DEPARTMENT OF MATHEMATICS
ABHEDANANDA MAHAVIDYALAYA, SAINTHIA
ACADEMIC PLAN (SUGGESTIVE), 2017-18

Semester:	I
Courses:	CORE COURSE (BMH1CC01) - Calculus, Geometry & Differential Equations
TotalMarks:	75
Total credit:	06
Total no. of lectures:	90
Objective:	To have a tentative course of action well in advance through the said Academic Plan to be able to: • execute the new CBCS with ease • finish syllabus and conduct evaluations on time to the satisfaction of both the student and the teacher
Evalution method:	C1- 10% of the total marks (class test/assignment/seminar + attendance) C2- 10% of total marks (class test/assignment/seminar + attendance) C3- 60 marks [(10x2) + (4x5) + (2x10)]- semester-end examination
C1:	8^{th} week from the beginning of the semester Completion of 25% of the total course syllabus Around 3^{rd} week of September 2017
C2:	16^{th} week from the beginning of semester Completion of 50% of the syllabus Around 3^{rd} week of November 2017
C3:	21^{st}-23^{rd} week 75% of the syllabus completed Around Last Week of December, 2018

Syllabus BMH1CC01	**UNIT-1** Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of type , 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. **UNIT-2** Reduction formulae, derivations and illustrations of reduction formulae for the integration of sin nx, cosnx, tan nx, sec nx, $(\log x)_n$, $\sin_n x \sin_m x$, parametric equations, parametrizing a curve, arc length, arc length of parametric curves, area of surface of revolution. **UNIT-3.** Reflection properties of conics, translation and 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 **UNIT-4** 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.
Texts prescribed by university for uniformity in translation and ease of access	1. S.L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, India, 2004 2. S. Goldberg, Calculus and Mathematical analysis 3. Murray, D., Introductory Course in

	Differential Equations, Longmans Green and Co. 4.Murray, D., Introductory Course in Differential Equations, Longmans Green and Co. 5. T. Apostol, Calculus, Volumes I and II.

ACADEMIC PLAN	
Semester Begins	Fourth Week of July 2017
Number of lectures/week (1hr/lecture)	6/weak
Tentative no. of classes/topic taken and syllabus covered before C1 **25 % of CC-I should have been covered**	12 classes will be taken and UNIT-4 should be covered
August 2017	Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation
September 2017 (before college breaks for Puja vacation)	Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.
Tentative no. of classes/topic taken and syllabus covered before C2 **50% of CC1 should have been covered**	18 classes will be taken and UNIT-1 & 2 should be covered
November 2017	Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of type , concavity and inflection points, envelopes, asymptotes, curve tracing in Cartesian coordinates,

December 2017	tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences. Reduction formulae, derivations and illustrations of reduction formulae for the integration of sin nx, cosnx, tan nx, sec nx, $(\log x)^n$ parametric equations, parametrizing a curve, arc length, arc length of parametric curves, area of surface of revolution. Keeping record marks for C2

Semester:	I
Courses:	CORE COURSE (BMH1CC02) - Algebra
TotalMarks:	75
Total credit:	06
Total no. of lectures:	90
Objective:	To have a tentative course of action well in advance through the said Academic Plan to be able to: • execute the new CBCS with ease • finish syllabus and conduct evaluations on time to the satisfaction of both the student and the teacher
Evalution method:	C1- 10% of the total marks (class test/assignment/seminar + attendance) C2- 10% of total marks (class test/assignment/seminar + attendance) C3- 60 marks [(10x2) + (4x5) + (2x10)]- semester-end examination
C1:	8th week from the beginning of the semester Completion of 25% of the total course syllabus Around 3rd week of September 2017
C2:	16th week from the beginning of semester Completion of 50% of the syllabus Around 3rd week of November 2017
C3:	21st-23rd week 75% of the syllabus completed Around Last Week of December, 2018

Syllabus BMH1CC02	**UNIT-1** 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 of equation,Descartes rule of signs, Cubic and biquadratic equations, reciprocal equation,separation of the roots of equations,Strum's theorem, Inequality: The inequality involving AM≥GM≥HM, Cauchy-Schwartz inequality **UNIT-2** Equivalence relations and partitions, 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 **UNIT-3.** 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 **UNIT-4** Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, characterizations of invertible matrices. Vector spaces, Subspaces of R_n, 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 in finding the inverse of a matrix.
Texts prescribed by university for uniformity in translation and ease of access	1. K.B. Dutta, Matrix and linear algebra 2. K. Hoffman, R. Kunze, Linear algebra. 3. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007

ACADEMIC PLAN	

Semester Begins	Fourth Week of July 2017
Number of lectures/week (1hr/lecture)	6/weak
Tentative no. of classes/topic taken and syllabus covered before C1 **25 % of CC02 should have been covered**	12 classes will be taken and UNIT-2 should be covered
August 2017	Sequences, Bounded sequence, Convergent sequence, Limit of a sequence, liminf, lim sup. Limit Theorems
September 2017 (before college breaks for Puja vacation)	Monotone Sequences, Monotone Convergence Theorem. Subsequences, Divergence Criteria. Monotone Subsequence Theorem (statement only), Bolzano Weierstrass Theorem for Sequences.Cauchy sequence, Cauchy's Convergence Criterion
Tentative no. of classes/topic taken and syllabus covered before C2 **50% of CC02 should have been covered**	18 classes will be taken and UNIT-3 & 4 should be covered
November 2017	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,
December 2017	Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, characterizations of invertible matrices, Vector spaces, Subspaces of R_n, 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 in finding the inverse of a matrix Keeping record marks for C2

Semester:	II
Courses:	CORE COURSE (BMH1CC04) - **Differential Equation and Vector Calculus**
TotalMarks:	75
Total credit:	06
Total no. of lectures:	90
Objective:	To have a tentative course of action well in advance through the said Academic Plan to be able to: • execute the new CBCS with ease • finish syllabus and conduct evaluations on time to the satisfaction of both the student and the teacher
Evalution method:	C1- 10% of the total marks (class test/assignment/seminar + attendance) C2- 10% of total marks (class test/assignment/seminar + attendance) C3- 60 marks [(10x2) + (4x5) + (2x10)]- semester-end examination

Classes begin from 2nd week of January, 2018

C1:	8th week from the beginning of the semester Completion of 25% of the total course syllabus
C2:	16th week from the beginning of semester Completion of 50% of the syllabus
C3:	21st-23rd week 75% of the syllabus completed

Syllabus BMH1CC04	UNIT-1 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 non-homogeneous equations of higher order with constant coefficients, Euler's equation, method of undetermined coefficients, method of variation of parameters. UNIT-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. UNIT-3. Equilibrium points, Interpretation of the phase plane 9 Power series solution of a differential equation about an ordinary point, solution about a regular singular point UNIT-4 Triple product, introduction to vector functions, operations with vector-valued functions, limits and continuity of vector functions, differentiation and integration of vector functions.
Texts prescribed by university for uniformity in translation and ease of access	1. M.R. Speigel, Schaum's outline of Vector Analysis 2. Maity, K.C. and Ghosh, R.K., Vector Analysis, New Central Book Agency (P) Ltd. Kolkata (India). 3. S.L. Ross, Differential Equations, 3rd Ed., John 4. Wiley and Sons, India, 2004 4. G.F.Simmons, Differential Equations, Tata McGraw Hill

ACADEMIC PLAN	
Semester Begins	From 2nd week of January, 2018

Number of lectures/week (1hr/lecture)	6/weak
Tentative no. of classes/topic taken and syllabus covered before C1 **25 % of CC03 should have been covered**	12 classes will be taken and UNIT-1 should be covered
January, 2018	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,
February, 2018	Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler's equation, method of undetermined coefficients, method of variation of parameters
Tentative no. of classes/topic taken and syllabus covered before C2 **50% of CC-I should have been covered**	18 classes will be taken and UNIT-2 & 4 should be covered
March, 2018	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:
April 2018	Two Equations in two unknown functions., Triple product, introduction to vector functions operations with vector-valued functions, limits and continuity of vector functions differentiation and integration of vector functions.
May-June 2018	Power series solution of a differential equation about an ordinary point, solution about a regular singular Keeping record marks for C2

Semester:	II
Courses:	CORE COURSE (BMH1CC03) - Real Analysis 75
Total credit:	06
Total no. of lectures:	90
Objective:	To have a tentative course of action well in advance through the said Academic Plan to be able to: • execute the new CBCS with ease • finish syllabus and conduct evaluations on time to the satisfaction of both the student and the teacher
Evalution method:	C1- 10% of the total marks (class test/assignment/seminar + attendance) C2- 10% of total marks (class test/assignment/seminar + attendance) C3- 60 marks [(10x2) + (4x5) + (2x10)]- semester-end examination

Classes begin from 2nd week of January, 2018

C1:	8th week from the beginning of the semester Completion of 25% of the total course syllabus
C2:	16th week from the beginning of semester Completion of 50% of the syllabus
C3:	21st-23rd week 75% of the syllabus completed

Syllabus BMH1CC03	**Unit-1:** Review of Algebraic and Order Properties of $\mathbb{R}$, ε - neighbourhood of a point in $\mathbb{R}$. Idea of countable sets, uncountable sets and uncountability of $\mathbb{R}$. Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets. Suprema and Infima.Completeness Property of $\mathbb{R}$ and its equivalent properties. The Archimedean Property, Density of Rational (and Irrational) numbers in $\mathbb{R}$, Intervals. Limit points of a set, Isolated points, Open set, closed

	set, derived set, Illustrations of Bolzano-Weierstrass theorem for sets, compact sets in $\mathbb{R}$, Heine-Borel Theorem. **Unit-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. **Unit-3 :** Infinite series, convergence and divergence of infinite series, Cauchy Criterion, Tests for convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's nth root test, Integral test. Alternating series, Leibniz test. Absolute and Conditional convergence.
Texts prescribed by university for uniformity in translation and ease of access	1. S. Goldberg, Calculus and mathematical analysis, 1989. 2. W. Rudin, Principles of Mathematical Analysis, Tata McGraw-Hill, 1953 3. Brian S. Thomson, Andrew. M. Bruckner and Judith B. Bruckner, Elementary Real Analysis, Prentice Hall, 2001.

ACADEMIC PLAN	
Semester Begins	From 2nd week of January, 2018
Number of lectures/week (1hr/lecture)	6/weak
Tentative no. of classes/topic taken and syllabus covered before C1 **25 % of CC03 should have been covered**	12 classes will be taken and UNIT-2 should be covered

January, 2018	Sequences, Bounded sequence, Convergent sequence, Limit of a sequence, liminf, lim sup. Limit Theorems. Monotone Sequences, Monotone Convergence Theorem. Subsequences, Divergence Criteria. Monotone .
February, 2018	Subsequence Theorem (statement only), Bolzano Weierstrass Theorem for Sequences.Cauchy sequence, Cauchy's Convergence Criterion
Tentative no. of classes/topic taken and syllabus covered before C2 **50% of CC-I should have been covered**	18 classes will be taken and UNIT-2 & 4 should be covered
March, 2018	Infinite series, convergence and divergence of infinite series, Cauchy Criterion, Tests for convergence:
April 2018	. Comparison test, Limit Comparison test, Ratio Test, Cauchy's nth root test, Integral test. Alternating series, Leibniz test. Absolute and Conditional convergence
May-June 2018	ε -neighbourhood of a point in $\mathbb{R}$. Idea of countable sets, uncountable sets and uncountability of $\mathbb{R}$. Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets. Suprema and Infima.Completeness Property of $\mathbb{R}$ Keeping record marks for C2