

ONLINE CLASS UNDER COVID 19

1st and 2nd semge 2020-21

2020-21 Teaching Plan of Semester 1 Generic Elective (GE) [Interdisciplinary for other Department				
Generic Elective (GE) [Interdisciplinary for other Department				
	SyllabusGE1T: Calculus, Geometry & Differential Equation	**Teacher**	**Allotted Time**	**Class per week**
	Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of typeeax+bsinx, eax+bcosx, (ax+b)nsinx, (ax+b)ncosx,.		AUT -DEC	1
	Reduction formulae, derivations and illustrations of reduction formulae of the type ∫sinnx dx, ∫cosnx dx, ∫tannx dx, ∫secnx dx, ∫(log x)n dx, ∫sinnxsinmx dx,			
	second degree equations, classification of conics using the discriminant, polar equations of conics. Spheres. Cylindrical surfaces. Central conicoids, paraboloids, plane sections of conicoids, generating lines, classification of quadrics			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations			1
	GE-2 : Algebra SEM II **Syllabus** GE2T : Algebra	**Teacher**	**Allotted Time**	**Class per week**
	Polar representation of complex numbers, nth roots of unity, De Moivre's theorem for rational indices and its applications. Theory of equations: Relation between roots and coefficients, transformation of equation, Descartes rule of signs, Inequality: The inequality involving AM≥ GM≥ HM, Cauchy-Schwartz inequality		**JAN TO JUNE**	
	Equivalence relations. Functions, composition of functions, Invertible functions, one to one correspondence and cardinality of a set. Principles of Mathematical induction, statement of Fundamental Theorem of Arithmetic.,			**1**
	Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation Ax=b, solution sets of linear systems, applications of linear systems, linear independence.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, characterizations of invertible matrices. Subspaces of Rn, dimension of subspaces of Rn, rank of a matrix, Eigen values, eigen vectors and characteristic equation of a matrix	P.BERA		1

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

Teaching Plan of Semester 1 (Session July, 2019 to December, 2019)				
CC 01(Calculus, Geometry &Differential Equation) 1st sem H 2019-20				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of type $e^{ax}+b\sin x$, $e^{ax}+b\cos x$, $(ax+b)^n \sin x$, $(ax+b)^n \cos x$, concavity and inflection points, envelopes, asymptotes, curve tracing in cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences.		JULY TO DEC	2
	Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \tan^n x\,dx$, $\int \sec^n x\,dx$, $\int (\log x)^n dx$, $\int \sin^n x \sin^m x\,dx$ parametric equations, parameterizing a curve, arc length of a curve, arc length of parametric curves, area under a curve, area and volume of surface of revolution, techniques of sketching conics.	B.SHAW	JULY TO DEC	2

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Reflection properties of conics, rotation of axes and second-degree equations, classification of conics using the discriminant, polar equations of conics. Spheres. Cylindrical surfaces. Central conicoids, paraboloids, plane sections of conicoids, generating lines, classification of quadrics, illustrations of graphing standard quadric surfaces like cone, ellipsoid.		JULY TO DEC	
	Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.			3
CC 02(Algebra)				
Syllabus		**Teacher**	**Allotted Time**	**Class per week**
	Polar representation of complex numbers, n^{th} roots of unity, De Moivre's theorem for rational indices and its applications. Theory of equations: Relation between roots and coefficients, transformation ofequation, Descartes rule of signs, cubic and biquadratic equation. Inequality: The inequality involving AM≥ GM≥ HM, Cauchy-Schwartz inequality.			
	Equivalence relations.		JULY TO DEC	

Teaching Plan

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Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Functions, composition of functions, Invertible functions, One to one correspondence and cardinality of a set. Well-ordering property of positive integers, division algorithm, divisibility and Euclidean algorithm. Congruence relation between integers. Principles of Mathematical induction, Statement of Fundamental Theorem of Arithmetic.			**4**
	Systems of linear equations, Row reduction and echelon forms, Vector equations, The matrix equation $Ax = b$, Solution sets of linear systems, Applications of linear systems, Linear independence.	**B.SHAW**	JULY TO DEC	**4 +1**
	Introduction to linear transformations, Matrix of a linear transformation, Inverse of a matrix, Characterizations of invertible matrices. Subspaces ofRn, dimension of subspaces of R^n, Rank of a matrix, Eigen values, Eigen vectors and characteristic equation of a matrix. Cayley-Hamilton theorem and its use infinding the inverseof a matrix.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

2019-20 Teaching Plan of Semester 1				
DSC-1A: Differential CalculusBSc gen				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Limit and Continuity (ε and δ definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz's theorem, Partial differentiation, Euler's theorem on homogeneous functions. Tangents and normal, Curvature, Asymptotes, Singular points, Tracing of curves. Parametric representation of curves and tracing of parametric curves, Polar coordinates and tracing of curves in polar coordinates. Rolle's theorem,		AUG TO MOV	4
	Mean Value theorems, Lagrange and cauchy theorems. Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Power series and its convergences. Taylor's series, Maclaurin's series of sin x, cos x, ex, log(l+x), (l+x)m, Maxima and Minima, Indeterminate forms		AUG TO DEC	2
Teaching Plan of Semester 1IDSC1BT(CC-2) : Differential Equations				

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	SyllabusDSC1BT(CC-2) : Differential Equations	Teacher	Allotted Time	Class per week
	First order exact differential equations. Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations. Basic theory of linear differential equations, Wronskian, and its properties. Solving a differential equation by reducing its order. Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation,		**FEB TO JUNE**	**3+1**
	Simultaneous differential equations, Total differential equations. Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations, Linear partial differential equation of first order, Lagrange's method, Charpit's method. Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.		**FEB TO JUNE**	**1+1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

1st and 2nd sem GE 2021-22

2021-22 Teaching Plan of Semester 1 Generic Elective (GE) [Interdisciplinary for other Department				
Generic Elective (GE) [Interdisciplinary for other Department				
	SyllabusGE1T: Calculus, Geometry & Differential Equation	**Teacher**	**Allotted Time**	**Class per week**
	Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of typeeax+bsinx, eax+bcosx, (ax+b)nsinx, (ax+b)ncosx, concavity and inflection points, envelopes, asymptotes, curve tracing in cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences.		AUG TO DEC	1
	Reduction formulae, derivations and illustrations of reduction formulae of the type ∫sinnx dx, ∫cosnx dx, ∫tannx dx, ∫secnx dx, ∫(log x)n dx, ∫sinnxsinmx dx, parametric equations, parameterizing a curve, arc length of a curve, arc length of parametric curves, area under a curve, area and volume of surface of revolution, techniques of sketching conics.	B.SHAW		1
	Reflection properties of conics, rotation of axes and second degree equations, classification of conics using the discriminant, polar equations of conics. Spheres. Cylindrical surfaces. Central conicoids, paraboloids, plane sections of conicoids, generating lines, classification of quadrics, illustrations of graphing standard quadric surfaces like cone, ellipsoid			1+1
	Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations			1

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	GE-2 : Algebra SEM II Syllabus GE2T : Algebra	Teacher	Allotted Time	Class per week
	Polar representation of complex numbers, nth roots of unity, De Moivre's theorem for rational indices and its applications. Theory of equations: Relation between roots and coefficients, transformation of equation, Descartes rule of signs, cubic and biquadratic equation. Inequality: The inequality involving AM≥ GM≥ HM, Cauchy-Schwartz inequality		JAN TO JUNE	1+1
	Equivalence relations. Functions, composition of functions, Invertible functions, one to one correspondence and cardinality of a set. Well-ordering property of positive integers, division algorithm, divisibility and Euclidean algorithm. Congruence relation between integers. Principles of Mathematical induction, statement of Fundamental Theorem of Arithmetic.,			1
	Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation Ax=b, solution sets of linear systems, applications of linear systems, linear independence.	P.BERA		1
	Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, characterizations of invertible matrices. Subspaces of Rn, dimension of subspaces of Rn, rank of a matrix, Eigen values, eigen vectors and characteristic equation of a matrix. Cayley-Hamilton theorem and its use in finding the inverse of a matrix.	**B.SHAW**		1

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

ONLINE CLASS UNDER COVID 19

1st sem H 2020-21

Teaching Plan of Semester 1 (Session July, 2020 to December, 2020)				
CC 01(Calculus, Geometry &Differential Equation)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of type $e^{ax}+b\sin x$, $e^{ax}+b\cos x$, $(ax+b)^n\sin x$, $(ax+b)^n\cos x$, concavity and inflection points, envelopes, asymptotes, curve tracing in cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences.		AUG TO DEC	2

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \tan^n x\,dx$, $\int \sec^n x\,dx$, $\int (\log x)^n dx$, $\int \sin^n x \sin^m x\,dx$ parametric equations, parameterizing a curve, arc length of a curve, arc length of parametric curves, area under a curve, area and volume of surface of revolution, techniques of sketching conics.			
	Reflection properties of conics, rotation of axes and second-degree equations, classification of conics using the discriminant, polar equations of conics. Spheres. Cylindrical surfaces. Central conicoids, paraboloids, plane sections of conicoids, generating lines, classification of quadrics, illustrations of graphing standard quadric surfaces like cone, ellipsoid.			2
	Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.		AUG TO DEC	1
CC 02(Algebra)				
Syllabus		**Teacher**	**Allotted Time**	**Class per week**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Polar representation of complex numbers, n^{th} roots of unity, De Moivre's theorem for rational indices and its applications. Theory of equations: Relation between roots and coefficients, transformation ofequation, Descartes rule of signs, cubic and biquadratic equation. Inequality: The inequality involving AM≥ GM≥ HM, Cauchy-Schwartz inequality.		AUG TO DEC	
	Equivalence relations. Functions, composition of functions, Invertible functions, One to one correspondence and cardinality of a set. Well-ordering property of positive integers, division algorithm, divisibility and Euclidean algorithm. Congruence relation between integers. Principles of Mathematical induction, Statement of Fundamental Theorem of Arithmetic.			**2**
	Systems of linear equations, Row reduction and echelon forms, Vector equations, The matrix equation $Ax = b$, Solution sets of linear systems, Applications of linear systems, Linear independence.	**B.SHAW**		2
	Introduction to linear transformations, Matrix of a linear transformation, Inverse of a matrix, Characterizations of invertible matrices. Subspaces ofRn, dimension of subspaces of R^n,			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Rank of a matrix, Eigen values, Eigen vectors and characteristic equation of a matrix. Cayley-Hamilton theorem and its use infinding the inverseof a matrix.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

ONLINE CLASS UNDER COVID 19

2nd sem H 2020-21

Teaching Plan of Semester 2 (Session January, 2021 to June, 2021)				
CC 03(Real Analysis)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Review of algebraic and order properties of R, ε-neighborhood of a point in R. Idea of countable sets, uncountable sets and uncountability of R. Bounded above sets, bounded below sets, bounded sets, unbounded sets. Suprema and infima. Completeness property of R and its equivalent properties. The Archimedean property, density of rational (and Irrational) numbers in R, intervals. Limit points of a set, isolated points, open set, closed set, derived set,illustrations of Bolzano-Weierstrass theorem for sets, compact sets in R, Heine-Borel Theorem.		JAN - JUNE	2
	Sequences, bounded sequence, convergent sequence, limit of a sequence, liminf, lim sup. Limit theorems. Monotone sequences, monotone convergence theorem. Subsequences,divergence criteria. Monotone subsequence theorem (statement only), Bolzano Weierstrass theorem for sequences. Cauchy sequence, Cauchy's convergence criterion.			

Teaching Plan

Department of Mathematics

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	Infinite series, convergence and divergence of infinite series, Cauchy criterion, Tests for convergence: Comparison test, Limit comparison test, Ratio test, Cauchy's n^{th} root test, Integral test. Alternating series, Leibniz test. Absolute and conditional convergence.			1

CC 04(Differential Equations & Vector Calculus)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Lipschitz condition and Picard's Theorem (Statement only). General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications, Linear homogeneous and nonhomogeneous equations of higher order with constant coefficients, Euler's equation,method of undetermined coefficients, method of variation of parameters.		JAN - JUNE	**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Systems of linear differential equations, Types of linear systems, Differential operators, An operator method for linear systems with constant coefficients, Basic Theory of linear systems in normal form, homogeneous linear systems with constant coefficients: Two Equations in two unknown functions.			**1**
	Equilibrium points, Interpretation of the phase plane Power series solution of a differential equation about an ordinary point, Solution about a regular singular point.	P.BERA		**2**
	Triple product, Introduction to vector functions, Operations with vector-valuedfunctions, Limits and Continuity of Vector functions, Differentiation and integration of vector functions.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

1st and 2nd sem GE 2022-23

2022-23 Teaching Plan of Semester 1 Generic Elective (GE) [Interdisciplinary for other Department				
Generic Elective (GE) [Interdisciplinary for other Department				
	SyllabusGE1T: Calculus, Geometry & Differential Equation	**Teacher**	**Allotted Time**	**Class per week**
	Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of typeeax+bsinx, eax+bcosx, (ax+b)nsinx, (ax+b)ncosx, concavity and inflection points, envelopes, asymptotes, curve tracing in cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences.		AUG TO DEC	1
	Reduction formulae, derivations and illustrations of reduction formulae of the type ∫sinnx dx, ∫cosnx dx, ∫tannx dx, ∫secnx dx, ∫(log x)n dx, ∫sinnxsinmx dx, parametric equations, parameterizing a curve, arc length of a curve, arc length of parametric curves, area under a curve, area and volume of surface of revolution, techniques of sketching conics.	B.SHAW		1
	Reflection properties of conics, rotation of axes and second degree equations, classification of conics using the discriminant, polar equations of conics. Spheres. Cylindrical surfaces. Central conicoids, paraboloids, plane sections of conicoids, generating lines, classification of quadrics, illustrations of graphing standard quadric surfaces like cone, ellipsoid			1+1
	Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations			1

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	GE-2 : Algebra SEM II Syllabus GE2T : Algebra	Teacher	Allotted Time	Class per week
	Polar representation of complex numbers, nth roots of unity, De Moivre's theorem for rational indices and its applications. Theory of equations: Relation between roots and coefficients, transformation of equation, Descartes rule of signs, cubic and biquadratic equation. Inequality: The inequality involving AM≥ GM≥ HM, Cauchy-Schwartz inequality		JAN TO JUNE	1+1
	Equivalence relations. Functions, composition of functions, Invertible functions, one to one correspondence and cardinality of a set. Well-ordering property of positive integers, division algorithm, divisibility and Euclidean algorithm. Congruence relation between integers. Principles of Mathematical induction, statement of Fundamental Theorem of Arithmetic.,			1
	Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation Ax=b, solution sets of linear systems, applications of linear systems, linear independence.	P.BERA		1
	Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, characterizations of invertible matrices. Subspaces of Rn, dimension of subspaces of Rn, rank of a matrix, Eigen values, eigen vectors and characteristic equation of a matrix. Cayley-Hamilton theorem and its use in finding the inverse of a matrix.	**B.SHAW**		1

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

1st sem HONOURS 2021-22

Teaching Plan of Semester 1 (Session July, 2021 to December, 2022)				
CC 01(Calculus, Geometry &Differential Equation)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of type $e^{ax}+b\sin x$, $e^{ax}+b\cos x$, $(ax+b)^n \sin x$, $(ax+b)^n \cos x$, concavity and inflection points, envelopes, asymptotes, curve tracing in cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences.		AUG -DEC	2
	Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \tan^n x\,dx$, $\int \sec^n x\,dx$, $\int (\log x)^n dx$, $\int \sin^n x \sin^m x\,dx$ parametric equations, parameterizing a curve, arc length of a curve, arc length of parametric curves, area under a curve, area and volume of surface of revolution, techniques of sketching conics.	B.SHAW		1

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Reflection properties of conics, rotation of axes and second-degree equations, classification of conics using the discriminant, polar equations of conics. Spheres. Cylindrical surfaces. Central conicoids, paraboloids, plane sections of conicoids, generating lines, classification of quadrics, illustrations of graphing standard quadric surfaces like cone, ellipsoid.			1
	Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.			2
CC 02(Algebra)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Polar representation of complex numbers, n^{th} roots of unity, De Moivre's theorem for rational indices and its applications. Theory of equations: Relation between roots and coefficients, transformation ofequation, Descartes rule of signs, cubic and biquadratic equation. Inequality: The inequality involving AM≥ GM≥ HM, Cauchy-Schwartz inequality.		**AUG-DEC**	**1+1**
	Equivalence relations.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Functions, composition of functions, Invertible functions, One to one correspondence and cardinality of a set. Well-ordering property of positive integers, division algorithm, divisibility and Euclidean algorithm. Congruence relation between integers. Principles of Mathematical induction, Statement of Fundamental Theorem of Arithmetic.		**AUG -DEC**	**1**
	Systems of linear equations, Row reduction and echelon forms, Vector equations, The matrix equation $Ax = b$, Solution sets of linear systems, Applications of linear systems, Linear independence.	P.BERA		**1**
	Introduction to linear transformations, Matrix of a linear transformation, Inverse of a matrix, Characterizations of invertible matrices. Subspaces ofRn, dimension of subspaces of R^n, Rank of a matrix, Eigen values, Eigen vectors and characteristic equation of a matrix. Cayley-Hamilton theorem and its use infinding the inverseof a matrix.	**B.SHAW**		**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

1st and 2nd sem DSC 2021-22

2021-22 Teaching Plan of Semester 1			
DSC-1A: Differential CalculusBsc gen			
Syllabus	**Teacher**	**Allotted Time**	**Class per week**
Limit and Continuity (ε and δ definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz's theorem, Partial differentiation,.		AUG TO DEC	2+1
Euler's theorem on homogeneous functions. Tangents and normals, Curvature, Asymptotes, Singular points, Tracing of curves. Parametric representation of curves and tracing of parametric curves, Polar coordinates and tracing of curves in polar coordinates. Rolle's theorem, Mean Value theorems, Lagrange and cauchy theorems. Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Power series and its convergences. Taylor's series, Maclaurin's series of sin x, cos x, ex, log(l+x), (l+x)m, Maxima and Minima, Indeterminate forms			2+1
Teaching Plan of Semester 1IDSC1BT(CC-2) : Differential Equations			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	SyllabusDSC1BT(CC-2) : Differential Equations	Teacher	Allotted Time	Class per week
	First order exact differential equations. Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations. Basic theory of linear differential equations, Wronskian, and its properties. Solving a differential equation by reducing its order. Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation, Simultaneous differential equations, Total differential equations. Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations, Linear partial differential equation of first order, Lagrange's method, Charpit's method. Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.		**JAN TO JUNE**	**2+2+1+1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

1st sem HONOURS 2022-23

Teaching Plan of Semester 1 (Session July, 2022 to December, 2023)				
CC 01(Calculus, Geometry &Differential Equation)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of type $e^{ax+b}\sin x$, $e^{ax+b}\cos x$, $(ax+b)^n \sin x$, $(ax+b)^n \cos x$, concavity and inflection points, envelopes, asymptotes, curve tracing in cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences.		AUG -DEC	2
	Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \tan^n x\,dx$, $\int \sec^n x\,dx$, $\int (\log x)^n dx$, $\int \sin^n x \sin^m x\,dx$ parametric equations, parameterizing a curve, arc length of a curve, arc length of parametric curves, area under a curve, area and volume of surface of revolution, techniques of sketching conics.	B.SHAW		1

Teaching Plan

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	Reflection properties of conics, rotation of axes and second-degree equations, classification of conics using the discriminant, polar equations of conics. Spheres. Cylindrical surfaces. Central conicoids, paraboloids, plane sections of conicoids, generating lines, classification of quadrics, illustrations of graphing standard quadric surfaces like cone, ellipsoid.			1
	Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.			2
CC 02(Algebra)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Polar representation of complex numbers, n^{th} roots of unity, De Moivre's theorem for rational indices and its applications. Theory of equations: Relation between roots and coefficients, transformation ofequation, Descartes rule of signs, cubic and biquadratic equation. Inequality: The inequality involving AM≥ GM≥ HM, Cauchy-Schwartz inequality.		**AUG-DEC**	**1+1**
	Equivalence relations.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Functions, composition of functions, Invertible functions, One to one correspondence and cardinality of a set. Well-ordering property of positive integers, division algorithm, divisibility and Euclidean algorithm. Congruence relation between integers. Principles of Mathematical induction, Statement of Fundamental Theorem of Arithmetic.		**AUG -DEC**	**1**
	Systems of linear equations, Row reduction and echelon forms, Vector equations, The matrix equation $Ax = b$, Solution sets of linear systems, Applications of linear systems, Linear independence.	P.BERA		**1**
	Introduction to linear transformations, Matrix of a linear transformation, Inverse of a matrix, Characterizations of invertible matrices. Subspaces ofRn, dimension of subspaces of R^n, Rank of a matrix, Eigen values, Eigen vectors and characteristic equation of a matrix. Cayley-Hamilton theorem and its use infinding the inverseof a matrix.	**B.SHAW**		**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

2nd sem HONOURS 2022-23

Teaching Plan of Semester 2 (Session January, 2022to June, 2023)				
CC 03(Real Analysis)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Review of algebraic and order properties of R, ε-neighborhood of a point in R. Idea of countable sets, uncountable sets and uncountability of R. Bounded above sets, bounded below sets, bounded sets, unbounded sets. Suprema and infima. Completeness property of R and its equivalent properties. The Archimedean property, density of rational (and Irrational) numbers in R, intervals. Limit points of a set, isolated points, open set, closed set, derived set,illustrations of Bolzano-Weierstrass theorem for sets, compact sets in R, Heine-Borel Theorem.		JAN-JUNE	1+1
	Sequences, bounded sequence, convergent sequence, limit of a sequence, liminf, lim sup. Limit theorems. Monotone sequences, monotone convergence theorem. Subsequences,divergence criteria. Monotone subsequence theorem (statement only), Bolzano Weierstrass theorem for sequences. Cauchy sequence, Cauchy's convergence criterion.	B.SHAW		1
	Infinite series, convergence and divergence of infinite series, Cauchy criterion, Tests for convergence: Comparison test, Limit comparison test, Ratio test, Cauchy's n^{th} root test, Integral test. Alternating series, Leibniz test. Absolute and conditional convergence.			2

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

CC 04(Differential Equations & Vector Calculus)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Lipschitz condition and Picard's Theorem (Statement only). General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications, Linear homogeneous and nonhomogeneous equations of higher order with constant coefficients, Euler's equation,method of undetermined coefficients, method of variation of parameters.		**JAN -JUNE**	**1**
	Systems of linear differential equations, Types of linear systems, Differential operators, An operator method for linear systems with constant coefficients, Basic Theory of linear systems in normal form, homogeneous linear systems with constant coefficients: Two Equations in two unknown functions.			**2**
	Equilibrium points, Interpretation of the phase plane Power series solution of a differential equation about an ordinary point, Solution about a regular singular point.	**B.SHAW**		**1**
	Triple product, Introduction to vector functions, Operations with vector-valuedfunctions, Limits and Continuity of Vector functions, Differentiation and integration of vector functions.	P.BERA		**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

1st and 2nd sem DSC 2022-23

2022-23 Teaching Plan of Semester 1				
DSC-1A: Differential CalculusBsc gen				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Limit and Continuity (ε and δ definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz's theorem, Partial differentiation,.		AUG TO DEC	2+1
	Euler's theorem on homogeneous functions. Tangents and normals, Curvature, Asymptotes, Singular points, Tracing of curves. Parametric representation of curves and tracing of parametric curves, Polar coordinates and tracing of curves in polar coordinates. Rolle's theorem, Mean Value theorems, Lagrange and cauchy theorems. Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Power series and its convergences. Taylor's series, Maclaurin's series of sin x, cos x, ex, log(l+x), (l+x)m, Maxima and Minima, Indeterminate forms			2+1
Teaching Plan of Semester 1IDSC1BT(CC-2) : Differential Equations				

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	SyllabusDSC1BT(CC-2) : Differential Equations	Teacher	Allotted Time	Class per week
	First order exact differential equations. Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations. Basic theory of linear differential equations, Wronskian, and its properties. Solving a differential equation by reducing its order. Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation, Simultaneous differential equations, Total differential equations. Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations, Linear partial differential equation of first order, Lagrange's method, Charpit's method. Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.		**JAN TO JUNE**	**2+2+1+1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

Teaching Plan of Semester 3 (Session July, 2018 to December, 2018) 3rd sem H 2018-19				
CC 05(Theory of Real Functions& Introduction to Metric Space)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Limits of functions (ε - δ approach), Sequential criterion for limits, Divergence criteria. Limit theorems, One sided limit. Infinite limits and limits at infinity. Continuous functions, sequential criterion for continuity and discontinuity. Algebra of continuous functions. Continuous functions on an interval, intermediate value theorem, location of roots theorem, preservation of intervals theorem. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem.		AUG - DEC	4
	Differentiability of a function at a point and in an interval, Caratheodory's theorem, algebra of differentiable functions. Relative extrema, interior extremum theorem. Rolle's theorem. Mean value theorem, intermediate value property of derivatives, Darboux's theorem. Applications of mean value theorem to inequalities and approximation of polynomials.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Cauchy's mean value theorem. Taylor's theorem with Lagrange's form of remainder, Taylor's theorem with Cauchy's form of remainder, application of Taylor's theorem to convex functions, relative extrema. Taylor's series and Maclaurin's series expansions ofexponential and trigonometric functions, $\ln(1+x)$, $\frac{1}{ax+b}$ and $(x+1)^n$. Application of Taylor's theorem to inequalities.		AUG - DEC	1
	Metric spaces: Definition and examples. Open and closed balls, neighbourhood,open set, interior of a set. Limit point of a set, closed set, diameter of a set, subspaces, dense sets, separable spaces.		AUG - DEC	1
CC 06(Group Theory 1)				
Syllabus		**Teacher**	**Allotted Time**	**Class per week**
	Symmetries of a square, Dihedral groups, Definition andexamples of groups including permutation groups and quaternion groups (through matrices), Elementary properties of groups.		AUG - DEC	

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Subgroups and examples of subgroups, Centralizer, Normalizer, Center of a group, Product of two subgroups.	B.SHAW		2
	Properties of cyclic groups, Classification of subgroups of cyclic groups. Cycle notation for permutations, Properties of permutations, Even and odd permutations, Alternating group, Properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem.			
	External direct product of a finite number of groups, Normal subgroups, Factor groups, Cauchy's theorem for finite abelian groups.		AUG - DEC	

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Group homomorphisms, Properties of homomorphisms, Cayley's theorem, Properties of isomorphisms. First, Second and Third isomorphism theorems.	P. BERA		2
	CC 07 Theory (Numerical Methods) **Syllabus**	**Teacher**	**Allotted Time**	**Class per week**
	Algorithms. Convergence. Errors: relative, absolute. Round off. Truncation.		AUG - DEC	
	Transcendental and polynomial equations: Bisection method, Newton's method, Secant method, Regula-falsi method, Fixed point iteration, Newton-Raphson method. Rate of convergence of these methods.	B.SHAW		2

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	System of linear algebraic equations: Gaussian elimination and Gauss Jordan methods. Gauss Jacobi method, Gauss Seidel method and their convergence analysis. LU decomposition			
	Interpolation: Lagrange and Newton's methods. Error bounds. Finite difference operators. Gregory forward and backward difference interpolation. Numerical differentiation: Methods based on interpolations; methods based on finite differences.			
	Numerical Integration: Newton Cotes formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpsons 3/8th rule, Weddle's rule, Boole's Rule. midpoint rule, Composite trapezoidal rule, Composite Simpson's 1/3rd rule, Gauss quadrature formula. The algebraic eigen value problem: Power method. Approximation: Least square polynomial approximation.	B.SHAW	AUG - DEC	**2**
	Ordinary differential equations: The method of successive approximations, Euler's method, the modified Euler method, Runge-Kutta methods of orders two and four.	**P.BERA**	AUG - DEC	**1**
CC 07 Practical (Numerical Methods Lab) **Syllabus**		**Teacher**	**Allotted Time**	**Class per week**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	List of practical (using any software) 1. Calculate the sum 1/1 + 1/2 + 1/3 + 1/4 + ----------+ 1/ N. 2. Enter 100 integers into an array and sort them in an ascending order. 3. Solution of transcendental and algebraic equations by i) Bisection method ii) Newton Raphson method. iii) Secant method. iv) Regula Falsi method. 4. Solution of system of linear equations i) LU decomposition method ii) Gaussian elimination method iii) Gauss-Jacobi method iv) Gauss-Seidel method 5. Interpolation i) Lagrange Interpolation ii) Newton Interpolation 6. Numerical Integration i) Trapezoidal Rule ii) Simpson's one third rule iii) Weddle's Rule iv) Gauss Quadrature 7. Method of finding Eigenvalue by Power method 8. Fitting a Polynomial Function 9. Solution of ordinary differential equations i) Euler method ii) Modified Euler method iii) RungeKutta method	B.SHAW	AUG - DEC	**2**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

SEC 1(Logic and Sets)		Teacher	Allotted Time	Class per week
	Syllabus			
	Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, quantifiers, binding variables and negations.	B.SHAW	AUG - DEC	1
	Sets, Subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, Properties of empty set. Standard set operations. Classes of sets. Power set of a set.	**P.BERA**	AUG - DEC	1
	Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set. Composition of relations, types of relations, partitions, equivalence Relations with example of congruence modulo relation. Partial ordering relations, n- array relations.	B.SHAW	AUG - DEC	1

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

2019-20 Teaching Plan of Semester III				
3rd and 4th sem DSC				
	SyllabusDSC1CT(CC-3): Real Analysis	**Teacher**	**Allotted Time**	**Class per week**
	Finite and infinite sets, examples of countable and uncountable sets. Real line, bounded sets, suprema and infima, completeness property of R, Archimedean property of R, intervals. Concept of cluster points and statement of Bolzano-Weierstrasstheorem.Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences. Cauchy's theorem on limits, order preservation and squeeze theorem, monotone sequences and their convergence (monotone convergence theorem without proof). Infinite series. Cauchy convergence criterion for series, positive term series, geometric series, comparison test, convergence of p-series, Root test, Ratio test, alternating series, Leibnitz's test (Tests of Convergence without proof). Definition and examples of absolute and conditional Convergence Series. Sequences and series of functions, Pointwise and uniform convergence. μ-test, M-test, Statements of the results about uniform convergence and integrability and differentiability of functions, Power series and radius of convergence.		AUG TO DEC	4
	Syllabus SEC1T: Theory of Equations			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

Teaching Plan of Semester 3 (Session July, 2019 to December, 2019)				
CC 05(Theory of Real Functions& Introduction to Metric Space) 3rd sem H 2019-20				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Limits of functions (ε - δ approach), Sequential criterion for limits, Divergence criteria. Limit theorems, One sided limit. Infinite limits and limits at infinity. Continuous functions, sequential criterion for continuity and discontinuity. Algebra of continuous functions. Continuous functions on an interval, intermediate value theorem, location of roots theorem, preservation of intervals theorem. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem.		AUG - DEC	4
	Differentiability of a function at a point and in an interval, Caratheodory's theorem, algebra of differentiable functions. Relative extrema, interior extremum theorem. Rolle's theorem. Mean value theorem, intermediate value property of derivatives, Darboux's theorem. Applications of mean value theorem to inequalities and approximation of polynomials.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Cauchy's mean value theorem. Taylor's theorem with Lagrange's form of remainder, Taylor's theorem with Cauchy's form of remainder, application of Taylor's theorem to convex functions, relative extrema. Taylor's series and Maclaurin's series expansions ofexponential and trigonometric functions, $\ln(1+x)$, $\frac{1}{ax+b}$ and $(x+1)^n$. Application of Taylor's theorem to inequalities.		AUG - DEC	1
	Metric spaces: Definition and examples. Open and closed balls, neighbourhood,open set, interior of a set. Limit point of a set, closed set, diameter of a set, subspaces, dense sets, separable spaces.		AUG - DEC	1
CC 06(Group Theory 1)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Symmetries of a square, Dihedral groups, Definition andexamples of groups including permutation groups and quaternion groups (through matrices), Elementary properties of groups.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Subgroups and examples of subgroups, Centralizer, Normalizer, Center of a group, Product of two subgroups.	P.BERA	AUG - DEC	2
	Properties of cyclic groups, Classification of subgroups of cyclic groups. Cycle notation for permutations, Properties of permutations, Even and odd permutations, Alternating group, Properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem.			
	External direct product of a finite number of groups, Normal subgroups, Factor groups, Cauchy's theorem for finite abelian groups.	B.SHAW	AUG - DEC	2
	Group homomorphisms, Properties of homomorphisms, Cayley's theorem, Properties of isomorphisms. First, Second and Third isomorphism theorems.			
CC 07 Theory (Numerical Methods) **Syllabus**		**Teacher**	**Allotted Time**	**Class per**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

				week
	Algorithms. Convergence. Errors: relative, absolute. Round off. Truncation.	P.BERA	AUG - DEC	2
	Transcendental and polynomial equations: Bisection method, Newton's method, Secant method, Regula-falsi method, Fixed point iteration, Newton-Raphson method. Rate of convergence of these methods.			
	System of linear algebraic equations: Gaussian elimination and Gauss Jordan methods. Gauss Jacobi method, Gauss Seidel method and their convergence analysis. LU decomposition			
	Interpolation: Lagrange and Newton's methods. Error bounds. Finite difference operators. Gregory forward and backward difference interpolation. Numerical differentiation: Methods based on interpolations; methods based on finite differences.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Numerical Integration: Newton Cotes formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpsons 3/8th rule, Weddle's rule, Boole's Rule. midpoint rule, Composite trapezoidal rule, Composite Simpson's 1/3rd rule, Gauss quadrature formula. The algebraic eigen value problem: Power method. Approximation: Least square polynomial approximation.	**B.SHAW**	AUG - DEC	**2**
	Ordinary differential equations: The method of successive approximations, Euler's method, the modified Euler method, Runge-Kutta methods of orders two and four.	P.BERA	AUG - DEC	**1**
CC 07 Practical (Numerical Methods Lab)		**Teacher**	**Allotted Time**	**Class per week**
Syllabus				

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	List of practical (using any software) 1. Calculate the sum 1/1 + 1/2 + 1/3 + 1/4 + ----------+ 1/ N. 2. Enter 100 integers into an array and sort them in an ascending order. 3. Solution of transcendental and algebraic equations by i) Bisection method ii) Newton Raphson method. iii) Secant method. iv) Regula Falsi method. 4. Solution of system of linear equations i) LU decomposition method ii) Gaussian elimination method iii) Gauss-Jacobi method iv) Gauss-Seidel method 5. Interpolation i) Lagrange Interpolation ii) Newton Interpolation 6. Numerical Integration i) Trapezoidal Rule ii) Simpson's one third rule iii) Weddle's Rule iv) Gauss Quadrature 7. Method of finding Eigenvalue by Power method 8. Fitting a Polynomial Function 9. Solution of ordinary differential equations i) Euler method ii) Modified Euler method iii) RungeKutta method Note: For any of the CAS (Computer aided software) Data types-simple data types, floating data types, character data types, arithmetic operators and operator precedence, variables and constant declarations,	P.BERA	AUG - DEC	**2**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

SEC 1(Logic and Sets)		Teacher	Allotted Time	Class per week
	Syllabus			
	Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, quantifiers, binding variables and negations.	**B.SHAW**	AUG - DEC	**1**
	Sets, Subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, Properties of empty set. Standard set operations. Classes of sets. Power set of a set.	P.BERA	AUG - DEC	**1**
	Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set. Composition of relations, types of relations, partitions, equivalence Relations with example of congruence modulo relation. Partial ordering relations, n- array relations.	**B.SHAW**	AUG - DEC	**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

ONLINE CLASS UNDER COVID 19

3rd sem H 2020-21

Teaching Plan of Semester 3 (Session July, 2020 to December, 2020)				
CC 05(Theory of Real Functions& Introduction to Metric Space)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Limits of functions (ε - δ approach), Sequential criterion for limits, Divergence criteria. Limit theorems, One sided limit. Infinite limits and limits at infinity. Continuous functions, sequential criterion for continuity and discontinuity. Algebra of continuous functions. Continuous functions on an interval, intermediate value theorem, location of roots theorem, preservation of intervals theorem. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem.		AUG - DEC	
	Differentiability of a function at a point and in an interval, Caratheodory's theorem, algebra of differentiable functions. Relative extrema, interior extremum theorem. Rolle's theorem. Mean value theorem, intermediate value property of derivatives, Darboux's theorem. Applications of mean value theorem to inequalities and approximation of polynomials.			3

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Cauchy's mean value theorem. Taylor's theorem with Lagrange's form of remainder, Taylor's theorem with Cauchy's form of remainder, application of Taylor's theorem to convex functions, relative extrema. Taylor's series and Maclaurin's series expansions ofexponential and trigonometric functions, $\ln(1+x)$, $\frac{1}{ax+b}$ and $(x+1)^n$. Application of Taylor's theorem to inequalities.			
	Metric spaces: Definition and examples. Open and closed balls, neighbourhood,open set, interior of a set. Limit point of a set, closed set, diameter of a set, subspaces, dense sets, separable spaces.		AUG - DEC	1
CC 06(Group Theory 1)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Symmetries of a square, Dihedral groups, Definition andexamples of groups including permutation groups and quaternion groups (through matrices), Elementary properties of groups.		AUG - DEC	

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Subgroups and examples of subgroups, Centralizer, Normalizer, Center of a group, Product of two subgroups.	P.BERA		3
	Properties of cyclic groups, Classification of subgroups of cyclic groups. Cycle notation for permutations, Properties of permutations, Even and odd permutations, Alternating group, Properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem.			
	External direct product of a finite number of groups, Normal subgroups, Factor groups, Cauchy's theorem for finite abelian groups.			
	Group homomorphisms, Properties of homomorphisms, Cayley's theorem, Properties of isomorphisms. First, Second and Third isomorphism theorems.		AUG - DEC	
CC 07 Theory (Numerical Methods) **Syllabus**		**Teacher**	**Allotted Time**	**Class per**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

				week
	Algorithms. Convergence. Errors: relative, absolute. Round off. Truncation.		AUG - DEC	
	Transcendental and polynomial equations: Bisection method, Newton's method, Secant method, Regula-falsi method, Fixed point iteration, Newton-Raphson method. Rate of convergence of these methods.			
	System of linear algebraic equations: Gaussian elimination and Gauss Jordan methods. Gauss Jacobi method, Gauss Seidel method and their convergence analysis. LU decomposition			
	Interpolation: Lagrange and Newton's methods. Error bounds. Finite difference operators. Gregory forward and backward difference interpolation. Numerical differentiation: Methods based on interpolations; methods based on finite differences.			**3**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Numerical Integration: Newton Cotes formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpsons 3/8th rule, Weddle's rule, Boole's Rule. midpoint rule, Composite trapezoidal rule, Composite Simpson's 1/3rd rule, Gauss quadrature formula. The algebraic eigen value problem: Power method. Approximation: Least square polynomial approximation.	P.BERA	AUG - DEC	
	Ordinary differential equations: The method of successive approximations, Euler's method, the modified Euler method, Runge-Kutta methods of orders two and four.			
CC 07 Practical (Numerical Methods Lab)		**Teacher**	**Allotted Time**	**Class per week**
Syllabus				

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	List of practical (using any software) 1. Calculate the sum 1/1 + 1/2 + 1/3 + 1/4 + ----------+ 1/ N. 2. Enter 100 integers into an array and sort them in an ascending order. 3. Solution of transcendental and algebraic equations by i) Bisection method ii) Newton Raphson method. iii) Secant method. iv) Regula Falsi method. 4. Solution of system of linear equations i) LU decomposition method ii) Gaussian elimination method iii) Gauss-Jacobi method iv) Gauss-Seidel method 5. Interpolation i) Lagrange Interpolation ii) Newton Interpolation 6. Numerical Integration i) Trapezoidal Rule ii) Simpson's one third rule iii) Weddle's Rule iv) Gauss Quadrature 7. Method of finding Eigenvalue by Power method 8. Fitting a Polynomial Function 9. Solution of ordinary differential equations i) Euler method ii) Modified Euler method iii) RungeKutta method Note: For any of the CAS (Computer aided software) Data types-simple data types, floating data types, character data types, arithmetic operators and operator precedence, variables and constant declarations,	**B.SHAW**		**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

SEC 1(Logic and Sets)		Teacher	Allotted Time	Class per week
	Syllabus			
	Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, quantifiers, binding variables and negations.	P.BERA		2
	Sets, Subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, Properties of empty set. Standard set operations. Classes of sets. Power set of a set.			
	Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set. Composition of relations, types of relations, partitions, equivalence Relations with example of congruence modulo relation. Partial ordering relations, n- array relations.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

3rd and 4th sem DSC 2021-22

2021-22 **Teaching Plan of Semester III**				
	SyllabusDSC1CT(CC-3): Real Analysis	**Teacher**	**Allotted Time**	**Class per week**
	Finite and infinite sets, examples of countable and uncountable sets. Real line, bounded sets, suprema and infima, completeness property of R, Archimedean property of R, intervals. Concept of cluster points and statement of Bolzano-Weierstrasstheorem.Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences. Cauchy's theorem on limits, order preservation and squeeze theorem, monotone sequences and their convergence (monotone convergence theorem without proof). Infinite series. Cauchy convergence criterion for series, positive term series, geometric series, comparison test, convergence of p-series, Root test, Ratio test, alternating series, Leibnitz's test (Tests of Convergence without proof). Definition and examples of absolute and conditional Convergence Series. Sequences and series of functions, Pointwise and uniform convergence. μ-test, M-test, Statements of the results about uniform convergence and integrability and differentiability of functions, Power series and radius of convergence.		AUG TO DEC	1+2
	Syllabus SEC1T: Theory of Equations			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

3rd sem HONOURS 2021-22

Teaching Plan of Semester 3 (Session July, 2021 to December, 2021)				
CC 05(Theory of Real Functions& Introduction to Metric Space)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Limits of functions (ε - δ approach), Sequential criterion for limits, Divergence criteria. Limit theorems, One sided limit. Infinite limits and limits at infinity. Continuous functions, sequential criterion for continuity and discontinuity. Algebra of continuous functions. Continuous functions on an interval, intermediate value theorem, location of roots theorem, preservation of intervals theorem. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem.		AUG TO DEC	1
	Differentiability of a function at a point and in an interval, Caratheodory's theorem, algebra of differentiable functions. Relative extrema, interior extremum theorem. Rolle's theorem. Mean value theorem, intermediate value property of derivatives, Darboux's theorem. Applications of mean value theorem to inequalities and approximation of polynomials.	B.SHAW		1

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Cauchy's mean value theorem. Taylor's theorem with Lagrange's form of remainder, Taylor's theorem with Cauchy's form of remainder, application of Taylor's theorem to convex functions, relative extrema. Taylor's series and Maclaurin's series expansions ofexponential and trigonometric functions, $\ln(1+x)$, $\frac{1}{ax+b}$ and $(x+1)^n$. Application of Taylor's theorem to inequalities.			1
	Metric spaces: Definition and examples. Open and closed balls, neighbourhood,open set, interior of a set. Limit point of a set, closed set, diameter of a set, subspaces, dense sets, separable spaces.			1
CC 06(Group Theory 1)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Symmetries of a square, Dihedral groups, Definition andexamples of groups including permutation groups and quaternion groups (through matrices), Elementary properties of groups.	P.BERA		**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Subgroups and examples of subgroups, Centralizer, Normalizer, Center of a group, Product of two subgroups.	**B.SHAW**		**1**
	Properties of cyclic groups, Classification of subgroups of cyclic groups. Cycle notation for permutations, Properties of permutations, Even and odd permutations, Alternating group, Properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem.	P.BERA	**AUG -DEC**	**1**
	External direct product of a finite number of groups, Normal subgroups, Factor groups, Cauchy's theorem for finite abelian groups.	P.BERA		**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Group homomorphisms, Properties of homomorphisms, Cayley's theorem, Properties of isomorphisms. First, Second and Third isomorphism theorems.	**B.SHAW**		**1**
	CC 07 Theory (Numerical Methods) **Syllabus**	**Teacher**	**Allotted Time**	**Class per week**
	Algorithms. Convergence. Errors: relative, absolute. Round off. Truncation.	**B.SHAW**		
	Transcendental and polynomial equations: Bisection method, Newton's method, Secant method, Regula-falsi method, Fixed point iteration, Newton-Raphson method. Rate of convergence of these methods.	P.BERA	**AUG TO DEC**	**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	System of linear algebraic equations: Gaussian elimination and Gauss Jordan methods. Gauss Jacobi method, Gauss Seidel method and their convergence analysis. LU decomposition	P.BERA		**1**
	Interpolation: Lagrange and Newton's methods. Error bounds. Finite difference operators. Gregory forward and backward difference interpolation. Numerical differentiation: Methods based on interpolations; methods based on finite differences.	**B.SHAW**		
	Numerical Integration: Newton Cotes formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpsons 3/8th rule, Weddle's rule, Boole's Rule. midpoint rule, Composite trapezoidal rule, Composite Simpson's 1/3rd rule, Gauss quadrature formula. The algebraic eigen value problem: Power method. Approximation: Least square polynomial approximation.	P.BERA	**AUG TO DEC**	**1**
	Ordinary differential equations: The method of successive approximations, Euler's method, the modified Euler method, Runge-Kutta methods of orders two and four.	P.BERA		**1**
CC 07 Practical (Numerical Methods Lab)		**Teacher**	**Allotted**	**Class**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

Syllabus		Time	per week

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	List of practical (using any software) 1. Calculate the sum 1/1 + 1/2 + 1/3 + 1/4 + ----------+ 1/ N. 2. Enter 100 integers into an array and sort them in an ascending order. 3. Solution of transcendental and algebraic equations by i) Bisection method ii) Newton Raphson method. iii) Secant method. iv) Regula Falsi method. 4. Solution of system of linear equations i) LU decomposition method ii) Gaussian elimination method iii) Gauss-Jacobi method iv) Gauss-Seidel method 5. Interpolation i) Lagrange Interpolation ii) Newton Interpolation 6. Numerical Integration i) Trapezoidal Rule ii) Simpson's one third rule iii) Weddle's Rule iv) Gauss Quadrature 7. Method of finding Eigenvalue by Power method 8. Fitting a Polynomial Function 9. Solution of ordinary differential equations i) Euler method ii) Modified Euler method iii) RungeKutta method Note: For any of the CAS (Computer aided software) Data types-simple data types, floating data types, character data types, arithmetic operators and operator precedence, variables and constant declarations, expressions, input/output, relational operators, logical operators and logical expressions, control statements and loop statements, Arrays should be introduced to the students.	**B,.SHAW**	**AUG TO DEC**	**2**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

SEC 1(Logic and Sets)		Teacher	Allotted Time	Class per week
	Syllabus			
	Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, quantifiers, binding variables and negations.	P.BERA	**AUG TO DEC**	**1**
	Sets, Subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, Properties of empty set. Standard set operations. Classes of sets. Power set of a set.	**B.SHAW**		**1**
	Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set. Composition of relations, types of relations, partitions, equivalence Relations with example of congruence modulo relation. Partial ordering relations, n- array relations.	**P.BERA**		**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

3rd sem HONOURS 2022-23

Teaching Plan of Semester 3 (Session July, 2022 to December, 2023)				
CC 05(Theory of Real Functions& Introduction to Metric Space)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Limits of functions (ε - δ approach), Sequential criterion for limits, Divergence criteria. Limit theorems, One sided limit. Infinite limits and limits at infinity. Continuous functions, sequential criterion for continuity and discontinuity. Algebra of continuous functions. Continuous functions on an interval, intermediate value theorem, location of roots theorem, preservation of intervals theorem. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem.		AUG TO DEC	1
	Differentiability of a function at a point and in an interval, Caratheodory's theorem, algebra of differentiable functions. Relative extrema, interior extremum theorem. Rolle's theorem. Mean value theorem, intermediate value property of derivatives, Darboux's theorem. Applications of mean value theorem to inequalities and approximation of polynomials.	B.SHAW		1

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Cauchy's mean value theorem. Taylor's theorem with Lagrange's form of remainder, Taylor's theorem with Cauchy's form of remainder, application of Taylor's theorem to convex functions, relative extrema. Taylor's series and Maclaurin's series expansions ofexponential and trigonometric functions, $\ln(1+x)$, $\frac{1}{ax+b}$ and $(x+1)^n$. Application of Taylor's theorem to inequalities.			1
	Metric spaces: Definition and examples. Open and closed balls, neighbourhood,open set, interior of a set. Limit point of a set, closed set, diameter of a set, subspaces, dense sets, separable spaces.			1
CC 06(Group Theory 1)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Symmetries of a square, Dihedral groups, Definition andexamples of groups including permutation groups and quaternion groups (through matrices), Elementary properties of groups.	P.BERA		**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Subgroups and examples of subgroups, Centralizer, Normalizer, Center of a group, Product of two subgroups.	**B.SHAW**		**1**
	Properties of cyclic groups, Classification of subgroups of cyclic groups. Cycle notation for permutations, Properties of permutations, Even and odd permutations, Alternating group, Properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem.	P.BERA	**AUG -DEC**	**1**
	External direct product of a finite number of groups, Normal subgroups, Factor groups, Cauchy's theorem for finite abelian groups.	P.BERA		**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Group homomorphisms, Properties of homomorphisms, Cayley's theorem, Properties of isomorphisms. First, Second and Third isomorphism theorems.	**B.SHAW**		**1**
	CC 07 Theory (Numerical Methods) **Syllabus**	**Teacher**	**Allotted Time**	**Class per week**
	Algorithms. Convergence. Errors: relative, absolute. Round off. Truncation.	**B.SHAW**		
	Transcendental and polynomial equations: Bisection method, Newton's method, Secant method, Regula-falsi method, Fixed point iteration, Newton-Raphson method. Rate of convergence of these methods.	P.BERA	**AUG TO DEC**	**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	System of linear algebraic equations: Gaussian elimination and Gauss Jordan methods. Gauss Jacobi method, Gauss Seidel method and their convergence analysis. LU decomposition	P.BERA		**1**
	Interpolation: Lagrange and Newton's methods. Error bounds. Finite difference operators. Gregory forward and backward difference interpolation. Numerical differentiation: Methods based on interpolations; methods based on finite differences.	**B.SHAW**		
	Numerical Integration: Newton Cotes formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpsons 3/8th rule, Weddle's rule, Boole's Rule. midpoint rule, Composite trapezoidal rule, Composite Simpson's 1/3rd rule, Gauss quadrature formula. The algebraic eigen value problem: Power method. Approximation: Least square polynomial approximation.	P.BERA	**AUG TO DEC**	**1**
	Ordinary differential equations: The method of successive approximations, Euler's method, the modified Euler method, Runge-Kutta methods of orders two and four.	P.BERA		**1**
CC 07 Practical (Numerical Methods Lab)		**Teacher**	**Allotted**	**Class**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

Syllabus		Time	per week

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	List of practical (using any software) 1. Calculate the sum 1/1 + 1/2 + 1/3 + 1/4 + ----------+ 1/ N. 2. Enter 100 integers into an array and sort them in an ascending order. 3. Solution of transcendental and algebraic equations by i) Bisection method ii) Newton Raphson method. iii) Secant method. iv) Regula Falsi method. 4. Solution of system of linear equations i) LU decomposition method ii) Gaussian elimination method iii) Gauss-Jacobi method iv) Gauss-Seidel method 5. Interpolation i) Lagrange Interpolation ii) Newton Interpolation 6. Numerical Integration i) Trapezoidal Rule ii) Simpson's one third rule iii) Weddle's Rule iv) Gauss Quadrature 7. Method of finding Eigenvalue by Power method 8. Fitting a Polynomial Function 9. Solution of ordinary differential equations i) Euler method ii) Modified Euler method iii) RungeKutta method Note: For any of the CAS (Computer aided software) Data types-simple data types, floating data types, character data types, arithmetic operators and operator precedence, variables and constant declarations, expressions, input/output, relational operators, logical operators and logical expressions, control statements and loop statements, Arrays should be introduced to the students.	**B,.SHAW**	**AUG TO DEC**	**2**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

SEC 1(Logic and Sets)		Teacher	Allotted Time	Class per week
	Syllabus			
	Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, quantifiers, binding variables and negations.	P.BERA	**AUG TO DEC**	**1**
	Sets, Subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, Properties of empty set. Standard set operations. Classes of sets. Power set of a set.	**B.SHAW**		**1**
	Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set. Composition of relations, types of relations, partitions, equivalence Relations with example of congruence modulo relation. Partial ordering relations, n- array relations.	**P.BERA**		**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya

Teaching Plan of Semester 4 (Session 2018 January to June , 2018)				
CC 08(Riemann Integration and Series of Functions) 4th sem H 2018-19				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Riemann integration: inequalities of upper and lower sums, Darbaux integration, Darbaux theorem, Riemann conditions of integrability, Riemann sum and definition of Riemann integral through Riemann sums, equivalence of two definitions. Riemann integrability of monotone and continuous functions, properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. Intermediate Value theorem for Integrals. Fundamental theorem of Integral Calculus.		**JANUARY TO JUNE**	3
	Improper integrals. Convergence of Beta and Gamma functions.			
	Pointwise and uniform convergence of sequence of functions. Theorems on continuity, derivability and integrability of the limit function of a sequence of functions. Series of functions; Theorems on the continuity and derivability of the sum function of a series of functions. Cauchy criterion for uniform convergence and Weierstrass M-Test.		**JANUARY TO JUNE**	

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya

	Fourier series: Definition of Fourier coefficients and series, Reimann Lebesgue lemma, Bessel's inequality, Parseval's identity, Dirichlet's condition. Examples of Fourier expansions and summation results for series.			3
	Power series, radius of convergence, Cauchy Hadamard theorem. Differentiation and integration of power series; Abel's theorem; Weierstrass approximation theorem.			
CC 09(Multivariate Calculus)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Functions of several variables, limit and continuity of functions of two or more variables Partial differentiation, total differentiability and differentiability, sufficient condition for differentiability. Chain rule for one and two independent parameters, directional derivatives, the gradient, maximal and normal property of the gradient, tangent planes, Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems	B.SHAW	**JANUARY TO JUNE**	**2**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya

	Double integration over rectangular region, double integration over non-rectangular region, Double integrals in polar co-ordinates, Triple integrals, triple integral over a parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical co-ordinates.Change of variables in double integrals and triple integrals	**P.BERA**	**JANUARY TO JUNE**	**2**
	Definition of vector field, divergence and curl. Line integrals, applications of line integrals: mass and work. Fundamental theorem for line integrals, Conservative vector fields, Independence of path.	**B.SHAW**	**JANUARY TO JUNE**	**2+2**
	Green's theorem, Surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, The Divergence theorem.		**JANUARY TO JUNE**	
CC 10 (Ring Theory and Linear Algebra I)		**Teacher**	**Allotted Time**	**Class per week**
Syllabus				

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya

	Definition and examples of rings, Properties of rings, Subrings, Integral domains and fields, Characteristic of a ring. Ideal, Ideal generated by a subset of a ring, factor rings, operations on ideals, Prime and maximal ideals.			
	Ring homomorphisms, Properties of ring homomorphisms. Isomorphism theorems I, II and III, Field of quotients.			
	Vector spaces, Subspaces, Algebra of subspaces, Quotient spaces, Linear combination of vectors, Linear span, Linear independence, Basis and dimension, Dimension of subspaces	**B.SHAW**	**JANUARY TO JUNE**	4

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya

	Linear transformations, Null space, Range, Rank and nullity of a linear transformation, Matrix representation of a linear transformation, Algebra of linear transformations. Isomorphisms. Isomorphism theorems, Invertibility and isomorphisms, Change of coordinate matrix.			
SEC 2(Graph Theory) **Syllabus**		**Teacher**	**Allotted Time**	**Class per week**
	Definition, examples and basic properties of graphs, Pseudo graphs, Complete graphs, Bipartite graphs Isomorphism of graphs.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya

	Eulerian circuits, Eulerian graph, Semi-Eulerian graph, theorems, Hamiltonian cycles,theorems Representation of a graph by matrix, The adjacency matrix, Incidence matrix, Weighted graph,	P.BERA	**JANUARY TO JUNE**	3
	Travelling salesman's problem, Shortest path, Tree and their properties, Spanning tree, Dijkstra's algorithm, Warshall algorithm.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, jhargam

Teaching Plan of Semester 4 (Session 2020 January to June , 2020)				
CC 08(Riemann Integration and Series of Functions) 4th sem H 2019-20				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Riemann integration: inequalities of upper and lower sums, Darbaux integration, Darbaux theorem, Riemann conditions of integrability, Riemann sum and definition of Riemann integral through Riemann sums, equivalence of two definitions. Riemann integrability of monotone and continuous functions, properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. Intermediate Value theorem for Integrals. Fundamental theorem of Integral Calculus.		**JANUARY TO JUNE**	3
	Improper integrals. Convergence of Beta and Gamma functions.			
	Pointwise and uniform convergence of sequence of functions. Theorems on continuity, derivability and integrability of the limit function of a sequence of functions. Series of functions; Theorems on the continuity and derivability of the sum function of a series of functions. Cauchy criterion for uniform convergence and Weierstrass M-Test.		**JANUARY TO JUNE**	3
	Fourier series: Definition of Fourier coefficients and series, Reimann Lebesgue lemma, Bessel's inequality, Parseval's identity, Dirichlet's condition. Examples of Fourier expansions and summation results for series.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, jhargam

	Power series, radius of convergence, Cauchy Hadamard theorem. Differentiation and integration of power series; Abel's theorem; Weierstrass approximation theorem.			
	CC 09(Multivariate Calculus)			
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Functions of several variables, limit and continuity of functions of two or more variables Partial differentiation, total differentiability and differentiability, sufficient condition for differentiability. Chain rule for one and two independent parameters, directional derivatives, the gradient, maximal and normal property of the gradient, tangent planes, Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems	P.BERA	**JANUARY TO JUNE**	**2**
	Double integration over rectangular region, double integration over non-rectangular region, Double integrals in polar co-ordinates, Triple integrals, triple integral over a parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical co-ordinates.Change of variables in double integrals and triple integrals	P.BERA	**JANUARY TO JUNE**	**2**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, jhargam

	Definition of vector field, divergence and curl. Line integrals, applications of line integrals: mass and work. Fundamental theorem for line integrals, Conservative vector fields, Independence of path.	**B.SHAW**	**JANUARY TO JUNE**	**2+2**
	Green's theorem, Surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, The Divergence theorem.		**JANUARY TO JUNE**	
CC 10 (Ring Theory and Linear Algebra I)		**Teacher**	**Allotted Time**	**Class per week**
Syllabus				

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, jhargam

	Definition and examples of rings, Properties of rings, Subrings, Integral domains and fields, Characteristic of a ring. Ideal, Ideal generated by a subset of a ring, factor rings, operations on ideals, Prime and maximal ideals.			
	Ring homomorphisms, Properties of ring homomorphisms. Isomorphism theorems I, II and III, Field of quotients.			
	Vector spaces, Subspaces, Algebra of subspaces, Quotient spaces, Linear combination of vectors, Linear span, Linear independence, Basis and dimension, Dimension of subspaces	**B.SHAW**	**JANUARY TO JUNE**	4

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, jhargam

	Linear transformations, Null space, Range, Rank and nullity of a linear transformation, Matrix representation of a linear transformation, Algebra of linear transformations. Isomorphisms. Isomorphism theorems, Invertibility and isomorphisms, Change of coordinate matrix.			
SEC 2(Graph Theory) **Syllabus**		**Teacher**	**Allotted Time**	**Class per week**
	Definition, examples and basic properties of graphs, Pseudo graphs, Complete graphs, Bipartite graphs Isomorphism of graphs.	P.BERA	**JANUARY TO JUNE**	3

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, jhargam

	Eulerian circuits, Eulerian graph, Semi-Eulerian graph, theorems, Hamiltonian cycles,theorems Representation of a graph by matrix, The adjacency matrix, Incidence matrix, Weighted graph,	B.SHAW		
	Travelling salesman's problem, Shortest path, Tree and their properties, Spanning tree, Dijkstra's algorithm, Warshall algorithm.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	General properties of polynomials, Graphical representation of polynomials, maximum and minimum values of a polynomial, General properties of equations, Descarte's rule of signs positive and negative rule, Relation between the roots and the coefficients of equations. Symmetric functions, Applications of symmetric function of the roots, Transformation of equations. Solutions of reciprocal and binomial equations. Algebraic solutions of the cubic and biquadratic equations. Properties of the derived functions.		AUG TO DEC	2+1
Teaching Plan of Semester IV				
SyllabusDSC1DT(CC-4): Algebra		**Teacher**	**Allotted Time**	**Class per week**
	Definition and examples of groups, examples of abelian and non-abelian groups, the group Zn of integers under addition modulo n and the group U(n) of units under multiplication modulo n. Cyclic groups from number systems, complex roots of unity, circle group, the general linear group GLn (R), groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square, the permutation group Sym (n), Group of quaternions. Subgroups, cyclic subgroups, the concept of a subgroup generated by a subset and the commutator subgroup of group, examples of subgroups including the center of a group. Cosets, Index of subgroup, Lagrange's theorem, order of an element, Normal subgroups: their definition, examples, and characterizations, Quotient groups.Definition and examples of rings, examples of commutative and non-commutative rings: rings from number systems, Zn the ring of integers modulo n, ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions. Subrings and ideals, Integral domains and fields, examples of fields: Zp, Q, R, and C. Field of rational functions.		**JAN-JUNE**	**4**
	SEC2T: Graph Theory			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Definition, examples and basic properties of graphs, pseudo graphs, complete graphs, bi-partite graphs, isomorphism of graphs, paths and circuits, connected graphs, Eulerian circuits, Hamiltonian cycles, the adjacency matrix, weighted graph, travelling salesman's problem, shortest path, Dijkstra's algorithm, Floyd-Warshall algorithm.		**JAN-JUNE**	**2+1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

ONLINE CLASS UNDER COVID 19

4th sem H 2020-21

Teaching Plan of Semester 4 (Session 2021 January to June , 2021)				
CC 08(Riemann Integration and Series of Functions)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Riemann integration: inequalities of upper and lower sums, Darbaux integration, Darbaux theorem, Riemann conditions of integrability, Riemann sum and definition of Riemann integral through Riemann sums, equivalence of two definitions. Riemann integrability of monotone and continuous functions, properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. Intermediate Value theorem for Integrals. Fundamental theorem of Integral Calculus.		JAN – JUNE	3
	Improper integrals. Convergence of Beta and Gamma functions.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Pointwise and uniform convergence of sequence of functions. Theorems on continuity, derivability and integrability of the limit function of a sequence of functions. Series of functions; Theorems on the continuity and derivability of the sum function of a series of functions. Cauchy criterion for uniform convergence and Weierstrass M-Test.			3
	Fourier series: Definition of Fourier coefficients and series, Reimann Lebesgue lemma, Bessel's inequality, Parseval's identity, Dirichlet's condition. Examples of Fourier expansions and summation results for series.			
	Power series, radius of convergence, Cauchy Hadamard theorem. Differentiation and integration of power series; Abel's theorem; Weierstrass approximation theorem.		JAN – JUNE	
CC 09(Multivariate Calculus)				
Syllabus		**Teacher**	**Allotted Time**	**Class per week**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Functions of several variables, limit and continuity of functions of two or more variables Partial differentiation, total differentiability and differentiability, sufficient condition for differentiability. Chain rule for one and two independent parameters, directional derivatives, the gradient, maximal and normal property of the gradient, tangent planes, Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems	**B.SHAW**	JAN – JUNE	**2**
	Double integration over rectangular region, double integration over non-rectangular region, Double integrals in polar co-ordinates, Triple integrals, triple integral over a parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical co-ordinates. Change of variables in double integrals and triple integrals			
	Definition of vector field, divergence and curl. Line integrals, applications of line integrals: mass and work. Fundamental theorem for line integrals, Conservative vector fields, Independence of path.	**P.BERA**		**2**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Green's theorem, Surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, The Divergence theorem.		JAN – JUNE	
	CC 10 (Ring Theory and Linear Algebra I) **Syllabus**	**Teacher**	**Allotted Time**	**Class per week**
	Definition and examples of rings, Properties of rings, Subrings, Integral domains and fields, Characteristic of a ring. Ideal, Ideal generated by a subset of a ring, factor rings, operations on ideals, Prime and maximal ideals.		JAN – JUNE	
	Ring homomorphisms, Properties of ring homomorphisms. Isomorphism theorems I, II and III, Field of quotients.			
	Vector spaces, Subspaces, Algebra of subspaces, Quotient spaces, Linear combination of vectors, Linear span, Linear independence, Basis and dimension, Dimension of subspaces	**P.BERA**		**3**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Linear transformations, Null space, Range, Rank and nullity of a linear transformation, Matrix representation of a linear transformation, Algebra of linear transformations. Isomorphisms. Isomorphism theorems, Invertibility and isomorphisms, Change of coordinate matrix.		JAN – JUNE	
SEC 2(Graph Theory) **Syllabus**		**Teacher**	**Allotted Time**	**Class per week**
	Definition, examples and basic properties of graphs, Pseudo graphs, Complete graphs, Bipartite graphs Isomorphism of graphs.		JAN – JUNE	

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Eulerian circuits, Eulerian graph, Semi-Eulerian graph, theorems, Hamiltonian cycles,theorems Representation of a graph by matrix, The adjacency matrix, Incidence matrix, Weighted graph,	**B.SHAW**		**2**
	Travelling salesman's problem, Shortest path, Tree and their properties, Spanning tree, Dijkstra's algorithm, Warshall algorithm.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	General properties of polynomials, Graphical representation of polynomials, maximum and minimum values of a polynomial, General properties of equations, Descarte's rule of signs positive and negative rule, Relation between the roots and the coefficients of equations. Symmetric functions, Applications of symmetric function of the roots, Transformation of equations. Solutions of reciprocal and binomial equations. Algebraic solutions of the cubic and biquadratic equations. Properties of the derived functions.			1+1
Teaching Plan of Semester IV				
SyllabusDSC1DT(CC-4): Algebra		**Teacher**	**Allotted Time**	**Class per week**
	Definition and examples of groups, examples of abelian and non-abelian groups, the group Zn of integers under addition modulo n and the group U(n) of units under multiplication modulo n. Cyclic groups from number systems, complex roots of unity, circle group, the general linear group GLn (R), groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square, the permutation group Sym (n), Group of quaternions. Subgroups, cyclic subgroups, the concept of a subgroup generated by a subset and the commutator subgroup of group, examples of subgroups including the center of a group. Cosets, Index of subgroup, Lagrange's theorem, order of an element, Normal subgroups: their definition, examples, and characterizations, Quotient groups.Definition and examples of rings, examples of commutative and non-commutative rings: rings from number systems, Zn the ring of integers modulo n, ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions. Subrings and ideals, Integral domains and fields, examples of fields: Zp, Q, R, and C. Field of rational functions.		**JAN TO JUNE**	**2+1**
	SEC2T: Graph Theory			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Definition, examples and basic properties of graphs, pseudo graphs, complete graphs, bi-partite graphs, isomorphism of graphs, paths and circuits, connected graphs, Eulerian circuits, Hamiltonian cycles, the adjacency matrix, weighted graph, travelling salesman's problem, shortest path, Dijkstra's algorithm, Floyd-Warshall algorithm.			**1+1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

4THsem HONOURS 2021-22

Teaching Plan of Semester 4 (Session 2022 January to June , 2022)				
CC 08(Riemann Integration and Series of Functions)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Riemann integration: inequalities of upper and lower sums, Darbaux integration, Darbaux theorem, Riemann conditions of integrability, Riemann sum and definition of Riemann integral through Riemann sums, equivalence of two definitions. Riemann integrability of monotone and continuous functions, properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. Intermediate Value theorem for Integrals. Fundamental theorem of Integral Calculus.			2
	Improper integrals. Convergence of Beta and Gamma functions.		JAN TO JUNE	
	Pointwise and uniform convergence of sequence of functions. Theorems on continuity, derivability and integrability of the limit function of a sequence of functions. Series of functions; Theorems on the continuity and derivability of the sum function of a series of functions. Cauchy criterion for uniform convergence and Weierstrass M-Test.			2

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Fourier series: Definition of Fourier coefficients and series, Reimann Lebesgue lemma, Bessel's inequality, Parseval's identity, Dirichlet's condition. Examples of Fourier expansions and summation results for series.			
	Power series, radius of convergence, Cauchy Hadamard theorem. Differentiation and integration of power series; Abel's theorem; Weierstrass approximation theorem.			1
CC 09(Multivariate Calculus)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Functions of several variables, limit and continuity of functions of two or more variables Partial differentiation, total differentiability and differentiability, sufficient condition for differentiability. Chain rule for one and two independent parameters, directional derivatives, the gradient, maximal and normal property of the gradient, tangent planes, Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems	**B.SHAW**	**JAN TO JUNE**	**2**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Double integration over rectangular region, double integration over non-rectangular region, Double integrals in polar co-ordinates, Triple integrals, triple integral over a parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical co-ordinates.Change of variables in double integrals and triple integrals	**P.BERA**		**2**
	Definition of vector field, divergence and curl. Line integrals, applications of line integrals: mass and work. Fundamental theorem for line integrals, Conservative vector fields, Independence of path.	**B.SHAW**		**1**
	Green's theorem, Surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, The Divergence theorem.	**P.BERA**	**JAN TO JUNE**	**1**
CC 10 (Ring Theory and Linear Algebra I) **Syllabus**		**Teacher**	**Allotted Time**	**Class per week**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Definition and examples of rings, Properties of rings, Subrings, Integral domains and fields, Characteristic of a ring. Ideal, Ideal generated by a subset of a ring, factor rings, operations on ideals, Prime and maximal ideals.	**B.SHAW**	**JAN TO JUNE**	**1**
	Ring homomorphisms, Properties of ring homomorphisms. Isomorphism theorems I, II and III, Field of quotients.			
	Vector spaces, Subspaces, Algebra of subspaces, Quotient spaces, Linear combination of vectors, Linear span, Linear independence, Basis and dimension, Dimension of subspaces	**P.BERA**	**JAN TO JUNE**	**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Linear transformations, Null space, Range, Rank and nullity of a linear transformation, Matrix representation of a linear transformation, Algebra of linear transformations. Isomorphisms. Isomorphism theorems, Invertibility and isomorphisms, Change of coordinate matrix.	**B.SHAW**	**JAN TO JUNE**	**1**
SEC 2(Graph Theory)		**Teacher**	**Allotted Time**	**Class per week**
Syllabus				
	Definition, examples and basic properties of graphs, Pseudo graphs, Complete graphs, Bipartite graphs Isomorphism of graphs.		**JAN TO JUNE**	

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Eulerian circuits, Eulerian graph, Semi-Eulerian graph, theorems, Hamiltonian cycles,theorems Representation of a graph by matrix, The adjacency matrix, Incidence matrix, Weighted graph,	**B.SHAW**		**3**
	Travelling salesman's problem, Shortest path, Tree and their properties, Spanning tree, Dijkstra's algorithm, Warshall algorithm.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

3rd and 4th sem DSC 2022-23

2022-23 **Teaching Plan of Semester III**				
	SyllabusDSC1CT(CC-3): Real Analysis	**Teacher**	**Allotted Time**	**Class per week**
	Finite and infinite sets, examples of countable and uncountable sets. Real line, bounded sets, suprema and infima, completeness property of R, Archimedean property of R, intervals. Concept of cluster points and statement of Bolzano-Weierstrasstheorem.Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences. Cauchy's theorem on limits, order preservation and squeeze theorem, monotone sequences and their convergence (monotone convergence theorem without proof). Infinite series. Cauchy convergence criterion for series, positive term series, geometric series, comparison test, convergence of p-series, Root test, Ratio test, alternating series, Leibnitz's test (Tests of Convergence without proof). Definition and examples of absolute and conditional Convergence Series. Sequences and series of functions, Pointwise and uniform convergence. μ-test, M-test, Statements of the results about uniform convergence and integrability and differentiability of functions, Power series and radius of convergence.		AUG TO DEC	1+2
	Syllabus SEC1T: Theory of Equations			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Definition, examples and basic properties of graphs, pseudo graphs, complete graphs, bi-partite graphs, isomorphism of graphs, paths and circuits, connected graphs, Eulerian circuits, Hamiltonian cycles, the adjacency matrix, weighted graph, travelling salesman's problem, shortest path, Dijkstra's algorithm, Floyd-Warshall algorithm.			**1+1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

4THsem HONOURS 2022-23

Teaching Plan of Semester 4 (Session 2023 January to June , 2022)				
CC 08(Riemann Integration and Series of Functions)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Riemann integration: inequalities of upper and lower sums, Darbaux integration, Darbaux theorem, Riemann conditions of integrability, Riemann sum and definition of Riemann integral through Riemann sums, equivalence of two definitions. Riemann integrability of monotone and continuous functions, properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. Intermediate Value theorem for Integrals. Fundamental theorem of Integral Calculus.			2
	Improper integrals. Convergence of Beta and Gamma functions.		JAN TO JUNE	
	Pointwise and uniform convergence of sequence of functions. Theorems on continuity, derivability and integrability of the limit function of a sequence of functions. Series of functions; Theorems on the continuity and derivability of the sum function of a series of functions. Cauchy criterion for uniform convergence and Weierstrass M-Test.			2

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Fourier series: Definition of Fourier coefficients and series, Reimann Lebesgue lemma, Bessel's inequality, Parseval's identity, Dirichlet's condition. Examples of Fourier expansions and summation results for series.			
	Power series, radius of convergence, Cauchy Hadamard theorem. Differentiation and integration of power series; Abel's theorem; Weierstrass approximation theorem.			1
CC 09(Multivariate Calculus)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Functions of several variables, limit and continuity of functions of two or more variables Partial differentiation, total differentiability and differentiability, sufficient condition for differentiability. Chain rule for one and two independent parameters, directional derivatives, the gradient, maximal and normal property of the gradient, tangent planes, Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems	**B.SHAW**	**JAN TO JUNE**	**2**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Double integration over rectangular region, double integration over non-rectangular region, Double integrals in polar co-ordinates, Triple integrals, triple integral over a parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical co-ordinates.Change of variables in double integrals and triple integrals	**P.BERA**		**2**
	Definition of vector field, divergence and curl. Line integrals, applications of line integrals: mass and work. Fundamental theorem for line integrals, Conservative vector fields, Independence of path.	**B.SHAW**		**1**
	Green's theorem, Surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, The Divergence theorem.	**P.BERA**	**JAN TO JUNE**	**1**
CC 10 (Ring Theory and Linear Algebra I) **Syllabus**		**Teacher**	**Allotted Time**	**Class per week**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Definition and examples of rings, Properties of rings, Subrings, Integral domains and fields, Characteristic of a ring. Ideal, Ideal generated by a subset of a ring, factor rings, operations on ideals, Prime and maximal ideals.	**B.SHAW**	**JAN TO JUNE**	**1**
	Ring homomorphisms, Properties of ring homomorphisms. Isomorphism theorems I, II and III, Field of quotients.			
	Vector spaces, Subspaces, Algebra of subspaces, Quotient spaces, Linear combination of vectors, Linear span, Linear independence, Basis and dimension, Dimension of subspaces	**P.BERA**	**JAN TO JUNE**	**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Linear transformations, Null space, Range, Rank and nullity of a linear transformation, Matrix representation of a linear transformation, Algebra of linear transformations. Isomorphisms. Isomorphism theorems, Invertibility and isomorphisms, Change of coordinate matrix.	**B.SHAW**	**JAN TO JUNE**	**1**
SEC 2(Graph Theory)		**Teacher**	**Allotted Time**	**Class per week**
Syllabus				
	Definition, examples and basic properties of graphs, Pseudo graphs, Complete graphs, Bipartite graphs Isomorphism of graphs.		**JAN TO JUNE**	

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Eulerian circuits, Eulerian graph, Semi-Eulerian graph, theorems, Hamiltonian cycles,theorems Representation of a graph by matrix, The adjacency matrix, Incidence matrix, Weighted graph,	**B.SHAW**		**3**
	Travelling salesman's problem, Shortest path, Tree and their properties, Spanning tree, Dijkstra's algorithm, Warshall algorithm.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

5th sem HONOURS 2019-20

Teaching Plan of Semester 5TH				
CC 11				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Partial differential equations – Basic concepts and definitions. Mathematical problems. First-order equations: classification, construction and geometrical interpretation. Method of characteristics for obtaining general solution of quasi linear equations. Canonical forms of first-order linear equations. Method of separation of variables for solving first order partial differential equations.		AUG - DEC	3
	Derivation of heat equation, wave equation and Laplace equation. Classification of second order linear equations as hyperbolic, parabolic or elliptic. Reduction of second order linear equations to canonical forms.			
	The Cauchy problem, Cauchy-Kowalewskaya theorem, Cauchy problem of an infinite string. Initial boundary value problems. Semi-infinite string with a fixed end, semi-infinite string with a free end. Equations with non-homogeneous boundary conditions. Nonhomogeneous wave equation. Method of separation of variables, solving the vibrating string problem. Solving the heat conduction problem		AUG - DEC	4
	Central force. Constrained motion, varying mass, tangent and normal components of acceleration, modelling ballistics and planetary motion, Kepler's second law.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Graphical Demonstration(Teaching aid) 1. Solution of Cauchy problem for first order PDE. 2. Finding the characteristics for the first order PDE. 3. Plot the integral surfaces of a given first order PDE with initial data. 4. Solution of wave equation $0\ 2\ 2\ 2\ 2\ 2 = \partial\ \partial - \partial\ \partial$ x u c t u for the following associated conditions: (a) u(x,0) = (x), u (x,0) = (x), x ∈ R, t > 0. φ t ψ (b) u(x,0) = φ(x), ut (x,0) =ψ (x),u(0,t) = 0 x ∈ (0,∞), t > 0 5. Solution of wave equation $0\ 2\ 2\ 2\ 2\ 2 = \partial\partial - \partial\partial$ x u c t u for the following associated conditions: (a) u(x,0) = φ(x), u (o,t) = a,u (l,t) = b, 0 < x <l,t> 0. u(x,0) = φ(x), x ∈ R, 0 < t < T.			
	CC 12			
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Automorphism, inner automorphism, automorphism groups, automorphism groups of finite and infinite cyclic groups, applications of factor groups to automorphism groups, Characteristic subgroups, Commutator subgroup and its properties.	P.BERA	AUG - DEC	**3**
	Properties of external direct products, the group of units modulo n as an external direct product, internal direct products, Fundamental theorem of finite abelian groups.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Group actions, stabilizers and kernels, permutation representation associated with a given group action. Applications of group actions. Generalized Cayley's theorem. Index theorem.			
	Groups acting on themselves by conjugation, class equation and consequences, conjugacy in Sn, p-groups, Sylow's theorems and consequences, Cauchy's theorem, Simplicity of An for n ≥ 5, non-simplicity tests..	**DG**	AUG - DEC	**2**
DSE 1 (LPP)				
Syllabus		**Teacher**	**Allotted Time**	**Class per week**
	Introduction to linear programming problem. Theory of simplex method, graphical solution, convex sets, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method. Big-M method and their comparison..	**B.SHAW**	AUG - DEC	**2+4**
	Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual. Transportation problem and its mathematical formulation, northwest-corner method, least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment proble			
	Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure,linearprogrammingsolutionof games.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

DSE 2 (: Probability and Statistics)		Teacher	Allotted Time	Class per week
	Syllabus			
	Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, geometric, negative binomial, continuous distributions: uniform, normal, exponential.	**P.BERA**	AUG - DEC	**3**
	Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables, bivariate normal distribution, correlation coefficient, joint moment generating function (jmgf) and calculation of covariance (from jmgf), linear regression for two variables.			
	Chebyshev's inequality, statement and interpretation of (weak) law of large numbers and strong law of large numbers. Central limit theorem for independent and identically distributed random variables with finite variance, Markov chains, Chapman-Kolmogorov equations, classification of states.	**P.BERA**		**3**
	Random Samples, Sampling Diatributions, Estimation of parameters, Testing of hypothesis.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

ONLINE CLASS UNDER COVID 19

5th and 6th DSC 2020-21

2020-21 Teaching Plan of Semester VDSE 1				
DSE - 1: Vector Calculus and Analytical Geometry				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Algebra of vectors, Differentiation and partial differentiation of a vector function. Derivative of sum, dot product and cross product of two vectors. Gradient, divergence and curl. Techniques for sketching parabola, ellipse and hyperbola. Reflection properties of parabola, ellipse and hyperbola. Classification of quadratic equations representing lines, parabola, ellipse and hyperbola. Spheres, Cylindrical surfaces. Illustrations of graphing standard quadric surfaces like cone, ellipsoid.		JAN-JUNE	1
SEC-3: Number Theory				
	SyllabusSEC3T: Number Theory	**Teacher**	**Allotted Time**	**Class per week**
	Division algorithm, Lame's theorem, linear Diophantine equation, fundamental theorem of arithmetic, prime counting function, statement of prime number theorem. Goldbach conjecture, binary and decimal representation of integers, linear congruences, complete set of residues. Number theoretic functions, sum and number of divisors, totally multiplicative		**JAN - JUNE**	**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

ONLINE CLASS UNDER COVID 19

5th sem H 2020-21

Teaching Plan of Semester 5TH				
CC 11				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Partial differential equations – Basic concepts and definitions. Mathematical problems. First-order equations: classification, construction and geometrical interpretation. Method of characteristics for obtaining general solution of quasi linear equations. Canonical forms of first-order linear equations. Method of separation of variables for solving first order partial differential equations.		AUG – DEC	3
	Derivation of heat equation, wave equation and Laplace equation. Classification of second order linear equations as hyperbolic, parabolic or elliptic. Reduction of second order linear equations to canonical forms.			
	The Cauchy problem, Cauchy-Kowalewskaya theorem, Cauchy problem of an infinite string. Initial boundary value problems. Semi-infinite string with a fixed end, semi-infinite string with a free end. Equations with non-homogeneous boundary conditions. Nonhomogeneous wave equation. Method of separation of variables, solving the vibrating string problem. Solving the heat conduction problem			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Central force. Constrained motion, varying mass, tangent and normal components of acceleration, modelling ballistics and planetary motion, Kepler's second law.			
	Graphical Demonstration(Teaching aid) 1. Solution of Cauchy problem for first order PDE. 2. Finding the characteristics for the first order PDE. 3. Plot the integral surfaces of a given first order PDE with initial data. 4. Solution of wave equation 0 2 2 2 2 2 = ∂ ∂ − ∂ ∂ x u c t u for the following associated conditions: (a) u(x,0) = (x), u (x,0) = (x), x ∈ R, t > 0. φ t ψ (b) u(x,0) = φ(x), ut (x,0) =ψ (x),u(0,t) = 0 x ∈ (0,∞), t > 0 5. Solution of wave equation 0 2 2 2 2 2 = ∂∂−∂∂ x u c t u for the following associated conditions: (a) u(x,0) = φ(x), u (o,t) = a,u (l,t) = b, 0 < x <l,t> 0. u(x,0) = φ(x), x ∈ R, 0 < t < T.		AUG – DEC	
	CC 12			
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Automorphism, inner automorphism, automorphism groups, automorphism groups of finite and infinite cyclic groups, applications of factor groups to automorphism groups, Characteristic subgroups, Commutator subgroup and its properties.	**B.SHAW**	AUG – DEC	**3**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Properties of external direct products, the group of units modulo n as an external direct product, internal direct products, Fundamental theorem of finite abelian groups.	P.BERA		
	Group actions, stabilizers and kernels, permutation representation associated with a given group action. Applications of group actions. Generalized Cayley's theorem. Index theorem.			
	Groups acting on themselves by conjugation, class equation and consequences, conjugacy in Sn, p-groups, Sylow's theorems and consequences, Cauchy's theorem, Simplicity of An for n ≥ 5, non-simplicity tests..			
DSE 1 (LPP)		**Teacher**	**Allotted Time**	**Class per week**
Syllabus				
	Introduction to linear programming problem. Theory of simplex method, graphical solution, convex sets, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method. Big-M method and their comparison..	**B.SHAW**	AUG – DEC	**2**
	Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual. Transportation problem and its mathematical formulation, northwest-corner method, least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment proble			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure,linearprogrammingsolutionof games.			

	DSE 2 (: Probability and Statistics)	**Teacher**	**Allotted Time**	**Class per week**
	Syllabus			
	Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, geometric, negative binomial, continuous distributions: uniform, normal, exponential.	P.BERA	AUG – DEC	
	Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables, bivariate normal distribution, correlation coefficient, joint moment generating function (jmgf) and calculation of covariance (from jmgf), linear regression for two variables.			**1**
	Chebyshev's inequality, statement and interpretation of (weak) law of large numbers and strong law of large numbers. Central limit theorem for independent and identically distributed random variables with finite variance, Markov chains, Chapman-Kolmogorov equations, classification of states.	**B.SHAW**		
	Random Samples, Sampling Diatributions, Estimation of parameters, Testing of hypothesis.			**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari , Jhargram

ONLINE CLASS UNDER COVID 19

5th and 6th DSC 2020-21

2020-21 Teaching Plan of Semester VI DSC				
DSE-2: Linear Programming				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Linear Programming: Definition and formation Problems, Graphical Approach for solving some Linear Programming problems. Convex Sets, Supporting and Separating Hyperplanes. Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method, Big-M method and their comparison. Duality, formulation of the dual problem, primal- dual relationships, economic interpretation of the dual.		AUG -DEC	1
SEC-4: Probability and Statistics				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, continuous distributions: uniform, normal, exponential. Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables.		**AUG – TO DEC**	**1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

5th sem HONOURS 2021-22

Teaching Plan of Semester 5TH				
CC 11				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Partial differential equations – Basic concepts and definitions. Mathematical problems. First-order equations: classification, construction and geometrical interpretation. Method of characteristics for obtaining general solution of quasi linear equations. Canonical forms of first-order linear equations. Method of separation of variables for solving first order partial differential equations.		AUG TO DEC	6
	Derivation of heat equation, wave equation and Laplace equation. Classification of second order linear equations as hyperbolic, parabolic or elliptic. Reduction of second order linear equations to canonical forms.			
	The Cauchy problem, Cauchy-Kowalewskaya theorem, Cauchy problem of an infinite string. Initial boundary value problems. Semi-infinite string with a fixed end, semi-infinite string with a free end. Equations with non-homogeneous boundary conditions. Nonhomogeneous wave equation. Method of separation of variables, solving the vibrating string problem. Solving the heat conduction problem			
	Central force. Constrained motion, varying mass, tangent and normal components of acceleration, modelling ballistics and planetary motion, Kepler's second law.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Graphical Demonstration(Teaching aid) 1. Solution of Cauchy problem for first order PDE. 2. Finding the characteristics for the first order PDE. 3. Plot the integral surfaces of a given first order PDE with initial data. 4. Solution of wave equation 0 2 2 2 2 2 = ∂ ∂ − ∂ ∂ x u c t u for the following associated conditions: (a) u(x,0) = (x), u (x,0) = (x), x ∈ R, t > 0. φ t ψ (b) u(x,0) = φ(x), ut (x,0) =ψ (x),u(0,t) = 0 x ∈ (0,∞), t > 0 5. Solution of wave equation 0 2 2 2 2 2 = ∂∂−∂∂ x u c t u for the following associated conditions: (a) u(x,0) = φ(x), u (o,t) = a,u (l,t) = b, 0 < x <l,t> 0. u(x,0) = φ(x), x ∈ R, 0 < t < T.			5
	CC 12			
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Automorphism, inner automorphism, automorphism groups, automorphism groups of finite and infinite cyclic groups, applications of factor groups to automorphism groups, Characteristic subgroups, Commutator subgroup and its properties.	P.BERA	AUG TO DEC	**3**
	Properties of external direct products, the group of units modulo n as an external direct product, internal direct products, Fundamental theorem of finite abelian groups.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Group actions, stabilizers and kernels, permutation representation associated with a given group action. Applications of group actions. Generalized Cayley's theorem. Index theorem.			
	Groups acting on themselves by conjugation, class equation and consequences, conjugacy in Sn, p-groups, Sylow's theorems and consequences, Cauchy's theorem, Simplicity of An for $n \geq 5$, non-simplicity tests..	**B.SHAW**	AUG TO DEC	**1**
DSE 1 (LPP)		**Teacher**	**Allotted Time**	**Class per week**
Syllabus				
	Introduction to linear programming problem. Theory of simplex method, graphical solution, convex sets, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method. Big-M method and their comparison..	P.BERA	AUG TO DEC	**3**
	Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual. Transportation problem and its mathematical formulation, northwest-corner method, least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment proble			
	Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure,linearprogrammingsolutionof games.			

DSE 2 (: Probability and Statistics)	**Teacher**	**Allotted Time**	**Class per week**
Syllabus			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, geometric, negative binomial, continuous distributions: uniform, normal, exponential.	P.BERA	AUG TO DEC	**2**
	Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables, bivariate normal distribution, correlation coefficient, joint moment generating function (jmgf) and calculation of covariance (from jmgf), linear regression for two variables.		AUG TO DEC	
	Chebyshev's inequality, statement and interpretation of (weak) law of large numbers and strong law of large numbers. Central limit theorem for independent and identically distributed random variables with finite variance, Markov chains, Chapman-Kolmogorov equations, classification of states.	**B.SHAW**	AUG TO DEC	**2**
	Random Samples, Sampling Diatributions, Estimation of parameters, Testing of hypothesis.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

5th sem HONOURS 2022-23

Teaching Plan of Semester 5TH				
CC 11				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Partial differential equations – Basic concepts and definitions. Mathematical problems. First-order equations: classification, construction and geometrical interpretation. Method of characteristics for obtaining general solution of quasi linear equations. Canonical forms of first-order linear equations. Method of separation of variables for solving first order partial differential equations.		AUG TO DEC	6
	Derivation of heat equation, wave equation and Laplace equation. Classification of second order linear equations as hyperbolic, parabolic or elliptic. Reduction of second order linear equations to canonical forms.			
	The Cauchy problem, Cauchy-Kowalewskaya theorem, Cauchy problem of an infinite string. Initial boundary value problems. Semi-infinite string with a fixed end, semi-infinite string with a free end. Equations with non-homogeneous boundary conditions. Nonhomogeneous wave equation. Method of separation of variables, solving the vibrating string problem. Solving the heat conduction problem			
	Central force. Constrained motion, varying mass, tangent and normal components of acceleration, modelling ballistics and planetary motion, Kepler's second law.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Graphical Demonstration(Teaching aid) 1. Solution of Cauchy problem for first order PDE. 2. Finding the characteristics for the first order PDE. 3. Plot the integral surfaces of a given first order PDE with initial data. 4. Solution of wave equation 0 2 2 2 2 2 = ∂ ∂ − ∂ ∂ x u c t u for the following associated conditions: (a) u(x,0) = (x), u (x,0) = (x), x ∈ R, t > 0. φ t ψ (b) u(x,0) = φ(x), ut (x,0) =ψ (x),u(0,t) = 0 x ∈ (0,∞), t > 0 5. Solution of wave equation 0 2 2 2 2 2 = ∂∂−∂∂ x u c t u for the following associated conditions: (a) u(x,0) = φ(x), u (o,t) = a,u (l,t) = b, 0 < x <l,t> 0. u(x,0) = φ(x), x ∈ R, 0 < t < T.			5
	CC 12			
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Automorphism, inner automorphism, automorphism groups, automorphism groups of finite and infinite cyclic groups, applications of factor groups to automorphism groups, Characteristic subgroups, Commutator subgroup and its properties.	P.BERA	AUG TO DEC	**3**
	Properties of external direct products, the group of units modulo n as an external direct product, internal direct products, Fundamental theorem of finite abelian groups.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Group actions, stabilizers and kernels, permutation representation associated with a given group action. Applications of group actions. Generalized Cayley's theorem. Index theorem.			
	Groups acting on themselves by conjugation, class equation and consequences, conjugacy in Sn, p-groups, Sylow's theorems and consequences, Cauchy's theorem, Simplicity of An for $n \geq 5$, non-simplicity tests..	**B.SHAW**	AUG TO DEC	**1**
DSE 1 (LPP)		**Teacher**	**Allotted Time**	**Class per week**
Syllabus				
	Introduction to linear programming problem. Theory of simplex method, graphical solution, convex sets, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method. Big-M method and their comparison..	P.BERA	AUG TO DEC	**3**
	Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual. Transportation problem and its mathematical formulation, northwest-corner method, least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment proble			
	Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure,linearprogrammingsolutionof games.			

DSE 2 (: Probability and Statistics)	**Teacher**	**Allotted Time**	**Class per week**
Syllabus			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, geometric, negative binomial, continuous distributions: uniform, normal, exponential.	P.BERA	AUG TO DEC	**2**
	Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables, bivariate normal distribution, correlation coefficient, joint moment generating function (jmgf) and calculation of covariance (from jmgf), linear regression for two variables.		AUG TO DEC	
	Chebyshev's inequality, statement and interpretation of (weak) law of large numbers and strong law of large numbers. Central limit theorem for independent and identically distributed random variables with finite variance, Markov chains, Chapman-Kolmogorov equations, classification of states.	**B.SHAW**	AUG TO DEC	**2**
	Random Samples, Sampling Diatributions, Estimation of parameters, Testing of hypothesis.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

SEM 5 DSC

2022-23 **Teaching Plan of Semester VI DSC**				
DSE-2: Linear Programming				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Linear Programming: Definition and formation Problems, Graphical Approach for solving some Linear Programming problems. Convex Sets, Supporting and Separating Hyperplanes. Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method, Big-M method and their comparison. Duality, formulation of the dual problem, primal- dual relationships, economic interpretation of the dual.		AUG TO DEC	1+2
SEC-4: Probability and Statistics				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, continuous distributions: uniform, normal, exponential. Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables.		**AUG TO DEC**	**1+1+1**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

6th sem HONOURS 2021-22

Teaching Plan of Semester 6 (Session:2022 January to June 2022)				
CC 13(Metric Spaces and Complex Analysis)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Metric spaces: Sequences in metric spaces, Cauchy sequences. Complete metric spaces, Cantor's theorem.		JAN TO JUN	6
	Continuous mappings, Sequential criterion and other characterizations of continuity. Uniform continuity. Connectedness, Connected subsets of R. Compactness: Sequential compactness, Heine-Borel property, Totally bounded spaces, Finite intersection property, and continuous functions on compact sets. Homeomorphism. Contraction mappings. Banach fixed point theorem and its application to ordinary differential equation.			
	Limits, limits involving the point at infinity, Continuity. Properties of complex numbers, Regions in the Complex plane, Functions of complex variable, mappings. Derivatives, Differentiation formulas, Cauchy-Riemann equations, Sufficient conditions for differentiability.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Analytic functions, Examples of analytic functions, Exponential function, Logarithmic function, Trigonometric function, Derivatives of functions, and definite integrals of functions. Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy- Goursat theorem, Cauchy integral formula.		JAN TO JUN	4
	Liouville's theorem and the fundamental theorem of algebra. Convergence of sequences and series, Taylor series and its examples.			
	Laurent series and its examples, Absolute and uniform convergence of power series.			
CC 14(Ring Theory and Linear Algebra II) (Session:)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Polynomial rings over commutative rings, Division algorithm and consequences, Principal ideal domains, Factorization of polynomials, Reducibility tests, Irreducibility tests, Eisenstein criterion, and Unique factorization in Z [x]. Divisibility in integral domains, Irreducible, Primes, Unique factorization domains, Euclidean domains.	**B.SHAW+P.BERA**	JAN TO JUN	**3+3**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Dual spaces, Dual basis, Double dual, Transpose of a linear transformation and its matrix in the dual basis, Annihilators. Eigen spaces of a linear operator, Diagonalizability, Invariant subspaces and Cayley-Hamilton theorem, The minimal polynomial for a linear operator, Canonical forms.			
	Inner product spaces and norms, Gram-Schmidt orthogonalisation process, Orthogonal complements, Bessel's inequality, the adjoint of a linear operator. Least squares approximation, Minimal solutions to systems of linear equations. Normal and self-adjoint operators. Orthogonal projections and Spectral theorem.			
DSE 3 (Number Theory) (Session:)				
Syllabus		**Teacher**	**Allotted Time**	**Class per week**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Linear diophantine equation, Prime Counting Function, Statement of Prime number theorem, Goldbach conjecture, Linear congruences, Complete set of residues. Chinese remainder theorem, Fermat's little theorem, Wilson's theorem.		JAN TO JUN	
	Number theoretic functions, Sum and number of divisors, Totally multiplicative functions, Definition and properties of the Dirichlet product, The Mobius Inversion formula, The greatest integer function, Euler's phi-function, Euler's theorem, Reduced set of residues, Some properties of Euler's phi-function.	**P.BERA**		**3+2**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Order of an integer modulo n, Primitive roots for primes, Composite numbers having primitive roots, Euler's criterion, The Legendre symbol and its properties, Quadratic reciprocity, Quadratic congruences with composite moduli. Public key encryption, RSA encryption and decryption, the equation $x^2 + y^2 = z^2$, Fermat's Last theorem.			
DSE4(Mathematical Modelling) **Syllabus**		**Teacher**	**Allotted Time**	**Class per week**
	Power series solution of Bessel's equation and Legendre's equation, Laplace transform and inverse transform, application to initial value problem up to second order.	**DG**	JAN TO JUN	**1**
	Monte Carlo simulation modelling: simulating deterministic behavior (area under a curve, volume under a surface), generating random numbers: middle square method, linear congruence, queuing models: harbor system, morning rush hour, Overview of optimization modelling. Linear programming model: geometric solution algebraic solution, simplex method, sensitivity analysis			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

ONLINE CLASS UNDER COVID 19

6th sem H 2020-21

Teaching Plan of Semester 6 (Session:2021 January to June 2021)				
CC 13(Metric Spaces and Complex Analysis)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Metric spaces: Sequences in metric spaces, Cauchy sequences. Complete metric spaces, Cantor's theorem.		JAN - JUNE	2
	Continuous mappings, Sequential criterion and other characterizations of continuity. Uniform continuity. Connectedness, Connected subsets of R. Compactness: Sequential compactness, Heine-Borel property, Totally bounded spaces, Finite intersection property, and continuous functions on compact sets. Homeomorphism. Contraction mappings. Banach fixed point theorem and its application to ordinary differential equation.			
	Limits, limits involving the point at infinity, Continuity. Properties of complex numbers, Regions in the Complex plane, Functions of complex variable, mappings. Derivatives, Differentiation formulas, Cauchy-Riemann equations, Sufficient conditions for differentiability.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Analytic functions, Examples of analytic functions, Exponential function, Logarithmic function, Trigonometric function, Derivatives of functions, and definite integrals of functions. Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy- Goursat theorem, Cauchy integral formula.			2
	Liouville's theorem and the fundamental theorem of algebra. Convergence of sequences and series, Taylor series and its examples.		JAN - JUNE	
	Laurent series and its examples, Absolute and uniform convergence of power series.			
CC 14(Ring Theory and Linear Algebra II) (Session:)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Polynomial rings over commutative rings, Division algorithm and consequences, Principal ideal domains, Factorization of polynomials, Reducibility tests, Irreducibility tests, Eisenstein criterion, and Unique factorization in Z [x]. Divisibility in integral domains, Irreducible, Primes, Unique factorization domains, Euclidean domains.		JAN - JUNE	

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Dual spaces, Dual basis, Double dual, Transpose of a linear transformation and its matrix in the dual basis, Annihilators. Eigen spaces of a linear operator, Diagonalizability, Invariant subspaces and Cayley-Hamilton theorem, The minimal polynomial for a linear operator, Canonical forms.	P.BERA	JAN - JUNE	3
	Inner product spaces and norms, Gram-Schmidt orthogonalisation process, Orthogonal complements, Bessel's inequality, the adjoint of a linear operator. Least squares approximation, Minimal solutions to systems of linear equations. Normal and self-adjoint operators. Orthogonal projections and Spectral theorem.			
DSE 3 (Number Theory) (Session:)				
Syllabus		**Teacher**	**Allotted Time**	**Class per week**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Linear diophantine equation, Prime Counting Function, Statement of Prime number theorem, Goldbach conjecture, Linear congruences, Complete set of residues. Chinese remainder theorem, Fermat's little theorem, Wilson's theorem.	**B.SHAW**	JAN - JUNE	**2**
	Number theoretic functions, Sum and number of divisors, Totally multiplicative functions, Definition and properties of the Dirichlet product, The Mobius Inversion formula, The greatest integer function, Euler's phi-function, Euler's theorem, Reduced set of residues, Some properties of Euler's phi-function.			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Order of an integer modulo n, Primitive roots for primes, Composite numbers having primitive roots, Euler's criterion, The Legendre symbol and its properties, Quadratic reciprocity, Quadratic congruences with composite moduli. Public key encryption, RSA encryption and decryption, the equation $x^2 + y^2 = z^2$, Fermat's Last theorem.		JAN - JUNE	
DSE4(Mathematical Modelling)		**Teacher**	**Allotted Time**	**Class per week**
Syllabus				
	Power series solution of Bessel's equation and Legendre's equation, Laplace transform and inverse transform, application to initial value problem up to second order.	P.BERA	JAN - JUNE	**2**
	Monte Carlo simulation modelling: simulating deterministic behavior (area under a curve, volume under a surface), generating random numbers: middle square method, linear congruence, queuing models: harbor system, morning rush hour, Overview of optimization modelling. Linear programming model: geometric solution algebraic solution, simplex method, sensitivity analysis			

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

SEM 6 DSC

2021-22 Teaching Plan of Semester VDSE 1				
DSE - 1: Vector Calculus and Analytical Geometry				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Algebra of vectors, Differentiation and partial differentiation of a vector function. Derivative of sum, dot product and cross product of two vectors. Gradient, divergence and curl. Techniques for sketching parabola, ellipse and hyperbola. Reflection properties of parabola, ellipse and hyperbola. Classification of quadratic equations representing lines, parabola, ellipse and hyperbola. Spheres, Cylindrical surfaces. Illustrations of graphing standard quadric surfaces like cone, ellipsoid.		JANUARY TO JUNE	1+1+1
SEC-3: Number Theory				
	SyllabusSEC3T: Number Theory	**Teacher**	**Allotted Time**	**Class per week**
	Division algorithm, Lame's theorem, linear Diophantine equation, fundamental theorem of arithmetic, prime counting function, statement of prime number theorem. Goldbach conjecture, binary and decimal representation of integers, linear congruences, complete set of residues. Number theoretic functions, sum and number of divisors, totally multiplicative		JANUARY TO JUNE	**3**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

6th sem HONOURS 2021-22

Teaching Plan of Semester 6 (Session:2022 January to June 2022)				
CC 13(Metric Spaces and Complex Analysis)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Metric spaces: Sequences in metric spaces, Cauchy sequences. Complete metric spaces, Cantor's theorem.		JAN TO JUNE	6
	Continuous mappings, Sequential criterion and other characterizations of continuity. Uniform continuity. Connectedness, Connected subsets of R. Compactness: Sequential compactness, Heine-Borel property, Totally bounded spaces, Finite intersection property, and continuous functions on compact sets. Homeomorphism. Contraction mappings. Banach fixed point theorem and its application to ordinary differential equation.			
	Limits, limits involving the point at infinity, Continuity. Properties of complex numbers, Regions in the Complex plane, Functions of complex variable, mappings. Derivatives, Differentiation formulas, Cauchy-Riemann equations, Sufficient conditions for differentiability.			

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	Analytic functions, Examples of analytic functions, Exponential function, Logarithmic function, Trigonometric function, Derivatives of functions, and definite integrals of functions. Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy- Goursat theorem, Cauchy integral formula.		JAN TO JUNE	5
	Liouville's theorem and the fundamental theorem of algebra. Convergence of sequences and series, Taylor series and its examples.			
	Laurent series and its examples, Absolute and uniform convergence of power series.			
CC 14(Ring Theory and Linear Algebra II) (Session:)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Polynomial rings over commutative rings, Division algorithm and consequences, Principal ideal domains, Factorization of polynomials, Reducibility tests, Irreducibility tests, Eisenstein criterion, and Unique factorization in Z [x]. Divisibility in integral domains, Irreducible, Primes, Unique factorization domains, Euclidean domains.	P.BERA	JAN TO JUNE	**3**

Teaching Plan

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	Dual spaces, Dual basis, Double dual, Transpose of a linear transformation and its matrix in the dual basis, Annihilators. Eigen spaces of a linear operator, Diagonalizability, Invariant subspaces and Cayley-Hamilton theorem, The minimal polynomial for a linear operator, Canonical forms.			
	Inner product spaces and norms, Gram-Schmidt orthogonalisation process, Orthogonal complements, Bessel's inequality, the adjoint of a linear operator. Least squares approximation, Minimal solutions to systems of linear equations. Normal and self-adjoint operators. Orthogonal projections and Spectral theorem.			
DSE 3 (Number Theory) (Session:)				
Syllabus		**Teacher**	**Allotted Time**	**Class per week**

Teaching Plan

Department of Mathematics

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	Linear diophantine equation, Prime Counting Function, Statement of Prime number theorem, Goldbach conjecture, Linear congruences, Complete set of residues. Chinese remainder theorem, Fermat's little theorem, Wilson's theorem.		JAN TO JUNE	
	Number theoretic functions, Sum and number of divisors, Totally multiplicative functions, Definition and properties of the Dirichlet product, The Mobius Inversion formula, The greatest integer function, Euler's phi-function, Euler's theorem, Reduced set of residues, Some properties of Euler's phi-function.	**B.SHAW**		**3**

Teaching Plan

Department of Mathematics

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	Order of an integer modulo n, Primitive roots for primes, Composite numbers having primitive roots, Euler's criterion, The Legendre symbol and its properties, Quadratic reciprocity, Quadratic congruences with composite moduli. Public key encryption, RSA encryption and decryption, the equation $x^2 + y^2 = z^2$, Fermat's Last theorem.			
DSE4(Mathematical Modelling)		**Teacher**	**Allotted Time**	**Class per week**
Syllabus				
	Power series solution of Bessel's equation and Legendre's equation, Laplace transform and inverse transform, application to initial value problem up to second order.	P.BERA	JAN TO JUNE	1
	Monte Carlo simulation modelling: simulating deterministic behavior (area under a curve, volume under a surface), generating random numbers: middle square method, linear congruence, queuing models: harbor system, morning rush hour, Overview of optimization modelling. Linear programming model: geometric solution algebraic solution, simplex method, sensitivity analysis			

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SEM 5 DSC

2021-22 **Teaching Plan of Semester VI DSC**				
DSE-2: Linear Programming				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Linear Programming: Definition and formation Problems, Graphical Approach for solving some Linear Programming problems. Convex Sets, Supporting and Separating Hyperplanes. Theory of simplex method, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method, Big-M method and their comparison. Duality, formulation of the dual problem, primal- dual relationships, economic interpretation of the dual.		AUG TO DEC	1+2
SEC-4: Probability and Statistics				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, continuous distributions: uniform, normal, exponential. Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables.		**AUG TO DEC**	**1+1+1**

Teaching Plan

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Seva Bharati Mahavidyalaya, Kapgari, Jhargram

SEM 6 DSC

2022-23 **Teaching Plan of Semester VDSE 1**				
DSE - 1: Vector Calculus and Analytical Geometry				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Algebra of vectors, Differentiation and partial differentiation of a vector function. Derivative of sum, dot product and cross product of two vectors. Gradient, divergence and curl. Techniques for sketching parabola, ellipse and hyperbola. Reflection properties of parabola, ellipse and hyperbola. Classification of quadratic equations representing lines, parabola, ellipse and hyperbola. Spheres, Cylindrical surfaces. Illustrations of graphing standard quadric surfaces like cone, ellipsoid.		JANUARY TO JUNE	1+1+1
SEC-3: Number Theory				
	SyllabusSEC3T: Number Theory	**Teacher**	**Allotted Time**	**Class per week**
	Division algorithm, Lame's theorem, linear Diophantine equation, fundamental theorem of arithmetic, prime counting function, statement of prime number theorem. Goldbach conjecture, binary and decimal representation of integers, linear congruences, complete set of residues. Number theoretic functions, sum and number of divisors, totally multiplicative		JANUARY TO JUNE	**3**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

6th sem HONOURS 2022-23

Teaching Plan of Semester 6 (Session:2023 January to June 2023)				
CC 13(Metric Spaces and Complex Analysis)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Metric spaces: Sequences in metric spaces, Cauchy sequences. Complete metric spaces, Cantor's theorem.		JAN TO JUNE	6
	Continuous mappings, Sequential criterion and other characterizations of continuity. Uniform continuity. Connectedness, Connected subsets of R. Compactness: Sequential compactness, Heine-Borel property, Totally bounded spaces, Finite intersection property, and continuous functions on compact sets. Homeomorphism. Contraction mappings. Banach fixed point theorem and its application to ordinary differential equation.			
	Limits, limits involving the point at infinity, Continuity. Properties of complex numbers, Regions in the Complex plane, Functions of complex variable, mappings. Derivatives, Differentiation formulas, Cauchy-Riemann equations, Sufficient conditions for differentiability.			

Teaching Plan

Department of Mathematics

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	Analytic functions, Examples of analytic functions, Exponential function, Logarithmic function, Trigonometric function, Derivatives of functions, and definite integrals of functions. Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy- Goursat theorem, Cauchy integral formula.		JAN TO JUNE	5
	Liouville's theorem and the fundamental theorem of algebra. Convergence of sequences and series, Taylor series and its examples.			
	Laurent series and its examples, Absolute and uniform convergence of power series.			
CC 14(Ring Theory and Linear Algebra II) (Session:)				
	Syllabus	**Teacher**	**Allotted Time**	**Class per week**
	Polynomial rings over commutative rings, Division algorithm and consequences, Principal ideal domains, Factorization of polynomials, Reducibility tests, Irreducibility tests, Eisenstein criterion, and Unique factorization in Z [x]. Divisibility in integral domains, Irreducible, Primes, Unique factorization domains, Euclidean domains.	P.BERA	JAN TO JUNE	**3**

Teaching Plan

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	Dual spaces, Dual basis, Double dual, Transpose of a linear transformation and its matrix in the dual basis, Annihilators. Eigen spaces of a linear operator, Diagonalizability, Invariant subspaces and Cayley-Hamilton theorem, The minimal polynomial for a linear operator, Canonical forms.			
	Inner product spaces and norms, Gram-Schmidt orthogonalisation process, Orthogonal complements, Bessel's inequality, the adjoint of a linear operator. Least squares approximation, Minimal solutions to systems of linear equations. Normal and self-adjoint operators. Orthogonal projections and Spectral theorem.			
DSE 3 (Number Theory) (Session:)				
Syllabus		**Teacher**	**Allotted Time**	**Class per week**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Linear diophantine equation, Prime Counting Function, Statement of Prime number theorem, Goldbach conjecture, Linear congruences, Complete set of residues. Chinese remainder theorem, Fermat's little theorem, Wilson's theorem.		JAN TO JUNE	
	Number theoretic functions, Sum and number of divisors, Totally multiplicative functions, Definition and properties of the Dirichlet product, The Mobius Inversion formula, The greatest integer function, Euler's phi-function, Euler's theorem, Reduced set of residues, Some properties of Euler's phi-function.	**B.SHAW**		**3**

Teaching Plan

Department of Mathematics

Seva Bharati Mahavidyalaya, Kapgari, Jhargram

	Order of an integer modulo n, Primitive roots for primes, Composite numbers having primitive roots, Euler's criterion, The Legendre symbol and its properties, Quadratic reciprocity, Quadratic congruences with composite moduli. Public key encryption, RSA encryption and decryption, the equation $x^2 + y^2 = z^2$, Fermat's Last theorem.			
DSE4(Mathematical Modelling)		**Teacher**	**Allotted Time**	**Class per week**
Syllabus				
	Power series solution of Bessel's equation and Legendre's equation, Laplace transform and inverse transform, application to initial value problem up to second order.	P.BERA	JAN TO JUNE	1
	Monte Carlo simulation modelling: simulating deterministic behavior (area under a curve, volume under a surface), generating random numbers: middle square method, linear congruence, queuing models: harbor system, morning rush hour, Overview of optimization modelling. Linear programming model: geometric solution algebraic solution, simplex method, sensitivity analysis			