ST. ALOYSIUS COLLEGE (AUTO), JABALPUR
Reaccredited 'A+' by NAAC with CGPA (3.68/4.0)
College with Potential for Excellence by UGC
DST-FIST supported

BACHELOR IN SCIENCE (B.Sc.)

Course Code	**SI-MATH 1T**
Course Title	**Algebra, Vector Analysis and Geometry**
Course Type	**Core Course**
Pre- requisite (if any)	**To study this course a student must have had the subject Mathematics in class 12th**
Course Learning Outcomes	The course will enable the student to: 1. Recognize consistent and inconsistent systems of linear equation by the row, echelon from the augmented matrix, using the rank of matrix 2. To find the Eigen values and corresponding Eigen vectors for a square matrix. 3. Using the knowledge of vector calculus in geometry 4. Enhance the knowledge of three dimensional geometrical figure(eg. Cone and cylinder)
Credit Value	Theory : 6
Total Marks	Max. Marks 25+75

Unit	Topics	No. of Lectures
I	1.1 Historical Background : 1.1.1. Development of Indian Mathematics: Later Classical Period(500-1250) 1.1.2. A brief biography of Varahamihira and Aryabhatta 1.2 Rank of a Matrix 1.3 Echelon and Normal Form of Matrix 1.4 Characteristic Equations of a Matrix 1.4.1 Eigen values 1.4.2 Eigen vectors	15
II	2.1 Cayley's Hamilton Theorem 2.2 Application of Cayley's Hamilton Theorem to find the inverse of a matrix 2.3 Application of Matrix to solve a System of linear equations 2.4 Theorems on consistency and inconsistency of a system of linear equations 2.5 Solving linear equations up to three unknowns	18

	2.6 **Introduction to Congruence Modulo, Addition & Multiplication of Congruence Modulo. Its Applications**	
III	3.1 Scalar and Vector product of three and four vectors 3.2 Reciprocal vectors 3.3 Vector differentiation **3.3.1** Rules of differentiation **3.3.2** Derivative of triple products 3.4 Gradient ,Divergence and Curl 3.5 Directional derivatives 3.6 Vector identities 3.7 Vector equations	18
IV	**4.1** Vector Integration **4.2** Gauss theorem (without proof) and problems based on it. **4.3** Green theorem (without proof) and problems based on it. **4.4** Stoke theorem (without proof) and problems based on it.	15
V	5.1 General equation of second degree 5.2 Tracing of conics 5.3 System of conics 5.4 Cone: **5.4.1** Equation of cone with given base **5.4.2** generators of cone **5.4.3** condition for three mutually perpendicular generators **5.4.4** Right circular cone 5.5 Cylinder **5.5.1** Equation of cylinder and its properties **5.5.2** Right Circular Cylinder, **5.5.3** Enveloping Cylinder	24
	Text Books, Reference Books, Other Resources	

Suggested Reading

Text Books:

1. K.B. Datta: Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd. New Delhi 2000
2. Shanti Narayan- A Text Book of Vector Calculus, S. Chand & Co., New Delhi.1987.
3. S.L.Loney- The Elements of Coordinate Geometry Part -I New Age International (P) Ltd. Publishers, New Delhi 2016
4. P. K. Jain and Khalil Ahmad- A Text Book of Analytical Geometry of Three Dimensions Willey Eastern Ltd.,1999.

Pratibha

5. Gerard G. Emch.R. Sridharan M.D. Srinivas: Contributions to the History of Indian Mathematics, Hindustan Book Agency Vol. 3,2005
6. मध्यप्रदेश हिंदी ग्रंथ अकादमी की पुस्तके ।

Reference Books:

1. **Chandrika Prasad:** A Text Book on Algebra and Theory of Equations, Pothishala Pvt. Ltd.,Allahabad, 2017
2. **N. Jacobson** : Basic Algebra Vol. I and II, W.H.Freeman.2009.
3. **I.S.Luther and I.B.S. Passi**: Algebra Vo. I and II, Narosa Publishing House 1997.
4. N.Saran and S.N. Nigam- Introduction to Vector Analysis, Pothishala Pvt. Ltd. Allahabad 1990.
5. Murray R. Spiegel- Vector Analysis, Schaum Publishing Company..New York.2017
6. Gorakh Prasad and H.C. Gupta- Text Book on Coordinate Geometry, Pothishala Pvt. Ltd. Allahabad 2000
7. P. K. Jain and Khalil Ahmad- A Text Book of Analytical Geometry of Two Dimensions Macmillan India Ltd.,1994.
8. S.L.Loney- The Elements of Coordinate Geometry,Part-2 Macmillan,1923.
9. N.Saran and R.S. Gupta- Analytical Geometry of Three Dimension, Pothishala Pvt. Ltd. Allahabad .1994.
10. R.J.T. Bell- Elementary Treatise on Coordinate Geometry of Three Dimensions. Macmillan India Ltd.,1994
11. Bibhutibhusan Datta and Avadhesh Narayan Singh: History of Hindu Mathematics, Asia Publishing House 1962

Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100**
Continuous Comprehensive Evaluation (CCE):	**25 Marks**
University Exam (UE):	**75 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	15 10 **Total Marks: 25**
External Assessment: University Exam (UE) Time: 02.00 Hours	Section (A): Three Very Short Questions (50 Words Each) Section (B): Four Short Questions (200 Words Each) Section (C): Two Long Questions (500 Words Each)	03 × 03 = 09 04 × 09 = 36 02 × 15 = 30 **Total Marks: 75**

Pratibha Ahirwar Gaur

ST. ALOYSISUS' COLLEGE (AUTONOMOUS)
JABALPUR , M. P., INDIA
Reaccredited 'A+' by NAAC with CGPA (3.68/4.0)
College with Potential for Excellence by UGC
DST-FIST supported
BACHELOR IN SCIENCE (B.Sc.)

Course Code	S1-MATH 2T
Course Title	Calculus differential equation (paper 2)
Course Type	Core Course
Pre- requisite (if any)	To study this course a student must have had the subject Mathematics in class 12th
Course Learning Outcomes	The course will enable the student to: 1. Sketch curves in a plane using its mathematical in the different coordinate system of reference. 2. Using the derivatives in Optimization Social sciences, Physics and Life sciences etc. 3. Formulate the Differential equations for various Mathematical models. 4. Using techniques to solve and analyze various Mathematical models.
Credit Value	Theory : 6
Total Marks	Max. Marks 25+75| min passing marks 33

Unit	Topics	No. of Lectures
I	1.1 Historical Background : 1.1.1. Development of Indian Mathematics: Ancient and Early Classical Period (till 500 CE) 1.1.2. A brief biography of Bhaskaracharya (with special reference to Lilavati and Madhava) **1.2** Successive differentiation 1.2.1 Leibnitz theorem **1.2.2** Maclaurin's series expansions **1.2.3** Taylor's series expansions **1.3** Partial Differentiation 1.3.1 Partial derivative of higher order **1.3.2** Euler's theorem on homogeneous functions **1.4** Asymptotes **1.4.1** Asymptotes of algebraic curves **1.4.2** Conditions for existence of Asymptotes **1.4.3** Parallel Asymptotes	15

	1.4.4 Asymptotes of polar curves	
II	2.1 Curvature 2.1.1 Formula of radius of Curvature 2.1.2 Curvature at origin 2.1.3 Centre of Curvature 2.2 Concavity and Convexity 2.2.1 Concavity and convexity of curves 2.2.2 Points of inflexion 2.2.3 Singular point 2.2.4 Multiple points 2.3 Tracing of curves 2.3.1 Curves represented by Cartesian Equation 2.3.2 Curves represented by Polar Equations	18
III	3.1 Integration of transcendental functions 3.2 Introduction to Double and Triple Integral 3.3 Reduction formulae 3.4 Quadrature 3.4.1 For Cartesian coordinates 3.4.2 For Polar coordinates 3.5 Rectification 3.5.1 For Cartesian coordinates 3.5.2 For Polar coordinates	18
IV	4.1 Linear differential equations 4.1.1 Linear equations 4.1.2 Equations reducible to the linear form 4.1.3 Change of variables 4.2 Exact differential equations 4.3 first order and higher degree equations 4.3.1 Equation solvable for x, y and p 4.3.2 Equations homogeneous in x and y 4.3.3 Clairaut's equation 4.3.4 singular solutions 4.3.5 geometrical meaning of a differential equation 4.3.6 Orthogonal trajectories	18
V	5.1 Linear differential equation with constant coefficients 5.2 Homogeneous linear ordinary differential equations 5.3 Linear differential equations of second order 5.4 Transformation of equations by changing the dependent variable/ independent variable 5.5 Method of variation of parameters.	18
	Text Books, Reference Books, Other Resources	

Suggested Reading

Text Books:

1. Gorakh Prasad- Differential Calculus, Pothishala Private Ltd., Allahabad.

Pratibha

2. Gorakh Prasad- Integral Calculus, Pothishala Pvt. Ltd. Allahabad.
3. M. D. Raisinghanianar: Ordinary and Partial Differential equations. S. Chand & Co Ltd.2017
4. Gerard G. Emch.R. Sridharan M.D. Srinivas: Contributions to the History of Indian Mathematics, Hindustan Book Agency Vol. 3,2005
5. मध्यप्रदेश हिंदी ग्रंथ अकादमी की पुस्तकें।

Reference Books:

1. N.Piskunov - Differential and Integral Calculus, CBS Publishers,1996 .
2. G.F. Simmons- Differential Equation, Tata McGraw Hill, 1972.
3. E.A.Codington- An Introduction to ordinary differential Equation, Prentice Hall of India, 1961.
4. D.A.Murray- Introductory Course in Differential Equations, Orient Longman(India) 1967.
5. H.T.H. Piaggio- Elementary Treatise on Differential Equations and their Application, C.B.S. Publisher & Distributors, Delhi, 1985
6. Bibhutibhusan Datta and Avadhesh Narayan Singh: History of Hindu Mathematics, Asia Publishing House 1962

Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks:	**100**	
Continuous Comprehensive Evaluation (CCE):	**25 Marks**	
University Exam (UE):	**75 Marks**	
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	**15** **10** **Total Marks: 25**
External Assessment: University Exam (UE) Time: 02.00 Hours	Section (A): Three Very Short Questions (50 Words Each) Section (B): Four Short Questions (200 Words Each) Section (C): Two Long Questions (500 Words Each)	03 × 03 = 09 04 × 09 = 36 02 × 15 = 30 **Total Marks: 75**

Pratibha Ale Archana Sharma

BACHELOR IN SCIENCE (B.Sc.) ST. ALOYSISUS' COLLEGE (AUTONOMOUS)
JABALPUR , M. P., INDIA
Reaccredited 'A+' by NAAC with CGPA (3.68/4.0)
College with Potential for Excellence by UGC
DST-FIST supported
BACHELOR IN SCIENCE (B.Sc.)

Max .Marks	:	40
Class	:	BSc/B.A
Year	:	Second
Subject	:	Mathematics
Paper	:	I
Title	:	Abstract Algebra

Course Objective:

A blended teaching method will be used so that students can generalize results and prove them. and It will give the student experience, knowledge, and confidence to move forward in the study of mathematics.

Course Learning Outcomes:

Upon successful completion of this course, the student will be able to:

CLO1 Understand important mathematical concepts in abstract algebra such as definition of a group, order of a group, order of an element, ring, integral domain and field.

CLO2 Comprehend different types of subgroups such as normal subgroups, cyclic subgroups and their structure and characteristics.

CLO3 Appreciate the concepts of permutation groups, factor groups, Abelian groups homomorphism and isomorphism in groups and rings.

CLO4 Analyze and demonstrate examples of rings and fields.

CLO5 Make the students see and understand the connection and transition between previously studied mathematical concepts and more advanced mathematics

Unit 1: Definition and basic properties of groups,subgroups, subgroups generated by a subset,Cyclic groups and simple properties

Patisha Alok Asthana Sfais

Unit 2: Coset decomposition,Lagrange's theorem and its corollaries including Fermat's theorem,Normal subgroups,Quotient groups.

Unit 3:Homomorphism and Isomorphism of groups, Fundamental theorem of homomorphism,Transformation and Permutation group,

S_n(Various subgroups of S_n,$n<5$ to be studied), Cayley's Theorem.

Unit 4: Group Automorphism,Inner Automorphism,group of Automorphisms,Conjugacy relation and centralizer, Normaliser,Counting

principle and class equation of a finite group,

Cauchy's theorem for finite group,Cauchy's theorem for finite abelian groups and non abelian groups.

Unit 5: Definition and basic properties of rings,Ring homomorphism subrings, Ideals and quotient rings,Polynomial rings & its properties,

Integral domain and Field.

Test Books:

1. I.N.Herstein –Topics in Algebra,Wiley Eastern Ltd.New Delhi 1977
2. PB Bhattacharya. S.K Jain and S.R Nagpaul-Basic Abstract Algebra,Wiley Eastern,New Delhi 1997

Reference Books :

1.Shantinarayan –A text Book of Modern Abstract Algebra,S.Chand and Company New Delhi.

2. Surjeet Singh-A Text Book of Modern Algebra

3. N.Jacobson-Basic Algebra Vol.I and II W.H.Freeman

4.I.S Luther and I.B.S Passi-Algebra Vol I and II Narosa Publishing House

Pratibha

ST. ALOYSISUS' COLLEGE (AUTONOMOUS)
JABALPUR , M. P., INDIA
Reaccredited 'A+' by NAAC with CGPA (3.68/4.0)
College with Potential for Excellence by UGC
DST-FIST supported
BACHELOR IN SCIENCE (B.Sc.)

Max . Marks	:	40
Class	:	BSc/B.A
Year	:	Second
Subject	:	Mathematics
Paper	:	II
Title	:	**Advanced calculus**

Course Objective:

Understand the tests of convergence of infinite sequence and series. And to make the students see and understand the concept of continuity and differentiation of function of two variables and its application in real world.

Course Learning Outcomes:

Upon successful completion of this course, the students will be able to

CLO1 Understand of the theory of sequence and convergence of series.
CLO2 Appreciate principles of multi-variable calculus containing differentiability and prove.
CLO3 Understand the relationship between beta and Gamma function
CLO4 Reason abstract mathematical arguments and prove them.
CLO5 Understand the relationship between the increasing and decreasing behaviour of function.

Unit 1: Definition of a sequence, Theorems on limits of sequences, indeterminate forms. Bounded and monotonic sequences. Cauchy's convergence criterion, series of non-negative terms, comparison test, Cauchy's intergral test, Cauchy's root test, ratio tests, Raabe's tests, logarithmic tests, Alternating series. Leibnitz's test, Absolute and conditional convergence, absolute and conditional convergence of series of real and complex terms, rearrangement of series.

Pratibha Holang. Sijan

Unit 2: Continuity of functions of single variable, sequential continuity. Properties of continuous functions. Uniform continuity, chain rule of differentiability, Role's Theorem, Mean value theorems and their geometrical interpretations. Darboux's intermediate value theorem for derivatives.

Unit 3: Limit and continuity of functions of two variables, Partial differentiation, Change of variables, Euler's theorem on homogeneous functions, Taylor's theorem for function of two variables .Jacobians .

Unit 4: Envelopes, Evolutes, Maxima and Minima of functions of two variables, Lagrange's multiplier method, Beta and Gamma Functions.

Unit 5: Double and triple integrals, volumes and surfaces of solids of revolution Dirichlet's integrals, change of order of integration in double integrals.

Test Books:

1. R. R. Goldbeg -Real Analysis, Oxford& I.B.H. Publishing co., New Delhi
2. Gorakh Prasad- Differential Calculus, Pothishala Pvt. Ltd. Allahabad.
3. Gorakh Prasad- Integral Calculus, Pothishala Pvt. Ltd. Allahabad

Reference Books :

1. Gabriel Klaumber- Mathematical Analysis, Marcel Dekkar, Inc. NewYork, 1975
2. T. M. Apostol- Mathematical Analysis, Narosa Publishing House, New Delhi, 1985
3. D. Soma Sundaram and B. Choudhary- A first Course in mathematical Analysis, Narosa Publishing. House, New Delhi, 1997.
4. Murray R. Spiegel- Theory and problems of advance Calculus, Schauma Publishing Co., New York
5. O.E. Stanaitis – An Introduction to Sequence, Series and improper Integrals.

Pratibha Atul Archana Sajan

ST. ALOYSISUS' COLLEGE (AUTONOMOUS)
JABALPUR , M. P., INDIA
Reaccredited 'A+' by NAAC with CGPA (3.68/4.0)
College with Potential for Excellence by UGC
DST-FIST supported
BACHELOR IN SCIENCE (B.Sc.)

Max .Marks	:	40
Class	:	BSc/B.A
Year	:	Second
Subject	:	Mathematics
Paper	:	III
Title	:	**Differential Equations**

Course Objective:

Introduce students to solution of differential equations by Power Series method, Laplace Transform, Inverse Laplace Transform of derivatives and Integrals. and Introduce students to how to solve Partial Differential Equations of First, Second and Higher Order, Charpit's General Method.

Course Learning Outcomes:

Upon completion of the course, students will be able to

CLO1 Evaluate differential equations by Power Series Method. Find solution of Legendre's and Bessel's Differential Equations.

CLO2 Solve Laplace Transform of continuous functions, discontinuous functions, derivatives, integrals and inverse Laplace Transform.

CLO3 Classify partial differential equations and transform into canonical form.

CLO4 Find solution of linear partial differential equations of both first and second order.

CLO5 Apply Laplace Transform and inverse Laplace Transform in solving linear differential Equations.

Unit – I: Series solutions of differential equations, Power series method, Bessel and Legendre equations. Bessel's and Legendre's functions and their properties-recurrence and generating function. Orthogonality of functions.

Unit – II: Laplace Transformation, Linearity of the Laplace transformation, existence theorem for Laplace Transforms, Laplace Transforms of derivative and integrals. Shifting theorems, Differentiation and integration of transformations.

Unit – III: Inverse Laplace Transforms, Convolution theorem, Application of Laplace Transformations in solving linear differential equations with constant coefficients.

Unit – IV: Partial differential equations of the first order, Lagrange's solution. Some special types of equations which can be solved easily by methods other than general method, Charpit's general method.

Unit – V: Partial differential equations of second and higher orders, Classification of partial differential equations of second order, Homogeneous and non-homogeneous equations with constant coefficients, Partial differential equations reducible to equation with constant coefficients.

Text Book:

1. Sharma and Gupta, Integral Transform, Pragati Prakashan Meerut.
2. Sharma and Gupta, Differential Equation, Pragati Prakashan Meerut.
3. Raysinghania, Differential Equation, S. Chand & Company, New Delhi.

ST. ALOYSIUS COLLEGE (AUTONOMOUS)
JABALPUR (M. P.) INDIA
Reaccredited 'A+' by NAAC with CGPA (3.68/4.0)
College with Potential for Excellence by UGC
DST-FIST supported
BACHELOR IN SCIENCE (B.Sc.)

Max Marks	:	40
Class	:	BSc/B.A
Year	:	Third
Subject	:	Mathematics
Paper	:	I
Title	:	**Linear Algebra and Numerical analysis**

Course Objective:

Understand the numerical methods of their analysis for solving linear and non-linear system

and to make the students see and understand the transition between abstract algebra of linear algebra and applications of linear algebra to real world.

Course Learning Outcomes:

Upon successful completion of this course, the students will be able to

CLO1 Identify and construct linear transformations of a matrix, their characterize attains. Evaluate linear systems represented as linear transforms, their representation as matrix equations, and vector equations.

COL2 Explain concepts of inner product on vector spaces.

CLO3 Understand the theoretical and practical aspects of the use of numerical analysis and its application.

CLO4 Establish the limitations, advantages, and disadvantages of numerical analysis. Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration and the solution of linear equations nonlinear equations and differential equations.

CLO5 Use of numerical analysis and to obtain approximate solutions to otherwise intractable mathematical problems.

UNIT I : Definition and examples of Vector spaces, subspaces, sum and direct sum of subspaces. Linear span, Linear dependence, independence and their basic

Pratibha A.L. Archana Sijoy

properties. Basis, Existence Theorem for basis, Extension Theorem, Invariance of the number of elements of a basis, Dimension, Finite dimensional vector spaces, Existence of complementary subspaces of a subspace of a finite dimensional vector space. Dimension of sum of subspaces, Quotient space and its dimension.

UNIT II: Linear transformations and their representation as matrices, Algebra of linear transformations, Rank-Nullity theorem, change of basis, dual space, bi-dual space and natural isomorphism, adjoint of a linear transformation, eigen values and eigen vectors of a linear transformation, Diagonalisation, Bilinear, Quadratic and Hermitian forms.

UNIT III: Inner Product Space Cauchy Schwartz inequality, orthogonal vectors, orthogonal complements, orthonormal sets and bases, Bessel's inequality for finite dimensional spaces. Gram-Schmidt orthogonalization process.

UNIT IV: Solution of Equations: Bisection, Secant, Regula Falsi,Newton's Methods. Roots of second degree polynomial

Interpolation: Lagrange interpolation, Divided differences, Interpolation formula using Differences. Numerical Quadrature. Newton- Cote's formulae. Gauss Quadrature formulae.

UNIT V: Linear equations direct methods for solving systems of linear equations (Gauss elimination, LU decomposition, Cholesky decomposition). Iterative methods (Jacobi, Gauss- Seidel reduction methods).

Ordinary differential equations : Euler method, Single step method, Runge-Kutta's method, Multistep methods, Milne Simpson method. Methods based on Numerical integration, methods based on numerical differentiation.

Text Books:-

1. K.B.Datta- Matrix and Linear Algebra, Pretice hall of India Pvt. Ltd. New Delhi, 2000.
2. S.S.Sastry – Introductory Methods of Numerical Analysis, PHI Learning Pvt. Ltd.

Reference Books:-

1. K. Hoffiman and R. Kunze- Linear Algebra, 2nd Edition, Prentice Hall Englewood Cliffs,New Jersey, 1971.
2. S. K. jain, A Gunawardena & P. B. Bhattacharya- Basic Linear Algebra with MATLAB Key College Publishing(Springer- Verlag) 2001
3. S.Kumarasaran - Linear Algebra A Bermetric Approae Prentiee Hall of India, 2000
4. Balaguruswamy – Numerical Method Tata Mc. Grew Hil Publication.New York

ST. ALOYSISUS' COLLEGE (AUTONOMOUS)
JABALPUR , M. P., INDIA
Reaccredited 'A+' by NAAC with CGPA (3.68/4.0)
College with Potential for Excellence by UGC
DST-FIST supported
BACHELOR IN SCIENCE (B.Sc.)

Max.Marks	:	40
Class	:	BSc/B.A
Year	:	Third
Subject	:	Mathematics
Paper	:	II
Title	:	**Real and Complex analysis**

Course Objective:

The Course aspires to make students understand the concepts of Real and Complex Analysis

Course Learning Outcomes:

Upon successful completion of this course, the student will be able to:

CLO1 Understand the concept of Riemann Integration and prove generalized results and solve partial differentiation of second order , total differentiation and problem based on Young and Swartz Theorem

CLO2 Evaluate Fourier series of half and full intervals.

CLO3 Comprehend open sets, closed sets, metric spaces, convergence and their properties.

CLO4 Appreciate the use of continuity and compactness in metric space.

CLO5 Apply the concept and consequences of analyticity and the Cauchy Residue Theorem.

UNIT I : Riemann integral, Integrability of continuous and monotonic function. The fundamental theorem of integral calculus. Mean value theorems of integral calculus, Partial

Pratibha Ankaug. Sjain

derivatives and differentiability of real-Valued functions of two variables. Schwarz's and Young's theorem. Implicit function theorem.

UNIT II: Improper integrals and their convergence, Comparison tests, Abel's and Dirichlet's tests. Frullani's integral as a function of a parameter. Continuity, derivability and integrability of an integral of a function of a parameter. Fourier series of half and full intervals.

UNIT III: Definition and examples of metric spaces. Neighbourhoods. Limit points. Interior points. Open and closed sets. Closure and interior Boundary points. Subspace of metric space, Cauchy sequences, Completeness, Cantor's intersection theorem, Contraction principle, Real number as a complete ordered field. Dense subsets. Baire Category theorem. Separable, second countable and first countable spaces, Continuous functions, Uniform continuity, Properties of Continuous function on compact sets

UNIT IV: Continuity and differentiability of complex functions. Analytic functions. Cauchy-Reimann equations. Harmonic functions Cauchy's Theorem, Cauchy's integral formula

UNIT V: Power Series representation of an analytic function, Taylor's series, Laurant's series, Singularities, Cauchy's Residue Theorem, Contour Integration.

Text Books :

1. Mathematical Analysis by S.C. Malik and savita Arora. New Age Publication Delhi.
2. G.F.Simmons – Introduction to Topology and Modern Analysis. Mc. Graw Hill New York 1963
3. L.V. Alhfors, complex Analysis Mc. Graw Hill New York .

Recommend Books

1. Walter Rudin – Real and Complex Analysis Mc. Graw Hill New York
2. Ponnuswamy – Complex Analysis, Narosa Publication New Delhi
3. R.V.Churchill & J.W.Brown Complex Variables and Application. 5th Edition Mc. Graw Hill New York 1990

Patisha

ST. ALOYSISUS' COLLEGE (AUTONOMOUS)

JABALPUR (M. P.), INDIA

Reaccredited 'A+' by NAAC with CGPA (3.68/4.0)

College with Potential for Excellence by UGC

DST-FIST supported

BACHELOR IN SCIENCE (B.Sc.)

Max.Marks	:	40
Class	:	BSc/B.A
Year	:	Third
Subject	:	Mathematics
Paper	:	Third Optional -A
Title	:	**Statistical Methods**

Course Objective:

The central objective is to equip students with consequently requisite quantitative and statistical skills that they can employ and build on in flexible ways. and students shall be able to design collected data, analyze data appropriately and interpret data and draw conclusions from those analyses.

Course Learning Outcomes:

Upon successful completion of this course, the student will be able to:

- **CLO1** Demonstrate the ability to apply fundamental concepts in exploratory data analysis.
- **CLO2** Appreciate the concepts of measure of dispersion and standard deviation of a statistics.
- **CLO3** Discuss the basic concepts of probability and random variables.
- **CLO4** Describe the main properties of probability distributions and random variables.
- **CLO5** Understand the concept of the sampling methods of a statistics.
- **CLO6** Comprehend the foundations for classical deduction involving estimation, hypothesis testing, regression and correlation analysis.

Pratibha Ali Sharma Sajan

Unit 1: Frequency distribution- Measure of central tendency. Mean, Median, Mode, G.M., H.M., Partition values, Measures of dispersion- Range, Interquartile range, Mean deviation, Standard deviation, Moments, Skewness and Kurtosis.

Unit 2: Probability- Event, Sample space, Probability of an event. Addition and Multiplication theorems. Baye's theorem, Continuous Probability-Probability density function and its application for finding the mean ,mode median and standard deviation of various continuous probability distributions. Mathematical expectation. Expectation of sum and product of random variables. Moment generating function.

Unit 3: Theoretical Distribution-Binomial, Possion, rectangular and exponential distributions their properties and uses.

Unit 4: Method of least squares. Curve Fitting, co-relation and regression partial and multiple correlation (upto three variable only).

Unit 5: Sampling – Sampling of large sample. Null and alternative hypothesis, Errors of first and second kinds. Level of significance, Critical region. Fest of significance based on chi-square-t, F, Z-statistics

Text Books:

1. H.C. Saxena and J.N. Kapoor, Mathematical statistics, S. Chand and Compony
2. M. Ray- Statistical Methods.
3. Books of M.P. Hindi Granth Academy.

ST. ALOYSISUS' COLLEGE (AUTONOMOUS)
JABALPUR , M. P., INDIA
Reaccredited 'A+' by NAAC with CGPA (3.68/4.0)
College with Potential for Excellence by UGC
DST-FIST supported
BACHELOR IN SCIENCE (B.Sc.)

Max.Marks	:	40
Class	:	BSc/B.A
Year	:	Third
Subject	:	Mathematics
Paper	:	Third Optional - B
Title	:	**DISCRETE MATHEMATICS**

Course Objective:

Know how to apply the knowledge they have gained to solve real problems. And realize that there are multiple solutions to a given problem and these solutions will have a real impact on people's lives. and Know how to apply tools and ideas from mathematics and theoretical computer science to structure and solve complex problems.

Course Learning Outcomes:

On completion of syllabus student will be able to

CLO 1 Write and interpret mathematical notation and mathematical definitions. Appreciate the basic principles of Boolean algebra, Logic and Set theory.

CLO 2 Formulate and interpret statements presented in Boolean logic. Reformulate statements from common language to formal logic. Apply truth tables and the rules of propositional and predicate calculus.

CLO 3 Formulate short proofs using the following methods: direct proof, indirect proof, proof by contradiction and case analysis.

CLO 4 Demonstrate a working knowledge of set notation and elementary set theory, recognize the connection between set operations and logic, prove elementary results involving sets.

CLO 5 Model and solve real-world problems using graphs and trees, both quantitatively and qualitatively. Gain an historical perspective of the development of modern discrete mathematics.

Prabha Hardeep Jain

UNIT I: Boolean functions- disjunctive & conjunctive normal forms (canonical & dual canonical), Bool's expansion theorem, Relations- Binary relation, Inverse relation, Composite relation, Equivalence relation, Equivalence classes & its properties, Partition of a set.

UNIT II: Partial order relation, Partially ordered sets, Totally ordered sets, Hasse diagram, maximal and minimal element, first and last element, lattice- definition and examples, dual lattice, bounded lattice, distributive lattice, complemented lattice.

UNIT III : Graph- Definition, Types of Graphs, Subgraphs, Walk, path, circuit, connected and disconnected graph, Eular graph, Hamiltonian path and circuit, shortest path in weighted graph, Dijkstra's Algorithm for shortest paths.

UNIT IV : Trees and its properties, Rooted tree, Binary tree, Spanning tree, Rank and nullity of a graph, Kruskal's Algorithm and Prim's Algorithm.

UNIT V: Matrix representation of graphs- Incidence and Adjacency matrix, Cutset and its properties, Planar graphs (definition) Kuratowski's two graph.

TEXT BOOKS:

1. C.L.Liu.- Elements of Discrete Mathematics,Mcgraw Hill New-York
2. Narsingh Deo- Graph Theory, Prentice Hall.
3. Books of M.P. Hindi Granth Academy.

Pratibha Ale Anand. Sjain