MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8
(Affiliated to Krishna University,
Machilipatnam)

SYLLABUS

Subject: Mathematics **Semester: I**
Course Title: Differential Equations **Course Code:20MTCCDE15**
No.of Hrs:75 **LTP:510** **Credits: 5**

Objectives

- To emphasize on appropriate methods of solving ODE
- To provide problem solving techniques
- To enhance critical thinking, analytical reasoning and digital skills

Course Outcomes

CO1: Classify differential equations based on their order and degree and solve them analytically
CO2: Apply appropriate method to solve differential equations of first order and first degree
CO3: Apply the acquired knowledge to solve first order and higher degree differential equations
CO4: Identify family of orthogonal trajectories for a family of curves
CO5: Apply suitable method to solve higher order differential equations with constant and Variable coefficients
CO6: Evaluate an ordinary differential equation using Scilab software

UNIT I (12 Hrs)

Differential equations of first order and first degree:
Linear differential equations; Differential equations reducible to linear form (Bernouli's equation); Exact differential equations; Integrating factors (By inspection, $\frac{1}{Mx+Ny}$, $\frac{1}{Mx-Ny}$, $e^{\int (x)}$, $e^{\int f(y)dy}$); Change of variables.

UNIT II (12 Hrs)

Orthogonal Trajectories: Cartesian form, Polar form.
Differential equations of first order but not of the first degree:
Equations solvable for p; Equations solvable for y; Equations solvable for x; Equations that do not contain x or y; Clairaut's equation.

UNIT III (12 Hrs)

Higher order linear differential equations–I:

Solution of homogeneous linear differential equations of order 'n' with constant coefficients; Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators;

General solution of f(D)y = 0; General solution of f(D)y = Q(x): when

(i). $\frac{1}{f(D)}$ is expressed as partial fractions

(ii). P.I. of f(D)y = Q(x) where Q(x) = e^{ax}

(iii). P.I. of f(D)y = Q(x) where Q(x) = Sinbx (or) Cosbx

UNIT IV (12 Hrs)

Higher order linear differential equations–II:

General solution of non-homogeneous linear differential equations with constant coefficients: f(D)y = Q(x) when

P.I. of f(D)y = Q(x) where Q(x) = x^k

P.I. of f(D)y = Q(x) where Q(x) = e^{ax}V, V is a function of x

P.I. of f(D)y = Q(x) where Q(x) = xV, V is a function of x

P.I. of f(D)y = Q(x) when Q(x) = x^mV, V is a function of x

UNIT V (12 Hrs)

Higher order linear differential equations –III:

Method of variation of parameters; Linear differential equations with non-constant coefficients: The Cauchy-Euler equation, Legendre equation.

Skill / Hands-on using Scilab Software: (15 Hrs.)

- Basic Scilab commands
- Simple arithmetic and algebraic operations
- Elementary numeric and programming functions
- ODE solvers: ode, dassl, dassrt, odedc to evaluate an ordinary differential equation

Prescribed text book

- A textbook of B.Sc. Mathematics (Theory and Practical) Volume-I, Differential Equations by V. Venkateswara Rao, N. Krishna Murthy, B. V. S.S. Sarma and S.Anjaneya Sastry; S.Chand & Company Pvt.Ltd., New Delhi, Latest reprint

Reference books

1. Differential Equations and their Applications by Zafar Ahsan , Prentice- Hall of India Pvt. Ltd, New Delhi, 2nd edition.
2. Ordinary and Partial Differential Equations, Rai Singhania, S.Chand & Company Pvt.Ltd., New Delhi.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8
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SYLLABUS

Subject: Mathematics **Semester: II**
Course Title:3D Analytical Geometry **Course Code:20MTCCAG25**
No. of Hrs:75 **LTP:510** **Credits:5**

Objectives

- To emphasize on concepts in planes, lines, spheres and cones and describe their properties
- To provide problem solving techniques
- To enhance critical thinking, analytical reasoning and digital skills

Course Outcomes

CO1: Distinguish the geometry of planes, lines, spheres and cones and describe their properties
CO2: Explain properties and concepts in 3D solid geometry and use them in real life situations
CO3: Solve problems on planes, lines, spheres and cones by the acquired knowledge
CO4: Analyze methods of solving problems on planes, lines and spheres and apply appropriate method to solve them
CO5: Create and customize plots using graphic functions in Scilab software

Unit I: The Plane (12 Hrs)

Equation of plane in terms of its intercepts on the axis, Equation of the plane through the given points, Normal form of a plane, Angle between planes, Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes, Combined equation of pair of planes, Orthogonal projection on a plane. (No Proofs)

Unit II: The Line (12 Hrs)

Equation of a line; Angle between a line and a plane; The condition that a given line may lie in a given plane; The condition that two given lines are coplanar; Number of arbitrary constants in the equations of a straight line; Sets of conditions which determine a line; The shortest distance between two lines; The length and equation of the line of shortest distance between two straight lines; Length of the perpendicular from a given point to a given line. (No Proofs)

Unit III: The Sphere (12 Hrs)

Definition and equation of the sphere; Equation of the sphere through four given points; Plane section of a sphere; Intersection of two spheres; Equation of a circle; Sphere through a given circle; Intersection of a sphere and a line; Power of a point; Tangent plane; Plane of contact; Polar plane; Pole of a plane; Conjugate points; Conjugate planes. (No Proofs)

Unit IV: The Sphere and The Cone (12 Hrs)

Angle of intersection of two spheres; Condition for two spheres to be orthogonal; Radical plane; Coaxal system of spheres; Limiting points; Simplified form of the equation of two spheres. (No Proofs)

Definition of a cone; Vertex; Guiding curve; Generators; Equation of the cone with a given vertex and guiding curve; enveloping cone of a sphere; Equations of cones with vertex at origin; Condition that the general equation of the second degree should represent a cone; (No Proofs)

Unit V: The Cone (12 Hrs)

Enveloping cone of a sphere; Right circular cone; Equation of the right circular cone with a given vertex axis and semi-vertical angle; Condition that a cone may have three mutually perpendicular generators; Intersection of a line and a quadric cone; Tangent lines and tangent plane at a point; Condition that a plane may touch a cone; Reciprocal cones; Intersection of two cones with a common vertex (No Proofs)

Skill / Hands-on using Scilab Software: (15 Hrs.)

- Simple programming functions
- Graphics: plot, xset, driver, plot2d, xgrid, locate, plot3d

Prescribed text book

- A textbook of B.Sc. Mathematics (Theory and Practical) Volume-II, Analytical Geometry by V.Venkateswara Rao, N.Krishna Murthy, B.V.S.S.Sarma and S. Anjaneya Sastry; S.Chand & Company Pvt. Ltd., New Delhi, Latest reprint

Reference Books

1. Analytical Solid Geometry by Shanti Narayan and P.K. MittalS.Chand & Company Pvt. Ltd. 7th Edition
2. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and KhaleelAhmed, Wiley Eastern Ltd., 1999.
3. Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y.Subrahmanyam, G.R. Venkataraman, Tata-MC Gran-Hill Publishers Company Ltd., New Delhi.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Mathematics Semester: I

Course Title: Real Analysis Course Code: MATHC033

No.of Hrs.: 60

Objectives:

- To emphasize on the study of real number system and its properties.
- To make the students understand the elements of Real Analysis.
- To focus on the concepts and properties of Real numbers.

Course Outcomes:

CO1: Identify the nature of a sequence whether bounded, monotonic, convergent and divergent by employing relevant results.

CO2: Describe the nature of a series by applying suitable test of convergence

CO3: Illustrate the significance of real number system, real valued and real variable functions, mean value theorems, fundamental theorem and applications

CO4: Identify continuity of a function and type of discontinuity by applying acquired knowledge.

CO5: Categorize real valued and real variable functions as continuous, differentiable and integrable functions by applying learned principles and results.

Unit I: Real numbers (No question is to be set) (12 Hours)

The algebraic and order properties of R, Absolute value and Real line, Completeness property of R, Applications of Supremum property, Intervals

Real sequences: Sequences and their limits, Range and boundedness of sequences, limit of a sequence and convergent sequence, The Cauchy criterion, divergent sequences, monotonic sequences, necessary and sufficient condition for convergence of monotonic sequence, limit point of sequence, subsequences

and the Bolzano-Weierstrass theorem, Cauchy sequences, Cauchy's general principle of convergence theorem, Cauchy's first and second theorems on limits.

Unit II: Infinite series (12 Hours)

Introduction to series, convergence of series, Cauchy's general principle of convergence for series, tests for convergence of series, Series of non- negative terms

1. P-test,Geometric series,Auxiliary series,comparison tests, limit comparison test.
2. Cauchy's n^{th} root test
3. D'Alembert's ratio test.
4. Alternating series - Leibnitz's test.Absolute convergence and conditional convergence, semi convergence.

Unit III: Continuity (12 Hours)

Limits: (No question is to beset)

Real valued functions, boundedness of a function, limits of functions, Some extensions of limit concepts, infinite limits, limits at infinity.

Continuous functions: Continuous functions, combinations of continuous functions, continuous function on intervals, uniform continuity.

Unit IV: Differentiation and Mean value theorems (12 Hours)

The derivability of a function at a point, Derivability on an interval, derivability and continuity of a function, graphical meaning of the derivative, Sign of the derivative, Darboux theorem,Intermediate value theorem, Mean value theorems: Rolle's, Lagrange's, Cauchy's mean value theorems.

Unit V: Riemann integration:(12 Hours)

Riemann Integral, The Riemann Integral functions, Darboux's theorem, Necessary and sufficient condition for Riemann Integrability, properties of integrable functions, Fundamental theorem of integral calculus, integral as a limit of sum, First mean value theorem.

Prescribed Text book:

- A textbook of B.Sc. Mathematics (Theory and Practical) Volume-II,Real Analysis by Venkateswara Rao, N.Krishna Murthy, B.V.S.S.Sarma and S.Anjaneya Sastry, S.Chand & Co. Ltd, First Edition 2017.

Reference books:

1. A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others Published by S. Chand & Company Pvt. Ltd., New Delhi.
2. Elements of Real Analysis as per UGC Syllabus by Shanti Narayan and Dr M.D. Raisinghania Published by S. Chand & Company

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8
(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Mathematics

Course Title: Analytical Skills Course code: 20LSCAS2

No. of Hrs: 30 LTP:200 Credits:2

The entire course content focuses on skill development

Objectives

- To inculcate quantitative analytical skills and reasoning as an inherent ability
- To enhance competency in pursuing higher studies and jobs

Course Outcomes

CO1: Demonstrate arithmetic and business concepts and attain the associated skills

CO2: Exhibit competency in the use of verbal reasoning.

CO3: Apply skills and competencies acquired in related areas

CO4: Solve problems pertaining to quantitative ability, logical, reasoning and verbal ability

UNIT I: (9 Hours)

Arithmetic ability

Algebraic operations, BODMAS, Fractions, Divisibility rules, LCM & GCD (HCF)

Verbal reasoning

Number Series, Coding & Decoding

UNIT II: (9 Hours)

Verbal reasoning

Blood relationship, Clocks, Calendars

Quantitative aptitude

Average, Ratio & Proportion, Problems on ages

UNIT III: **(9 Hours)**

Quantitative aptitude

Time & Distance, Time & Speed

Business computations

Percentages, Profit & loss, Partnership, Simple & Compound interest

Co-curricular Activities: (**3 Hours**)

- Quiz
- Problem solving sessions
- Group discussions

Prescribed text book

- Quantitative Aptitude for Competitive Examination by R.S. Agrawal, S. Chand Publications.

Reference Books

1. Analytical Skills by Showick Thorpe, S. Chand and Company Ltd., New Delhi
2. Quantitative Aptitude and Reasoning by R. V. Praveen, PHI Publishers
3. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata McGraw Hill Publications.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Mathematics Semester: IV

Course Title: Linear Algebra Course Code: 20 MTCCLA45 No.of Hrs.:90 LTP:510 Credits:5

Objectives

- To emphasize basic concepts in vector spaces, inner product spaces and matrices and describe their applications
- To provide with knowledge on matrices and algebraic systems equipped with internal and external compositions and their properties
- To enhance analytical, reasoning and technical skills

Course Outcomes

CO1: Describe algebraic systems vector space, subspace and inner product space and their properties

CO2: Identify a basis for a finite dimensional vector space and an orthonormal basis for a finite dimensional inner product space

CO3: Analyze a linear transformation on a finite dimensional vector space and determine the dimension of range space and null space

CO4: Apply a suitable technique to find the rank of a matrix and solve a system of linear equations

CO5: Determine the Eigenvalues and Eigenvectors for a square matrix and apply a suitable method to find the inverse of it.

UNIT I: Vector Spaces-I **(13 Hrs.)**

Vector space, General properties of vector space, n-dimensional vectors, Addition and scalar multiplication of vectors, Internal and external composition, Null space, Subspace, Algebra of subspaces, Linear sum of two subspaces, Linear combination of vectors, Linear span, Linear independence and Linear dependence of vectors.

UNIT II:Vector Spaces-II (13 Hrs.)

Basis of a vector space, Finite dimensional vector space, Basis extension, Coordinates of a basis, Dimension of a vector space, Dimension of a subspace, Quotient space and Dimension of quotient space.

UNIT III: Linear Transformations(13 Hrs.)

Linear transformation (LT), Linear operator, Properties of LT, Sum and product of LTs, Algebra of linear operators, Range and null space of a linear transformation, Rank and Nullity of a linear transformation, Rank-Nullity theorem and applications

UNIT IV: Matrices(13 Hrs.)

Matrices, Elementary properties of matrices, Inverse of a matrix, Rank of a matrix, Linear equations, Characteristic equations, Characteristic values & vectors of a square matrix, Cayley-Hamilton theorem and applications

UNIT V: Inner Product Spaces (13 Hrs.)

Inner product space, Euclidean and unitary spaces, Norm or length of a vector, Schwarz inequality, Triangle Inequality, Parallelogram law, Orthogonality, Orthonormal set, Complete orthonormal set, Gram-Schmidt's orthogonalization process, Bessel's inequality and Parseval's Identity.

Skill/ Hands- on using GeoGebra / R- Tool:(20 Hrs.)

- Vectors and Matrices
- Arithmetic operations on vectors and matrices
- Transpose, determinant and inverse of a matrix

Co- curricular Activities: (5 Hrs.)

- Problem solving sessions
- Student seminars
- Quiz
- Assignments on applications of Linear Algebra & Matrices.

Prescribed Text Book:

A textbook of B.Sc. Mathematics, Volume - 5, Linear Algebra by V. Venkateswara Rao, N. Krishna Murthy, B. V. S.S. Sarma and S. AnjaneyaSastry; S.Chand & Company Pvt.Ltd., New Delhi, Latest Reprint.

Reference Books

- Linear Algebra by J.N. Sharma and A.R. Vasishta, published by Krishna Prakashan Mandir, Meerut
- Matrices by Shanti Narayana, published by S. Chand Publications.
- Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition),New Delhi.
- Linear Algebra by Stephen H. Friedberg et. al. published by Prentice Hall of India Pvt. Ltd. 4thEdition, 2007

MARIS STELLA COLLEGE (AUTONOMOUS),VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Mathematics Semester: I V

Course Title: Real Analysis Course Code: 20MTCCRA45

No.of Hrs.:90 LTP:510 Credits:5

Objectives

- To emphasize basic concepts related to real numbers , real valued and real variable functions and describe their applications
- To provide with knowledge on real number system and properties of real valued and real variable functions
- To enhance analytical, reasoning and technical skills

Course Outcomes

CO1: Identify the nature of a sequence whether bounded, monotonic and convergent by employing relevant results

CO2: Describe the nature of a series by applying a suitable test of convergence

CO3: Illustrate the significance of real number system, real valued and real variable functions, mean value theorems, fundamental theorem and applications

CO4: Identify continuity of a function and type of discontinuity .

CO5: Categorize real valued and real variable functions as continuous, differentiable and integrable by applying principles and results.

UNIT I: Real Numbers & Sequences (13Hrs.)

The algebraic and order properties of $\mathbb{R}$, Absolute value and real line, Completeness property of $\mathbb{R}$, Applications of supremum property; intervals.

(**No question is to be set**)

Sequences and their limits, Range and Boundedness of sequences, Limit of a sequence and Convergent sequence, The Cauchy's criterion, Monotone sequences, Necessary and sufficient condition for convergence of monotone sequence, Limit

point of a sequence, subsequences, the Bolzano-Weierstrass theorem, Cauchy sequence, Cauchy's general principle of convergence.

UNIT II: Infinite Series (13Hrs.)

Series, Convergence of series, Cauchy's general principle of convergence for series, Tests for convergence of series, Series of Non-Negative Terms, (i) P-test (ii) Cauchy's n^{th} root test or Root Test (iii) D'-Alembert's' Test or Ratio Test (iv) Alternating series-Leibnitz test, Absolute convergence and conditional convergence.

UNIT III: Limits and Continuity (13 Hrs.)

Real valued functions, Boundedness of a function, Limit of a function, Infinite limits, Limits at infinity. (**No question is to be set**).

Continuous functions, Algebra of continuous functions, Continuous functions on intervals, Discontinuity, Types of discontinuity, Uniform continuity.

UNIT IV: Differentiation (13Hrs.)

The derivability of a function at a point, on an interval, Derivability and continuity of a function, Graphical interpretation of the derivative, Mean value theorems, Rolle's theorem, Lagrange's theorem, Cauchy's mean value theorem

UNIT V:Riemann Integration (13 Hrs.)

Riemann Integral, Riemann integrable functions, Darboux theorem. Necessary and sufficient condition for Riemann integrability, Properties of integrable functions, Fundamental theorem of integral calculus, Integral as a limit of a sum, Mean value theorems.

Skill/ Hands- on using Geo Gebra:(20 Hrs.)

- Limits and continuity of functions using GeoGebra
- Differentiation using GeoGebra
- Integration using GeoGebra

Co- curricular Activities: (5 Hrs.)

- Problem solving sessions
- Student seminars
- Quiz
- Assignments on concepts in Real Analysis

Prescribed Text Book

A textbook of B.Sc. Mathematics, Volume - 4, Real Analysis by V.VenkateswaraRao, N. Krishna Murthy, B.V. S.S. Sarma and S.Anjaneya Sastry; S.Chand & Company Pvt.Ltd., New Delhi, Latest reprint.

Reference Books

- Introduction to Real Analysis by Robert G.Bartle and Donlad R. Sherbert, published by John Wiley.
- Elements of Real Analysis as per UGC Syllabus by Shanti Narayan and Dr. M.D. Raisinghania, published by S. Chand & Company Pvt. Ltd., New Delhi

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Mathematics Semester: III

Course Title: ABSTRACT ALGEBRA Course Code:MATHC034

No.of Hrs.:60

Objectives:

- To emphasize on the study of the concept of specific algebraic structure, group and its properties.
- To give the students more examples in order to make the concept simple and interesting.
- To provide the substructures of group and their properties

Course Outcomes:

CO 1. Demonstrate the structure of group, substructures, cyclic group and their properties

CO 2.Classify non abelian group of functions (permutations) and Illustrate its characteristics.

CO 3. Analyze properties of group isomorphism to describe the isomorphic groups and its generalization, group homomorphism.

CO 4. Analyze a group by the notion of a coset and apply Lagrange's theorem for finite groups.

CO 5. Realize the importance of normal subgroup of a group to develop quotient group of it.

Unit–I:Groups (10Hrs)

Binary operation – Algebraic structure – Semi group – Monoid – Group definition and elementary properties; Finite and infinite groups – examples – Order of a group. Composition tables with examples. Order of an element of a group.

Unit II: Sub groups(10 Hrs)

Complex Definition – Multiplication of two complexes, Inverse of a complex – Subgroup definition – examples – Criterion for a complex to be a subgroup- Criterion for the product of two subgroups to be a subgroup – Union and intersection of subgroups.

Cosets and Lagrange's theorem: Cosets definition – properties of cosets – Index of a subgroups of a finite group – Lagrange's theorem.

Unit–III: Normal subgroups (12 Hrs)

Definition of a Normal subgroup – proper and improper Normal subgroups – Hamilton group – Criterion for a subgroup to be a normal subgroup– Intersection of two normal subgroups – Subgroup of index 2 is a normal subgroup – Simple group – Quotient group – Criterion for the existence of the quotient group.

Unit–IV: Homomorphism (10 Hrs)

Definition of homomorphism – Image of homomorphism, elementary properties of homomorphism – Isomorphism – Automorphism definitions and elementary properties – Kernel of a Homomorphism – Fundamental theorem of homomorphism and applications.

Unit–V: Permutations and Cyclic groups (14Hrs)

Permutations: Definition of permutation – Permutation multiplication– inverse of a permutation – cyclic permutations –transposition – even and odd permutations –Cayley's theorem.

Cyclic groups: Definition of a cyclic group – Elementary properties – Classification of cyclic groups.

Prescribed Text book:

A text book of B.Sc. Mathematics (Theory and Practical)Volume-II, Abstract Algebra by Venkateswara Rao, N.Krishna Murthy, B.V.S.S.Sarma and S.Anjaneya Sastry, S.Chand & Co. Ltd, First Edition 2016 .

Reference books:

1. First course in abstract algebra by J.Fraliegh published by Narosa Publishers.
2. Modern Algebra by A.R.Vasishtha, Krishna Prakashan mandir pvt.ltd.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Mathematics Semester: V

Course Title: Ring Theory & Vector Calculus

Course Code:MATHC035

No.of Hrs.:60

Objectives:

- To introduce the concepts, ring and field and their properties.
- To provide basic knowledge in vector differentiation and vector integration.
- To emphasize on the evaluation of vector differentiation.
- To emphasize on the evaluation of line, surface and volume integrals and on their transforms

Course Outcomes:

CO 1. Classify the algebraic systems equipped with one and two binary Operations and explain their properties.

CO 2. Illustrate different types of rings, fundamentals, substructures, Ring isomorphism and their properties

CO3. Solve problems on gradient of a scalar function, divergent and curl of a vector function by applying their properties

CO4. Evaluate Line, circulation, surface volume integrals of scalar and Vector functions.

CO5. Understand the significance of Gauss,Green and Stokes theorems and apply them to evaluate certain integrals

Unit-I: Rings–I (12Hrs)

Definition of ring and some basic properties, Boolean Rings, divisors of zero and cancellation laws in a rings, Integral Domains, Division Rings andFields,The characteristic of ring–The characteristic ofanIntegralDomain, the characteristic of a field, SubRings, Ideals, Principal ideal & principal ideal rings.

UNIT-II:Rings-II (12 Hrs)

Quotient ring-Definition of homomorphism–Homomorphic image– Elementary Properties of Homomorphism–Kernel of homomorphism Fundamental theorem

of Homomorphism–Maximal Ideals–Prime Ideals, field of quotients of an integral domain.

Unit-III: Vector Differentiation (12Hrs)

Vector differentiation, ordinary derivatives of vectors, Differentiability, Gradient, Divergence, Curl operators, formulae and properties involving these operators.

Unit-IV: Vector Integration (12Hrs)

Line Integral, circulation, Surface Integral, Volume integral with examples.

Unit-V: Vector Integration applications (12Hrs)

Theorems on Gauss, Stokes and Green's theorem in a plane and applications of the set theorems.

PrescribedText book:

A textbook of B.Sc. Mathematics (Theory and Practical) , Volume-III, Ring Theory & Vector Calculus by V.Venkateswara Rao, N.Krishna Murthy, B.V.S.S.Sarma and S.Anjaneya Sastry, S.Chand & Co.Ltd, First print 2017.

Reference books:

1. Abstract Algebra by Vasishta and Vasishta.
2. Vector Calculus by Shanti Narayan, published by S.Chand & company Ltd.,New Delhi.
3. Vector Calculus by R.Gupta, published by Laxmi Publication

MARIS STELLACOLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

III B.Sc MATHEMATICS(Common Elective)

SYLLABUS

Subject: Mathematics Semester: VI

Course Title: Number Theory Course Code:MATHC039

No.of Hrs.:60

Objectives:

- To give simple account of classical number theory, as familiarity with Number theory helps to do any course in Mathematics and Computer Science.
- To focus on abstract area of Mathematics.
- To expose the students to the elements of number theory and their significance.
- To emphasize on the properties of integers.

Course Outcomes

CO1: Realize the significance of number theory properties of integers, fundamental theorem of arithmetic and applications.

CO2: Apply division and Euclidean algorithms to solve linear Diophantine equations

CO3: Solve linear congruences and demonstrate the applications of Chinese remainder theorem, Fermat, Wilson and Euler's theorems

CO4: Study the divisors of an integer by using number-theoretic functions

CO5: Solve quadratic congruences and determine quadratic residues using Euler's Criterion.

CO6: Evaluate Legendre symbol using Gauss lemma and quadratic reciprocity law.

Unit I: (12Hrs**)**

Divisibility, The division algorithm, Greatest common divisor, The Euclidean Algorithm, The Diophantine equation ax + by = c, The fundamental theorem of arithmetic.

Unit II: (12 Hrs)

Congruences, Basic properties of congruence, Linear congruences and The Chinese remainder theorem, Fermat's Little theorem, Wilson's theorem, Solution of congruences.

Unit III:(12Hrs)

Number theoretic functions,The sum and number of divisors, The Mobius Inversion formula,The greatest integer function.

Unit IV:(12Hrs)

Euler'sPhi-function,Euler's theorem,Someproperties of the Phi-function, Quadratic residues, Euler's criterion.

Unit V:(12Hrs)

The Legendre symbol and its properties, Gauss' lemma, Quadratic reciprocity, Quadratic reciprocity law.

Prescribed Book:

- Elementary Number Theory, Sixth Edition, David M.Burton, Tata McGraw-Hill Publishing company limited.

Reference books:

1. Basic Number Theory, S.B.Malik, second edition , Vikas publishing house pvt.Ltd.
2. An introduction to the theory of numbers, I.Niven, H.Zukerman, Fifth edition, John Wiley & sons

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

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II B.SC MATHEMATICS(COMMON ELECTIVE)

SYLLABUS

Subject: Mathematics Semester: VI

Course Title: Numerical Analysis Course Code:MATHC038

No.of Hrs.:60

Objectives:

- To emphasize on systematic presentation of Numerical Analysis.
- To give the importance of numerical methods.
- To teach different numerical methods of solving problems.

Course Outcomes:

CO1:Demonstrate the approximations and errors in numerical computations

CO2: Realize the significance of numerical methods and employ suitable method to solve algebraic and transcendental equations

CO3: Compute the p^{th} root of a number using numerical methods

CO4:Determine a polynomial which fits the given data and entry for a given argument using suitable interpolation formula with equal and unequal intervals

CO5:Determine argument for a given entry using suitable inverse interpolation formula

SYLLABUS

UNIT-I: (10 hours)

Errors in numerical computations: Numbers and their accuracy, Mathematical preliminaries, Errors and their analysis, Absolute, Relative and Percentage errors, A general error formula, Error in a series approximation.

UNIT-II: (12 hours)

Solution of Algebraic and transcendental equations: The bisection method, The iteration method, The method of false position, Newton Raphson method, Generalized Newton Raphson method, Muller's method.

UNIT-III: Interpolation-I (12 hours)

Interpolation: Errors in polynomial interpolation, Finite differences, Forward differences, Backward differences, Central differences, Symbolic relations, Detection of errors by use of difference tables, Differences of a polynomial.

UNIT-IV: Interpolation-II (12 hours)

Newton's formula for interpolation, Central difference interpolation formulae, Gauss central difference formulae, Stirling's central difference formula, Bessel's formula, Everett's formula.

UNIT-V: Interpolation-III (14 hours)

Interpolation with unevenly spaced points, Lagrange's formula, Error in Lagrange's formula, Divided differences and their properties, Relation between divided differences and forward differences, Relation between divided differences and backward differences, Relation between divided differences and central differences, Newton's general interpolation formula, Inverseinterpolation: Lagrange's inverse interpolation formula and method of successive approximations.

Prescribed Text Book:

Calculus of finite differences & Numerical analysis, Revised edition, Gupta, Malik and Chauhan, Krishna Prakashan Media Pvt. Ltd.

Reference books:

1. Numerical analysis, revised edition
   S. Ranganatham, Dr. M.V. S.S.N. Prasad, Dr. V.RameshBabuS.Chand publications.
2. Numerical analysis, G.Sankar Rao, New age international publisher.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA–8

(Affiliated to Krishna University, Machilipatnam)

III B.Sc Mathematics,(Common Elective)

SYLLABUS

Subject: Mathematics Semester: VI

Course Title: Laplace Transforms Course Code:MATHC037

No.of Hrs.:60

Objectives:

- To emphasize on systematic evaluation of Laplace and inverse Laplace transforms.
- To give the importance of Laplace transforms.

Course Outcomes:

CO1.Solve the Laplace transform of standard functions both from the definition and by using tables.

CO2. Select and use the appropriate shift theorems in finding Laplace and inverse Laplace transforms.

CO3. Select and combine the necessary Laplace transform techniques to solve second-order ordinary differential equations involving the Dirac delta (or unit impulse).

Unit-I: Laplace Transform I (12 hours)

Definition of Integral transform, Definition of Laplace transform, Linearity property of Laplace transform, Piecewise continuous functions, Existence of Laplace transform, Functions of exponential order and function of class A.

Chapter–1: 1.1 – 1.8;

Unit-II: Laplace Transform II (12 hours)

First shifting theorem, Second shifting theorem, Change of scale property, Laplace transform of derivatives of F(t), Initial value theorem and final value theorem.

Chapter–1: 1.9 – 1.12; 1.14 – 1.15;

Unit-III: Laplace Transform III (12 hours)

Laplace transform of integrals, Multiplication by t, Multiplication by t^n, Division by t, Laplace transform of Bessel function, Laplace transform of Error function, Laplace function of Sine and Cosine integrals.

Chapter–1: 1.16 – 1.20; 1.22 – 1.23;

Unit-IV: Inverse Laplace Transform I (12 hours)

Definition of Inverse Laplace transform, Linearity property, First shifting theorem, Second shifting theorem, Change of scale property, Use of partial fractions, Examples.

Chapter–2: 2.1; 2.4 – 2.9;

Unit-V: Inverse Laplace Transform II (12 hours)

Inverse Laplace transforms of derivatives, Inverse Laplace transforms of integrals, Multiplication by powers of p, division by powers of p, Convolution definition, Convolution theorem, proof and applications, Heaviside's expansion theorem and its applications.

Chapter–2: 2.10 – 2.17; 2.19;

Prescribed Text Book:

Integral Transforms by A.R.Vasishtha and R.K.Gupta, 34th Edition-2015.
Krishna Prakashan Media Pvt. Ltd.

Reference books:

1. Fourier Series and Integral Transforms by S.Sreenadh, S. Chand and Co.,
2. Laplace and Fourier Transforms by J.K.Goyal and K.P.Gupta, Pragathi Prakashan publications.
3. Integral Transforms by M.D. Raisinghania and H.C.Saxena, S. Chand and Co.,