GURUKULA KANGRI (DEEMED TO BE UNIVERSITY)

Department of Mathematics & Statistics

Proposed Syllabus for B.Sc.

Subject: Mathematics
StartingYearofImplementation:2022-23

Contents ofCoursesforB.Sc.withMathematicsasMajorSubject& B.Sc.(Hons) Mathematics

S. N	Subject Code	Course Type	Subject Title	Period			Evaluation Scheme				Subject Total
							Sessional			ESE	
				L	T	P	Credit	CT	TA		
B. Sc I Year											
Semester – I											
1	BMA-C111	DSC	Calculus	5	2	-	6	20	10	70	100
									Total credit		**6**
Semester – II											
1	BMA-C211	DSC	Algebra	5	2	-	6	20	10	70	100
									Total credit		**6**
ExitOptionwithCertificate											
B. Sc II Year											
Semester – III											
1	BMA-C311	DSC	Differential Equations	5	2	-	6	20	10	70	100
2	BMA-S311	SEC	Analytical Geometry	3	2	-	4	20	10	70	100
									Total credit		**10**
Semester – IV											
1	BMA-C411	DSC	Real Analysis	5	2	-	6	20	10	70	100
	BMA-S411	SEC	Vector Calculus andMechanics	3	2	-	4	20	10	70	100
									Total credit		**10**
ExitOptionwithDiploma											

B. Sc III Year											
Semester – V											
1	BMA-C511	DSC	Numerical Analysis	5	2	-	6	20	10	70	100
Any one of the following:											
2	BMA-S511	SEC1	Linear Programming	3	2	-	4	20	10	70	100
	BMA-S512	SEC2	Programming in C	2	-	4	4	20	10	70	100
										Total credit	**10**
Semester – VI											
1	BMA-C611	DSC	Linear Algebra	5	2	-	6	20	10	70	100
Any one of the following:											
2	BMA-S611	SEC1	Mathematical Modeling	3	2	-	4	20	10	70	100
	BMA-S612	SEC2	Laplace and Fourier Transform	3	2	-	4	20	10	70	100
										Total credit	**10**
ExitOptionwithB.Sc.Degree											
B. Sc IV Year											
Semester – VII											
1	BMA-C711	DSC	Advanced Differential Equations	5	2	-	6	20	10	70	100
2	BMA-C712	DSC	Advanced Real Analysis	5	2	-	6	20	10	70	100
3	BMA-C713	DSC	Mathematical Statistics	5	2	-	6	20	10	70	100
4	BMA-C714	…….	Industrial Training/Research Project/Dissertation	-	-	-	6	20	-	80	100
										Total credit	**24**
Semester – VIII											
1	BMA-C811	DSC	Fluid Dynamics	5	2	-	6	20	10	70	100
2	BMA-C812	DSC	Complex Analysis	5	2	-	6	20	10	70	100
3	BMA-C813	DSC	Abstract Algebra	5	2	-	6	20	10	70	100
4	BMA-C814	…….	Industrial Training/Research Project/Dissertation	-	-	-	6	20	-	80	100
SEC/VoC											
1	BMA-S811	…..	Vedic Mathematics	2	1	-	2	20	10	70	100
										Total credit	**24/26**
AwardofB.Sc.(Hons.) DegreeinMathematics											

Programme Outcome/ Programme Specific Outcome

Programme Outcome:

PO1: Inculcate foundation knowledge in the students to understand basics of mathematics including applied aspect for the same.

PO2: Evolve in-depth knowledge of various branches of pure and applied mathematics.

PO3: Enhance the ability to develop solution-oriented approach towards various real world problems.

PO4: Develop scientific and mathematical temper.

PO5: Use programming skills to solve mathematical problems enhancing digital literacy.

Programme Specific Outcome:

PSO1: Student would be able to formulate and develop mathematical arguments in a logical manner.

PSO2: Student would have adequate exposure to many aspects of mathematical sciences.

PSO3: Student is equipped with mathematical modeling ability, critical mathematical thinking and problem solving skills etc.

PSO4: Studentswould be able to apply their skills and knowledge in various fields of studies including, science, engineering, commerce and management etc.

B.Sc. I(MATHEMATICS)

Detailed Syllabus

For

CERTIFICATE COURSE

IN

MATHEMATICS

Programme: Certificate Class: B.Sc.	Year: First	Semester: I

Subject: Mathematics	
Course Code: BMA-C111	**Course Title: Calculus**

Course Outcome	CO1: Foundation knowledge for the students to understand basics of mathematics including applied aspect for developing enhanced quantitative skills and pursuing higher mathematics and research as well. CO2: Understand successive differentiation, maxima and minima, asymptotes and curve tracing in polar, cartesian as well as parametric curves. CO3: Understand theBeta and Gamma functions, double and triple integrals with applications.

Unit No.	Course Content	Hours
I	Successive differentiation, nth differential coefficients of a function, Leibnitz theorem, Expansion of functions: Maclaurin's and Taylor's theorems.	12
II	Partial differentiation: Partial derivatives of first and higher orders, Total differential coefficient, First and second order differential coefficient of an implicit function, Homogenous functions, Euler's theorem on homogenous function. Maxima and minima upto two independent variables.	12
III	Asymptotes: Parallel asymptotes, Asymptotes of an algebraic curve, Asymptotes of non-algebraic curve, Asymptotes of polar curves, Position and nature of double point, Curve tracing for Cartesian form of the curves, Curve tracing for polar form of the curves.	12
IV	Beta function, Gamma function and their properties, Relation between beta and gamma functions, Duplication formula. Rectification(Lengths of curves), Quadrature(Area of curves), Volumes and Surfaces of solids of revolution.	12
V	Double integration, Evaluation of double integral, Change of order of integration, Application of the double integrals, Triple integration, Change to spherical co-ordinates, Application of triple integrals	12

Suggested Readings:

1. R.G. Bartle & D.R. Sherbert: Introduction to Real Analysis, John Wiley & Sons
2. S. BalachandraRao& C. K. Shantha: Differential Calculus, New Age Publication.
3. H. Anton, I. Birens and S. Davis: Calculus, John Wiley and Sons, Inc., 2002.
4. G.B. Thomas and R.L. Finney: Calculus, Pearson Education, 2007
5. Shanti Narayan & Dr. P.K. Mittal: Integral Calculus, S.Chand
6. Schaum'sOutlineofCalculus -FrankAyresandElliottMendelson,5thed.USA:Mc.Graw.
7. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
8. Gorakh Prasad: Differential Calculus, Pothishala Publication
9. B.S.Grewal: Higher Engineering Mathematics, Khanna Publishers
10. Suggested digital plateform:NPTEL/SWAYAM/MOOCs

Mappingofcourseoutcomeswithprogramoutcomes&programspecific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	1	2	3	3	3
CO2	3	3	3	3	1	2	3	3	3
CO3	3	3	3	3	1	2	3	3	3

Note: 1-Low, 2-Medium, 3-High

Programme: Certificate Class: B.Sc.	Year: I	Semester: II

Subject: Mathematics

Course Code: BMA-211 | **Course Title: Algebra**

Course Outcome	**CO1:**Understanding theory of equations. **CO2:**Knowledge ofbasic concepts of Groups, Rings, Fields and their properties. **CO3:**Foundation for higher course in algebra.

Unit No.	Course Content	Hours
I	Algebraic Solution of cubic and bi-quadratic equations, Descarte's rule of signs, Relation between the roots and coefficients of equations.	12
II	Binary operations, Relation, Equivalence relations and partitions, Congruence modulo n, Definition of a group with examples and simple properties, Abelian group, Finite and infinite group, Order of a finite group, General properties of groups, Composition table for finite groups, Order of an element of a group.	12
III	Complexes and subgroups of a group, Theorems on subgroups, Cosets, Coset decomposition, Lagrange's theorem, Cyclic groups.	12
IV	Permutations, Cyclic Permutations, Even and odd permutations, Group of Permutations, Alternating group.	12
V	Rings, Elementary properties of Rings, Rings with or without zero divisors, Integral domains and fields, Division ring or skew fields, Subrings, Subfields.	12

Suggested Readings:

1. B. Fraleigh, A first course in Abstract Algebra, Addison-wiley, 2003
2. I. N. Herstein, Topics in Algebra, John Wiley & Sons, 2006
3. Thomas W Hungerford, Abstract Algebra – An Introduction, Sauders College Publishing 1990
4. Joseph A Gallian, Contemporary Abstract Algebra, Brooks/Cole Cengage Learning, 2016
5. Suggested digital platform: NPTEL/SWAYAM/MOOCS

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	2	2	1	1	1
CO2	3	3	2	3	2	3	---	1	1
CO3	3	2	3	3	1	2	1	1	---

B.Sc. II (MATHEMATICS)

Detailed Syllabus

For

DIPLOMA COURSE

IN

MATHEMATICS

Programme: Diploma Class: B.Sc.	Year: II	Semester: III

Subject: Mathematics

Course Code: **Course Title: Differential Equations**

Course Outcome	CO1: Imparting knowledge to understand linear ordinary differential equations of first and second order. CO2: Applying different methods to solve various types of differential equations. CO3: Basic knowledge of linear and nonlinear partial differential equation of first order and their solutions.

Unit No.	Course Content	Hours
I	Geometrical meaning of a differential equation. Exact differential equations, integrating factors. First order higher degree equations solvable for x,y,p, Lagrange's equations, Clairaut's equations. Equation reducible to Clairaut's form. Singular solutions.	12
II	Linear differential equations of second order: Reduction to normal form. Transformation of the equation by changing the dependent variable/ the independent variable. Solution by operators of non-homogeneous linear differential equations. Reduction of order of a differential equation. Method of variations of parameters. Method of undetermined coefficients.	12
III	Ordinary simultaneous differential equations. Solution of simultaneous differential equations involving operators x (d/dx) or t (d/dt) etc. Simultaneous equation of the form dx/P = dy/Q = dz/R. Total differential equations. Condition for Pdx + Qdy +Rdz = 0 to be exact. General method of solving Pdx + Qdy + Rdz = 0 by taking one variable constant. Method of auxiliary equations.	12
IV	Linear partial differential equation: Formation of first order PDE, Cauchy's problems for the first order equations, Solution by Lagrange's Method.,	12
V	Non-linear partial differential equation: Formation of first order PDE, Solution by Charpit's Method, Jacobi's method.	12

Suggested Readings:

1. M.D.Raisinghania: Ordinary and Partial Differential Equations (S. Chand)
2. Shepley L. Ross:Differential Equations (Wiley India)
3. I. N. Sneddon: Elements of Partial Differntial Equations (Dover books on Mathematics)
4. S G Deo, V Raghavendra, RKar, V Laksmikanthan : Text book of Ordinary Differential Equations (McGraw Hill Education)
5. Suggested digital platform:NPTEL/SWAYAM/MOOCs

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3	1	2	3	3	3
CO2	3	3	3	3	1	2	3	3	3
CO3	3	3	3	3	1	3	3	3	3

Programme: Diploma Class: B.Sc.	Year: II	Semester: III

Subject: Mathematics

Course Code: **Course Title: Analytical Geometry**

Course Outcome

CO1: Identification and tracing of different conics, equation of Sphere, find family of spheres passing through a circle, tangent planes and normal lines to a sphere.
CO2: Obtain equation of Cone, enveloping cone, cylinder, enveloping cylinder.
CO3:. Find equation of tangent plane to different conicoids and enveloping cone of a conicoid.

Unit No.	Course Content	Hours
I	General equation of second degree. Tracing of conics. Tangent at any point to the conic, chord of contact, pole of line to the conic, director circle of conic. Polar equation of a conic, tangent and normal to the conic.	8
II	Sphere: Plane section of a sphere. Sphere through a given circle. Intersection of two spheres, radical plane of two spheres. Co-axial system of spheres	8
III	Cones: Right circular cone, enveloping cone and reciprocal cone. Cylinder: Right circular cylinder and enveloping cylinder	8
IV	Central Conicoids: Equation of tangent plane. Director sphere. Normal to the conicoids. Polar plane of a point. Enveloping cone of a conicoid. Enveloping cylinder of a conicoid	8
V	Paraboloids: Circular section, Plane sections of conicoids. Generating lines. Confocal conicoid. Reduction of second degree equations.	8

Suggested Readings:

1. Analytical Solid Geometry by Shanti Narayan and P.K. Mittal, Published by S. Chand & Company Ltd. 7th Edition.
2. A text book of Mathematics for BA/B.ScVol 1, by V Krishna Murthy & Others, Published by S. Chand & Company, New Delhi.
3. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, Published by Wiley Eastern Ltd., 1999.
4. Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y. Subrahmanyam, G.R. Venkataraman published by Tata-MC Gran-Hill Publishers Company Ltd., New Delhi.
5. Suggested digital platform: NPTEL/SWAYAM/MOOCS

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3	1	2	2	3	3
CO2	3	3	2	3	1	2	2	3	3
CO3	3	3	2	3	1	2	2	3	3

Programme: Diploma Class: B.Sc.	Year: II	Semester: IV
Subject: Mathematics		
Course Code:	**Course Title: Real Analysis**	
Course Outcome	**CO1:**Real analysis is one of the building blocks of analysis. Objective of this course is to introduce students to basic concepts of real numbers and their properties. **CO2:**On successful completion of the course, students have gained knowledge about basic concept of real numbers set, limit point of sets, sequence and series of real numbers and their properties. They have the foundation for higher course in real analysis. **CO3:** This course will lead the student to basic course in advanced real analysis, metric spaces, etc.	

Unit No.	Course Content	Hours
I	**Order Structure, Boundedness of set, Equivalence and Countability:** Concept of field Structure and order structure, Order completeness in R, Archimedean properties of real numbers (Only basic concepts), Dedekind's form of Completeness Property, Real valued function and absolute value of real numbers, Equivalent sets and countable sets (Denumerable sets), Bounded set, Least upper bound (l.u.b.) and greatest lower bound (g.l.b.).	12
II	**Limit Point of Set:**Neighbourhood of a point, Deleted Neighbourhood, Interior points and interior of a set, open set, Isolated and Adherent points of set, Limit point of a set, Derive set, Perfect set, Bolzano-Weierstrass theorem (For sets), Closed set and Closures of a set, Dense set, Compact set and their properties, Open cover, Heine-Borel property and theorem.	12
III	**Limit and Continuity of Single Variable Function:** Limit of function, Algebra of limits of functions, Monotonic functions, Squeeze theorem (statement and example) Continuity and discontinuity of functions, Types of discontinuity, Algebra of continuity, Uniform Continuity, Borel's theorem (statement and example), Boundedness theorem (statement and example), Intermediate value theorem (statement and example), Derivative of function and examples.	12
IV	**Sequence of Real Numbers:** Sequence of real numbers, Bounded sequence, Limit of a sequence, Subsequence, Oscillating and Divergent sequences, Convergence sequence, Algebra of convergent sequences, Cauchy sequence, Limit inferior and limit superior, Bolzano-Weierstrass theorem for sequences (statement and examples), Cauchy general principle of convergence, Monotonic and nested sequences, Squeeze theorem (statement and examples), Cauchy's first and second theorem on limits (statement and examples).	12
V	**Infinite Series of Real Numbers:** Infinite series, Partial sum of series, Necessary condition for convergence, Cauchy's general principle of convergence for series, Comparison test (First and second), Cauchy's root test, Cauchy's condensation test, D'Alembert's ratio test, Raabe's test, Logarithmic test, Cauchy's integral test, Abel's test. Dirichlet's test, Alternating series, Leibnitz test, Absolute convergence and conditional convergence,	12

Suggested Books

1. R. R. Goldberg, Method of Real Analysis, Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi
2. S. C. Malik and SavitaArora, Mathematical Analysis, New Age International (P) Ltd Publishers.
3. T.M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P. Ltd..
4. R.G. Bartle and D. R Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd. .
5. K. A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics, Springer Verlag.
6. E. Fischer, Intermediate Real Analysis, Springer Verlag.

Mapping of course outcomes with program outcomes & program specific outcomes:

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	2	2	1	1	1
CO2	3	3	3	3	2	3	1	1	1
CO3	3	2	3	2	1	2	1	1	1

Programme: Class: B.Sc.	Year:II	Semester: IV

Subject: Mathematics

Course Code: **Course Title: Vector Calculus and Mechanics**

Course Outcome	CO1: By applying the principles of Vector Calculus, the student learns to solve a variety of practical problems in science and engineering. Exposing the foundations of mechanics which will be useful in understanding various physical phenomenon. CO2: Knowledge of basic mechanics such as simple harmonic motion, cycloid, projectiles, virtual works and equilibrium. CO3: The student, after completing the course can go for higher problems in mechanics such as hydrodynamics, this will be helpful in getting employment in industry.

Unit No.	Course Content	Hours
I	Vector Calculus : Vector identities, Differential operators, Vector differentiation, Vector integration, Gradient of a vector point function, Directional derivatives of a scalar point function, Divergence and curl of a vector point function, Theorems of Gauss, Green and Stokes.	8
II	Simple Harmonic Motion: Definition of simple harmonic motion (SHM) and examples, Equation of simple harmonic motion, Hook's law for horizontal and vertical strings with solved problems	8
III	Projectiles: Definitions of projectile (Trajectory, Velocity of projection, Angle of projection, Point of projection, Range, Time of flight and greatest height), Position of projectile at any time, Equation of trajectory, Maximum height, Maximum horizontal range of the projectile, Range and time of flight up an inclined plane and solved problems.	8
IV	Virtual Work : Definitions of virtual displacement and virtual work done, Difference between work done and virtual work done with examples, The principle of virtual work, Work done by the tension and thrust of an extensible string during a small displacement, Some solved problems.	8
V	Equilibrium : Stable and unstable equilibrium, Moments and couples and Varignon's theorem of moments and some solved problems.	8

Suggested Readings:

1. P.C. Matthew: Vector Calculus, springer Verlag London Limited, 1998.
2. R.C. Hibbeler: Engineering Mechanics-Statics, Prentics Hall Publishers
3. R.C. Hibbeler: Engineering Mechanics-Dynamics, Prentics Hall Publishers
4. M. Ray: A Textbook on Dynamics, S. Chand.
5. M. Ray: A Textbook on Statics, S. Chand.
6. A. Nelson: Engineering Mechanics Statics and Dynamics, Tata McGraw Hill
7. J.L. Synge & B.A. Griffith: Principles of Mechanics, Tata McGraw Hill
8. S. L. Loney: Dynamics of a particle and of rigid bodies, Cambridge University Press
9. Suggested digital plateform:NPTEL/SWAYAM/MOOCs

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	1	2	3	3	3
CO2	3	3	3	3	2	2	2	3	3
CO3	3	3	3	3	1	2	3	2	3

B.Sc.III (MATHEMATICS)

Detailed Syllabus

For

B.Sc. Degree

IN

MATHEMATICS

Programme: B.Sc. Degree Class: B.Sc.	Year: III	Semester: V

Subject: Mathematics

Course Code: **Course Title: Numerical Analysis**

Course Outcome	CO1: Understanding of approximate numbers and associated errors. CO2: Find the roots of algebraic and transcendental equations with desired accuracy. CO3: Applyvarious interpolation formulae to interpolate discretely defined functions. CO4: Determine the numerical solution of a given system of linear equations.

Unit No.	Course Content	Hours
I	Approximate numbers and significant digits, rounding off a number, type of errors viz inherent, truncation, absolute, relative and percentage errors, general error formula, error in addition, subtraction, multiplication, division and exponent of numbers, error in a series approximation.	12
II	Solution of algebraic and transcendental equations via Bisection, Iteration, Regula-Falsi, Newton-Raphson and Graeffe's root squaring methods.	12
III	Finite difference operators viz forward, backward, central, average, shift and divided difference operators, relation between finite difference operators, finite differences of a polynomial and transcendental functions, missing term technique, detection of errors by finite difference table.	12
IV	Newton's forward and backward interpolation formulae, Gauss's forward and backward difference interpolation formulae, Lagrange's interpolation and Newton's divided difference interpolation formulae for unevenly spaced points.	12
V	Numerical solution of a system of linear equations via matrix inversion, Gauss elimination, Gauss-Jordan, Cholesky and Croutmethods(direct methods only).	12

Suggested Readings:

1. F. B. Hildebrand, Introduction to Numerical Analysis, McGraw-Hill, N.Y.
2. S.S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India, Pvt. Ltd.
3. C. E. Froberg, Introduction to Numerical Analysis, Addison-Wesley.
4. M.K. Jain, S.R.K Iyengar and R.K.Jain, Numerical methods for Scientific and Engineering Computation, New Age International Pub.
5. R. V. Dukkipati, Applied Numerical methods, New Age International Pub.

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	3	3	2	2	2	2
CO2	3	3	3	3	3	3	3	3	3
CO3	1	2	3	3	3	3	2	3	3
CO4	2	3	3	3	3	2	2	3	3

Programme: B.Sc. Degree Class: B.Sc.	Year: III	Semester: V
Subject: Mathematics		
Course Code:	**Course Title:Linear Programming**	

Course Outcome	CO1: Develops ability to formulate real world problems as different types of linear programming problems. CO2: Develops ability to solve different types of linear programming problems by employing various techniques. CO3: Develops ability to analyse the effect of changes in various parameters on the optimal solutions of LPP.	
Unit No.	Course Content	Hours
I	Linear programming problems, Mathematical formulation of real world problems, Convex sets, Supporting and separating hyper-planes, extreme points, Graphical solution of two variable Linear Programming Problems.	8
II	Basic feasible solutions, Theory of simplex method, Feasibility and optimality conditions, Simplex algorithm, Simplex method in tableau format, Artificial variable techniques: two-phase method, Big-M method, Cases of different types of solutions.	8
III	Duality Theory, Formulation of the Dual Problem, Primal-Dual Relationship, Duality and Simplex Method, Dual Simplex Method, Sensitivity Analysis.	8
IV	Transportation problem and its mathematical formulation, triangular basis, northwest-corner method, least cost method and Vogel approximation method for determination of starting basic solution, UV algorithm for solving transportation problem.	8
V	Assignment problem and its mathematical formulation, Hungarian method for solving assignment problem, Travelling salesman problem.	8

Suggested Readings:

1. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, *Linear Programming and Network Flows*, 2nd Ed., John Wiley and Sons, India, 2004.
2. F.S. Hillier and G.J. Lieberman, *Introduction to Operations Research,* 9th Ed., Tata McGraw Hill, Singapore, 2009.
3. Hamdy A. Taha, *Operations Research, An Introduction,* 8th Ed., Prentice---Hall India, 2006.

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	1	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	2	3	2	3	3

Programme: Degree Class: B.Sc.	Year: III	Semester: V

Subject: Mathematics

Course Code: **Course Title: Programming In C**

Course Outcome

CO1: Writing algorithms for problem solving.
CO2: Use the basic concepts of C programming in problem solving.
CO3: Apply appropriate control statements and user defined functions.
CO4: Identify and apply appropriate programming constructssuch as arrays, structures, unions etc. for problem solving.

Unit No.	Course Content	Hours
I	Algorithms for problem solving, Structure of a C program, Pre-processor directives, Character set, Tokens in C, Keywords and identifiers, Constants, Variables, Data types, Arithmetic operators, Relational operators, Logical operators, Assignment operator, Conditional operator, Operator precedence and associativity, expressions, Declaration and initialization of variables, Reading and writing characters, Reading and writing strings, Data I/O, Qualifiers, Coercion, Manipulators, Comments, Library functions.	8
II	Branching and looping decisions, Decision making with IF, IF-ELSE, Nesting of IF-ELSE, ELSE-IF ladder, switch statement, 'for' loop, 'while' loop, 'do' loop, break, continue and goto statements.	8
III	Simple functions, Passing arguments to functions and returning values from functions, Recursion, Reference arguments, Storage classes, Scope and visibility of local and global variables	8
IV	Arrays Fundamentals, One-dimensional arrays, Two-dimensional arrays, Multi-dimensional arrays, Nesting of arrays, Passing arrays to functions, Strings, String handling functions, Array of strings.	8
V	Structures, Arrays and structures within structures, Array of structures, Passing structures to functions, Unions, Enumerations, typedef, Pointers, Pointers and arrays, Pointers and strings, Array of pointers, Reading from a file and writing in a file.	8

Suggested Readings:

1. Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, Prentice Hall.
2. Byron S. Gottfried, Schaum's Outline of Theory and Problems of Programming with C, McGraw-Hill.
3. E. Balagurusamy, Programming in ANSI C, Tata McGraw-Hill.
4. YashwantKanitkar, Let us C, B.P.B. Pub.

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	1	1	3	3	3	3	2	3	3
CO2	1	1	3	3	3	3	2	3	3
CO3	1	1	3	3	3	3	2	3	3
CO4	1	1	3	3	3	3	2	3	3

Programme: B.Sc. Degree Class: B.Sc.	Year: III	Semester: VI

Subject: Mathematics

Course Code: **Course Title: Linear Algebra**

Course Outcome	CO1: Liner algebra is a basic course in almost all branches of science. The objective of this course is to introduce a student to the basics of linear algebra and some of its applications. CO2: After Successful completion of this course, students should be able to understand the concept of linear transformation which will prepare the students to take up further applications in the relevant fields CO3: The student will use this knowledge in computer science, finance mathematics, industrial mathematics and bio mathematics. After completion of this course students appreciate its interdisciplinary nature.

Unit No.	Course Content	Hours
I	Elementary transformations, Echelon and normal forms, Rank of a matrix, Application of matrices to solve a system of linear (both homogeneous and non-homogeneous) equations, Consistency and general solutions.	12
II	Vector space: Introduction, subspaces, Linear combinations, linear spans, Sums and direct sums, Linear dependence and independence, Bases and dimensions, Dimensions and subspaces, Coordinates and change of bases.	12
III	Linear transformations: Linear transformations, rank and nullity, Linear operators, Algebra of linear transformations, Invertible linear transformations, Isomorphism	12
IV	Matrix of a linear transformation relative to ordered bases of finite-dimensional vector spaces. Correspondence between linear transformations and matrices, Linear functional: Linear functional, Dual space and dual basis, Double dual space, Annihilators, Transpose of a linear transformation.	12
V	Eigen values and Eigen vectors: Eigen vectors and Eigen values of a matrix, product of characteristic roots of a matrix and basic results on characteristic roots, Cayley-Hamilton theorem and its use in finding inverse of a matrix	12

Suggested Readings:

1. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence: *Linear Algebra,* 4th Ed., Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.
2. David C. Lay: *Linear Algebra and its Applications,* 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
3. S. Lang: *Introduction to Linear Algebra,* 2nd Ed., Springer, 2005.
4. Gilbert Strang: *Linear Algebra and its Applications*, Thomson, 2007.
5. Hoffman and Kunze: Linear Algebra, Prentice Hall of India, New Delhi, 1972.
6. H. Helson: Linear Algebra, Hindustan Book Agency, New Delhi, 1994.
7. Suggested digital plateform:NPTEL/SWAYAM/MOOCs

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	2	2	3	3	3
CO2	3	3	3	2	2	3	3	2	3
CO3	3	3	3	3	3	3	3	2	3

Programme: Degree Class: B.Sc.	Year: III	Semester: VI

Subject: Mathematics

Course Code: **Course Title: Mathematical Modelling**

Course Outcome	CO1: Understandingfundamental mathematical concepts and skills to deal withreal world problems. CO2: Understanding a mathematical model and the steps involved in Mathematical Modeling Process. CO3: Understandingthe techniques to develop various mathematical models through geometry, algebra and ordinary differential equations of first order.

Unit No.	Course Content	Hours
I	Mathematical Modelling: Definition, Need, Classification, Simple Situations Requiring Mathematical Modelling, The Technique of Mathematical Modelling, Classification of Mathematical Models, Some Characteristics of Mathematical Models.	8
II	Mathematical Modelling through Geometry, Mathematical Modelling through Algebra, Mathematical Modelling through Trigonometry, Mathematical Modelling through Calculus, Limitations of Mathematical Modelling.	8
III	Linear growth and decay models: Population growth model, Effect of immigration and Emigration on population size, Decrease of temperature, diffusion, Change of price of a commodity, Non-linear growth and decay model: Simple logistic model, Logistic model for non- isolated population, Simple compartment models.	8
IV	Mathematical modeling of Epidemics: Basic concept, Simple Epidemic model through system of ordinary differential equaiton of first order- A simple epidemic model, SIS model with constant number of carrir, Simple epidemic model with carriers, Model with removal, Model with removal and immigration.	8
V	Economics based models: Domar Macro model, Domar first debt model, Momar's second debt model, Samuelson's investment model.	8

Suggested Readings:

1. J. N. Kapur: Mathematical Modelling(New Age International Private Limited)
2. B. Barnes, G.R. Fulford: Mathematical Modelling -with Case Studies: Using Maple and MATLAB (CRC Press)
3. Suggested digital plateform:NPTEL/SWAYAM/MOOCs

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	1	3	3	3	3
CO2	3	3	3	3	2	3	3	3	3
CO3	3	3	3	3	2	3	3	3	3

Programme: B.Sc. Degree Class: B.Sc.	Year: II	Semester: III

Subject: Mathematics

Course Code: **Course Title: Laplace and Fourier Transforms**

Course Outcome	**CO1:** Describe the ideas of Fourier and Laplace Transforms and indicate their applications. **CO2:** Use Fourier series for solving boundary value problems. **CO3:**Solve differential equations with initial conditions using Laplace transform.

Unit No.	Course Content	Hours
I	Laplace transforms of some standard functions, Existence conditions for theLaplace transform Shifting theorems, Laplace transform of derivatives andintegrals, Laplace transform of periodic functions, error functions, Heaviside unitstep function and Dirac delta function.	8
II	Inverse Laplace transforms and their properties, Shifting theorems, Inverse Laplacetransform of derivatives and integrals, Heaviside expansion theorem, Convolutiontheorem.	8
III	Applications of Laplace transform to solve Ordinary and Partial differentialequations, Applications of Laplace transform to solve integral equations.	8
IV	Fourier series: Trigonometric Fourier Series and its convergence, Fourier series ofeven and odd functions, Gibbs phenomenon, Fourier half-range series, Parseval'sidentity, Complex form of Fourier series.	8
V	Fourier Transforms: Fourier integrals, Fourier sine and cosine transforms and theirproperties Fourier transform of derivatives and integrals, Convolution theorem,Application of Fourier transforms to Boundary Value Problems.	8

Suggested Readings:

1. E. Kreyszig. Advance Engineering Mathematics, John Wiley& Sons.2011.
2. R.K. Jain and S.R.K. lyenger, Advanced Engineering Mathematics, Narosa Publishing
3. House, 2009.
4. F. B. Hildebrand, Methods of Applied Mathematics, Courier Dover Publication, 1992.
5. L. Debanth and D. Bhatta, Integral Transforms and their Applications. 2 nd Ed. Taylor and
6. Francis Group, 2007.Suggested digital platform: NPTEL/SWAYAM/MOOCS

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	1	2	3	3	2	3
CO2	3	3	3	1	2	3	3	2	3
CO3	3	3	3	1	2	3	3	2	3

B.Sc. IV (MATHEMATICS)

Detailed Syllabus

For

B.Sc. (Hons.) COURSE

IN

MATHEMATICS

Programme: B.Sc. (Hons.) Class: B.Sc.	Year: IV	Semester: VII

Subject: Mathematics		
Course Code:	**Course Title: Advanced Differential Equation**	
Course Outcome	CO1: Identifying and obtaining the solution of first order differential equation by Picard's Methods and basic knowledge of linear differential equations of second order. CO2: Analyze the application of partial differential equation in terms of wave heat and Laplace equations. CO3: Student will be able to understand the ordinary and singular points and how to solve power series. CO4: Students will be able to understand basics of partial differential equations of first order, linear and non-linear partial differential equations. CO5: Obtaining the solution of Linear partial differential equations with constant cofficients.	
Unit No.	**Course Content**	Hours
I	The Existence and Uniqueness of solutions : The method of successive approximation, Picard's Existence and Uniqueness theorem, Ordinary and regular singular points, Power series solution, Series solution (Frobenius method) of first and second order linear equations.	12
II	Legendre and Bessel Functions and their recursion formulae, Integral representation and properties.	12
III	Solution of linear partial differential equations of second order with variable coefficients, Applications to the vibrational mechanical systems.	12
IV	Linear homogeneous boundary value problems: Eigenvalues, Eigenfunctions, Sturm-Liouville boundary value problems. Non-homogeneous boundary value problems: Non-homogeneous Sturm-Liouville boundary value problems	12
V	Wave equation, Laplace equation and Heat conduction equation, Their solutions by method of separation of variables and applications.	12

Suggested Readings:

1. M.D.Raisinghania: Advanced Differential Equations (S Chand)
2. Shepley L. Ross: Differential Equations (Wiley India)
3. I. N. Sneddon: Elements of Partial Differntial Equations, McGraw Hill Book Company.
4. S G Deo , V Raghavendra, R Kar, V Laksmikanthan : Text book of Ordinary Differential Equations (McGraw Hill Education)
5. Suggested digital plateform:NPTEL/SWAYAM/MOOCs

Mapping of course outcomes with program outcomes & program specific outcomes

CO's/ No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	1	2	2	3	3
CO2	3	3	3	3	1	2	2	3	3
CO3	3	3	3	3	1	2	2	3	3
CO4	3	3	3	3	1	2	2	3	3
CO5	3	3	3	3	1	2	2	3	3

Programme: B. Sc.(Hons.) Class: B.Sc.	Year: IV	Semester: VII
Subject: Mathematics		
Course Code:	**Paper: Advanced Real Analysis**	

Course Outcome

CO1: Advanced real analysis is one of the building blocks of analysis. Objective of this course is to introduce students to basic concepts of real valued functions, Riemann integrations and metric spaces.

CO2: On successful completion of the course, students will gain knowledge about concept of real valued functions, sequence and series of real valued functions, Fundamental theorem of calculus, metric spaces, connectedness and compactness of metric spaces etc.

CO3: This course has the foundation for higher courses like fixed point theory, topology, functional analysis etc.

Units	Paper Contents	Hours
I	**Sequence of Functions:** Sequence of real valued functions, pointwise and uniform convergence of sequence of functions, pointwise and uniform convergences of sequence of functions, uniform bounded sequence of functions, Cauchy's criterion for uniform convergence for sequence of functions, M_n-test, integrability and differentiability of uniform convergence sequence of functions.	12
II	**Series of Functions:** Series of real valued functions, pointwise and uniform convergence of series of functions, Cauchy's criterion for uniform convergence for series of functions, M-test, Abel's test, Dirichlet's test, Series of real valued functions, integrability and differentiability of uniform convergence series of functions. **Mean Value Theorem:** Rolle's, Lagrange's (First mean value theorem) and Cauchy's mean value theorems (Statements) with examples.	12
III	**Riemann integral:** Definition and Existence of Riemann integral, Partition, Upper sum, Lower sum, Refinement, Upper and lower Riemann integral, Properties of Riemann integral. **Fundamental Theorem of Calculus:** First and second fundamental theorem of calculus (statements) with examples.	12
IV	**Metric spaces and its properties:** Definition and examples of metric space, Open and closed balls with examples, Neighborhoods, Open and closed sets with some basic concepts, Continuous functions and its basic properties, Diagonal map, Continuity theorem for open set (only statement). Limit points and Closure of sets with some basic concepts, Derive set, Interior points of set, Basic concepts on interior of sets, Boundary of set and exterior of set with examples. **Complete metric spaces:** Convergent sequence in metric space, Cauchy sequence, Cauchy's criterion theorem, Complete metric spaces with basic properties.	12
V	**Connected spaces:** Connected and disconnected sets, some basic concepts on connectedness, locally connected spaces with examples, Totally disconnected spaces, Path, Path-connectedness with examples. **Compact spaces:** Open cover and sub cover, Compact metric space, Compact subsets, Basic results on compactness and continuity, Unions and intersections of compact subsets, Compactness of products, Local Compactness with basic concepts.	12

Suggested Books

1. Walter Rudin, Principles of Mathematical Analysis, McGraw, Hill.
2. Robert Bartle, the elements of integration and Lebesgue measure, Wiley Classics Library.
3. Gerald Folland, Real Analysis, Modern Techniques and Their Application, Wiley.
4. S.C. Malik and S. Arora, Mathematical Analysis, New Age International.
5. W. A. Sutherland, Introduction to metric and topological spaces (Second Edition), Oxford University Press, New York.
6. M. O. Searcoid, Metric spaces (Springer Undergraduate Mathematics Series), Springer, New York.
7. E. T. Copson, Metric Spaces, Phoenix Public Library, New York.

Mapping of course outcomes with program outcomes & program specific outcomes

CO'sNo.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	1	2	1	1	1
CO2	3	3	3	2	1	3	2	1	1
CO3	3	2	2	2	1	2	1	1	1

Programme: B. Sc.(Hons.) Class: B.Sc.	Year: IV	Semester: VII

Subject: Mathematics

Course Code: | **Course Title: Mathematical Statistics**

Course Outcome

CO1: Mathematical Statistics is a basic course in almost all branches of science. The objective of this course is to introduce a student to the basics of probability and statistics with some of its applications.

CO2: After completing this course, a student will have the knowledge of probability and statistics, its scope and importance in various fields.

CO3: The student will use this knowledge in computer science, finance mathematics, industrial mathematics and bio mathematics. After completion of this course students appreciate its interdisciplinary nature

Unit No.	Course Content	Hours
I	Random experiment, sample space and events, algebra of events. Definitions of Probability: Classical, statistical and axiomatic approaches, illustrations and applications, Addition rule, Conditional probability, independence of events and multiplication rule, Total probability rule, Bayes' theorem with applications.	12
II	Definitions of discrete and continuous random variables, Distribution function, probability mass and density functions – properties and illustrations, Expectation of a random variable and rules of expectation and related results, Probability generating function, Moments and moment generating function – properties and uses, Bernoulli's Distribution, Binomial Distribution, Poisson distribution (their density functions, mean, variance, moments up to fourth order)	12
III	Normal distribution, Uniform & Exponential distribution, sampling, types of Sampling, Test the significance, critical reason and level of significance, Null hypothesis, Test of hypothesis, Testing the significance of sample mean and difference between means of two samples.	12
IV	Pt. Estimation, Interval Estimation, Methods of Estimation, Max Likelihood method, Method of moments, Unbiasedness, Efficiency, Consistency, Sufficiency.	12
V	Curve Fitting,methods of Least square, Simple linear regression,Correlation, Multiple correlation.	12

Suggested Readings:

1. Miller & Freund: Probability and Statistics, Prentice Hall
2. Gupta &Kapoor: Probability and Statistics, Sultan. Chand & Sons
3. M.R.Spiegel: Theory & problems of Probability, Schaum'sOtline Series
4. Ray & Sharma, Mathematical Statistics, Ram Prasad Publication
5. S Ross: A First Course in Probability, PrenticeHall.
1. Suggested digital plateform:NPTEL/SWAYAM/MOOCS

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	2	2	1	1	1
CO2	3	3	3	2	2	3	2	1	2
CO3	3	2	2	2	1	2	1	1	2

Programme: B. Sc. Degree Class: B.Sc.	Year: III	Semester: VI
Subject: Mathematics		
Course Code:	**Paper: Fluid Dynamics**	
Course Outcome	**CO1:I**ntroducing the concepts of fluid motions. **CO2:** Finding equation of continuity and equation of motion of fluid flow. **CO3:**Provide foundation for higher courses like civil engineering, mechanical engineering etc.	

Units	Paper Contents	Hours
I	**Characteristics of Fluids:** Pressure, Density, Specific weight, Specific volume, Thermal conductivity of fluids, Specific heats (C_p and C_v), Incompressible andcompressible fluids, Compressibility, Viscous (Real) and non-viscous (inviscid or perfect) fluids, Viscosity, Newton's law of viscosity, Some important flows and their definition: Laminar (streamline) and turbulent flows, Steady and unsteady flows, Rotational and irrotational flows, Uniform and non-uniform flows.	12
II	**Fluid motion:**Eulerian and Lagrangian description of fluid motion and examples, Velocity of a fluid particle, Material, Local and convective derivative, Acceleration of a fluid particle (vector form and in Cartesian coordinate), Examples, Conservation of mass, Equation of conservation of mass (equation of continuity), Vector form, Cartesian coordinate, Cylindrical coordinate.	12
III	**Kinematical and Physical Properties:**Boundary conditions(Kinematical and Physical), Conditions at a boundary surface, examples, Streamlines, Path line, Streak lines, Difference between path lines and stream lines, Stream tube and stream filament, Examples, The velocity potential, The vorticity vector, Vortex lines and their equations, Vortex tube and vortex filament, Rotational and irrotational motion, Examples.	12
IV	**Equation of Motion:**Equation of Motion of perfect fluid: Euler's equation of motion (cartesian coordinate), Lamb's hydrodynamical equation, Examples.	12
V	**Bernoulli's equation and theorem:**Bernoulli's equation (Pressure Equation), Bernoulli's theorem, Applications of Bernoulli's equation and Bernoulli's theorem (Torrieclli's theorem, Pitot Tube).	12

Suggested Books

1. F. Charlton,A Text Book of Fluid Dynamics, CBC.

2. M.D.Raisinghania,Fluid Dynamics, S.Chand and Company.

3. B. R. Munson, D. F Young, T. H. Okiish, Fundamentals of Fluid Mechanics, John Wiley & Sons.

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	3	3	2	2	1	2
CO2	3	3	3	3	3	3	2	3	3
CO3	3	3	3	3	3	3	3	2	3

Programme: B. Sc.(Hons.) Class: B.Sc.	Year: IV	Semester: VIII

Subject: Mathematics

Course Code: **Course Title: Complex Analysis**

Course Outcome	CO1: The course is aimed at exposing the students to foundations of analysis which will be useful in understanding various physical phenomena and gives the student the foundation in mathematics. CO2: Upon successful completion, students will be able to understand the complex variables, analytic functions, complex integration and residues which will prepare the students to take up further applications in the relevant fields. CO3: After completion of this course the student will have rigorous and deeper understanding of fundamental concepts in Mathematics. This will be helpful to the student in understanding pure mathematics and in research.

Unit No.	Course Content	Hours
I	Continuity and differentiability of complex functions, Analytic and regular functions, Cauchy-Reimann equations, Necessary and sufficient conditions for a function to be analytic, some properties of conjugate functions, Construction of an analytic function, Milne Thomson's method.	12
II	Complex integration, Cauchy Goursat theorem, Cauchy's theorem, Morera's theorem, Cauchy's integral formulae, Cauchy inequalities, Liouville's theorem.	12
III	Gauss mean value theorem, Maximum & minimum modulus theorems, The Argument Theorem, Rouche's Theorem, Poisson's integral formulae.	12
IV	Power series, The circle of convergence of the power series, Taylor's series, Laurent's series, The zeros of an analytic function, Types of singularities, Introductory conformal mapping (Bilinear transformation).	12
V	Residue at a single pole, Residue at a pole a of order greater than unity, Residue at infinity, Cauchy's residue theorem, Evaluation of real definite integral, Integral round the unit circle.	12

Suggested Readings:

2. B.Churchil: Fundamental of Complex Analysis
3. Shanti Narain: Function of Complex Variable, S Chand, 2005
4. S Ponnusamy, Functions of Complex Analysis, Narosa, 200
5. J.H. Methews&R.W.Howell: Complex Analysis for Mathematics & Engineering, Narosa Pub.
6. Murry R. Spiegel: Complex Analysis, Schaum's outline
7. LV.Ahlfors: Complex Analysis, McGraw-Hill
8. Z. Nehari: Conformal Mapping , Dover Pub.
9. Suggested digital plateform:NPTEL/SWAYAM/MOOCS

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	2	3	3	3	3
CO2	3	3	3	2	3	3	3	2	3
CO3	3	3	3	3	2	3	2	2	3

Programme: B.Sc.(Hons.) Class: B.Sc.	Year: IV	Semester: VIII
Subject: Mathematics		
Course Code:	**Course Title:** Abstract Algebra	

Course Outcome	**CO1 :**Understanding the concepts of abstract mathematics, normal subgroups, finite groups, class equation of a group and its consequences. **CO2 :**Properties and relationships of Euclidean rings, ideals, principal ideal domains, fields etc. **CO3 :** Concept of homomorphism in groups and modules. **CO4 :** Understanding relationships among polynomial rings, roots of polynomials and extension fields. **CO5 :** Concept of fixed field, Galois group of a polynomial over a field and constructible numbers.

Units	Paper Contents	Hours
I	Normal subgroups, Simple groups,Conjugacy, Normalization, Centre of a group, Class-equation of a group and its consequences,Theorems for finite groups, Cauchy's theorem, Sylow's theorem.	12
II	Homomorphisms, Endomorphisms, Automorphisms, Inner automorphisms, Group of automorphisms and Inner automorphisms, Maximal subgroups, Composition series, Jordan-Holder theorem, Normal series, Solvable groups, Direct-Products.	12
III	Ideals, Principal Ideal, Maximal and Prime ideals, Quotient ring, Euclidean Rings, Module, Sub-module, Module homomorphism, Linear sum and direct sum of sub-modules.	12
IV	Extension fields, Transitivity of finite extensions, Algebraic element, Algebraic field extensions, Minimal polynomials, Roots of polynomials, Multiple roots, Splitting field, Existence of SF of a polynomial.	12
V	Automorphism of a field, Fixed field, Group of Automorphism of a field K relative by a subfield F of K, Galois group of a Polynomial over a field, Construction with straight edge and Compass.	12

Suggested Books

1.I.N. Herstein, Topics in Algebra, Wiley Eastern Ltd.
2.J. Fraleigh, A First Course in Abstract Algebra, Pearson Education.
3.Mac-Donald , Theory of Groups and Fields, Clarendon Press
4. Khanna and Bhambari,A Course in Abstract Algebra(VikashPub.,III Edition.)

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	1	2	1	2	3
CO2	3	3	3	3	1	2	2	2	3
CO3	3	3	3	3	1	2	1	2	3
CO4	3	3	3	3	1	2	2	2	3
CO5	3	3	3	3	1	2	2	2	3

Programme: B.Sc.(Hons.) Class: B.Sc.	Year: IV	Semester: VIII

Subject: Mathematics

Course Code: **Course Title:Vedic Mathematics**

Course Outcome	**CO1:** The course will lead to develop analytical thinking through this and learn efficient approaches for basic computations. **CO2:** It will help to analyse basic mathematical skills by learning new methods of calculations and will help students to enjoy Mathematics by understanding concepts in different way. **CO3:** This course will lead the student to basic courses likes trigonometry, algebra, astronomy etc.

Unit No.	Course Content	Hours
I	Introduction of Vedic Sutras and Upsutras. Application of EkadhikenaPurvena Sutra: **Multiplication** numbers containing two digits, three digits and more. **Division** divisor containing two digits.	5
II	Application of EkanyunenaPurvena Sutra: **Multiplication** numbers containing two digits, three digits and more. **Division** divisor containing two digits only.	5
III	Application of Urdhwatiragbhyam Sutra: **Multiplication** numbers containing two digits, three digits and more. **Division** divisor containing two digits only.	5
IV	Application of NikhilamNavatashchramamDashatah Sutra: **Multiplication** numbers containing two digits, three digits and more. **Division** divisor containing two digits and more, method (three digits divisor)	5
V	**Application of different Sutras and Upsutras(**ParavartyaYojayet Sutra**)** **Square and Cube** of numbers containing two digits and more (various methods). **Square root and Cuberoot**ofperfect numbers containing four digits and more **(**Vilokanam method,ParavartyaYojayet Sutra**).**	5

Suggested Readings:

1. Tirthji, Swami BhartiKrishan, *Vedic Mathematics*, MotiLalBanarasi Das, New Delhi .
2. KailashVishvakarma: Vedic Ganita: Vihangama Drishti-1, *SikshaSanskritiUthana Nyasa, New Delhi*
3. NidhiHanda: Ancient Hindu Mathematics: An introduction. OshinaPublisher, Indore.

Mapping of course outcomes with program outcomes & program specific outcomes

CO's No.	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	1	2	2	1	1
CO2	3	3	3	1	1	3	2	2	1
CO3	3	2	2	2	1	2	1	1	1