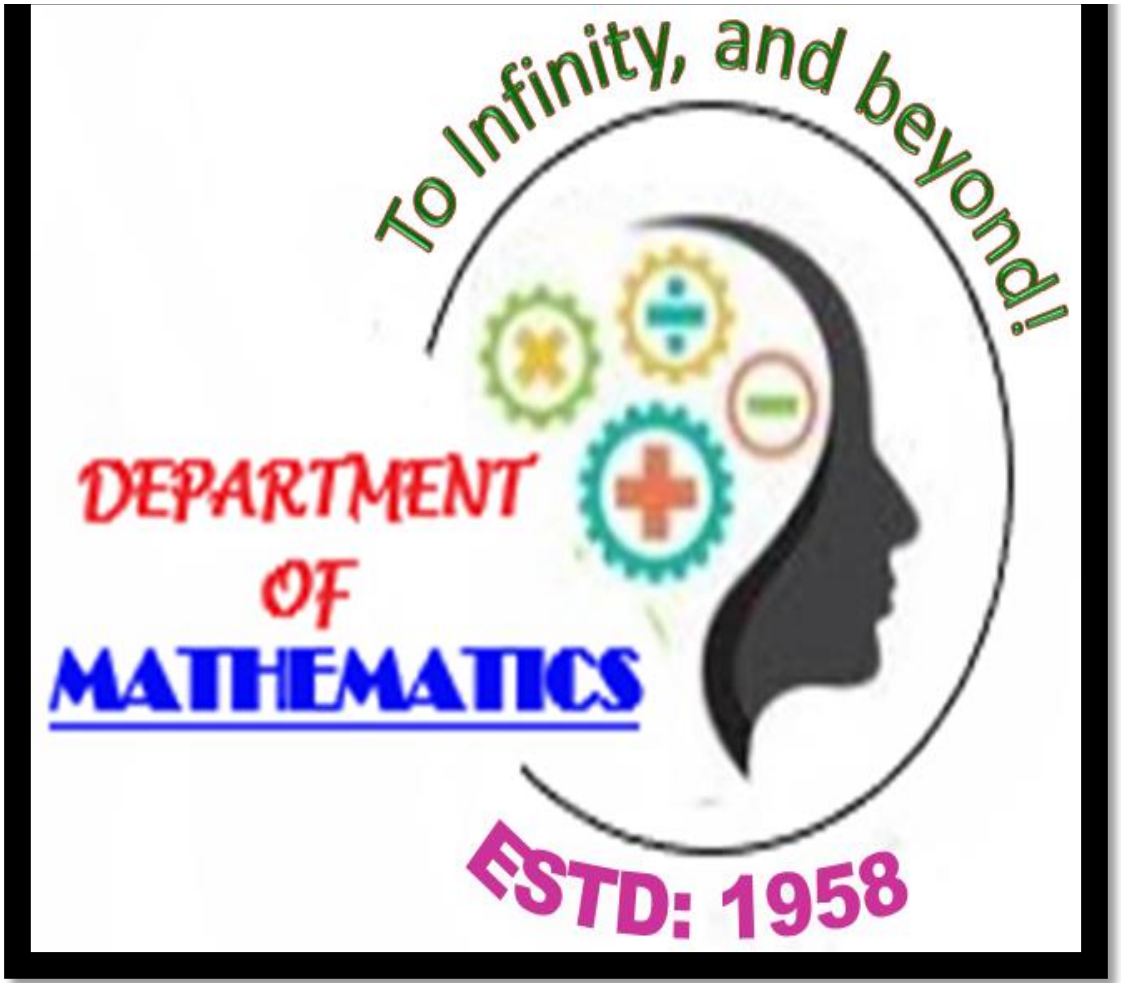
ST. JOSEPH'S COLLEGE FOR WOMEN (A)
VISAKHAPATNAM

DEPARTMENT OF MATHEMATICS

2020-2021



VISION

The department of mathematics strives to be recognized for academic excellence through the depth of its teaching and research, and to be locally relevant through its role in the development of the community. It serves while aligning with global technology.

MISSION

The mission of the mathematics department is to provide an environment where students can become mathematical thinkers, competent users and problem solvers of mathematics and mathematical applications and enable them to become lifelong learners and function as productive citizens.

PROGRAMME OUTCOMES OF BSC PROGRAMME

The knowledge intensive and skill-oriented curriculum of BSc programme in the three major mode is designed and deployed in the CBCS pattern at SJCW(A) envisaging the following outcomes

- Comprehensive **domain specific knowledge** provides the necessary intellectual competencies to progress to **higher** levels of **learning** and **research**
- Exhaustive **laboratory training** augments comprehension of theoretical principles and **ignites scientific temper**
- **Experiential learning** through internships/on the job training/surveys/field studies/live projects etc. ensures **problem solving and job skills**
- The **hard and soft skills** acquired in the form of LSRW/verbal/analytical/numerical/reasoning/programming/coding attributes, contribute to success in National and International level tests for **admission and recruitment**
- Individual and group **projects** and assignments kindle **research aptitude**
- **Autodidactic learning** tasks induce **critical thinking** and lead to optimal utilisation and creation of e resources on the net
- The mandatory **life skills courses** nurture **ethical behaviour, social responsibility and environmental consciousness**
- Leadership training, entrepreneurship education courses hone leadership skills and groom entrepreneurial tendencies fostering **future leaders and job providers**
- Selective perusal of personality development courses and participation in extra and co-curricular activities ensure physical and psychological fitness leading to **personal empowerment and responsible citizenship**
- The **holistic BSc programme** at SJCW(A), in toto, strengthens the strengths of the learners, weakens their weaknesses, helps them to overcome challenges and creates opportunities for them to evolve into socially **responsive members of society.**

INDEX PAGE GRID

Semester	Code No.	Subject
I	M1302(3)	Differential Equations
I	M1352(2)	Differential Equations Practical
II	M2301(3)	Solid Geometry
II	M2351(2)	Solid Geometry Practical
III	M3301(3)	Abstract Algebra
III	M3351(2)	Abstract Algebra Practical
IV	M4301(3)	Real Analysis
IV	M4351(2)	Real Analysis Practical
V	M5301(3)	Ring Theory & Vector Calculus
V	M5302(3)	Linear Algebra
V	M5351(2)	Ring Theory & Vector Calculus Practical
V	M5352(2)	Linear Algebra Practical
VI	M-E_1-6301(3) M-E_2-6301(3)	Electives: (any one) Numerical Analysis Laplace Transforms
VI	M-E_1-6351(2) M-E_2-6351(2)	Electives: (any one) Numerical Analysis Laplace Transforms Practical

V1	**M-A_1-6351(2)**	**Integral Transforms Practical**
VI	**M-A_2-6301(3)**	**Advanced Numerical Analysis**
VI	**M-A_2-6351(2)**	**Advanced Numerical Analysis Practical**
VI	**M-A3-6301(3)**	**Special Functions**
VI	**M-A3-6351(2)**	**Special Functions Practical**
VI	**M-B_1-6301 (3)**	**Graph Theory**
VI	**M-B_1-6351 (2)**	**Graph Theory Practical**
VI	**M-B_2-6301 (3)**	**Applied Graph Theory**
VI	**M-B_2-6351 (2)**	**Applied Graph Theory Practical**
VI	**M-B_3-6301 (3)**	**Fluid Mechanics**
VI	**M-B_3-6351 (2)**	**Fluid Mechanics Practical**

St. Joseph's College for Women (Autonomous), Visakhapatnam

I SEMESTER MATHEMATICS TIME: 5 Hrs/Week

M 1302 (3) DIFFERENTIAL EQUATIONS Max. Marks : 100

w.e.f 2020-2021(AH Batch)

SYLLABUS

Course Objectives:

To enable the students to –

- Analyze the solution of differential equations of the first order and of the first degree by variables separable, Homogeneous and Non-Homogeneous methods.
- Evaluate a solution of differential equations of the first order and of a degree higher than the first by using methods of solvable for p, x and y.
- Compute all the solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients.
- Solve simultaneous linear equations with constant coefficients and total differential equations
- Find the solution of First order partial differential equations for some standard types
- Apply Laplace transform to solve second order linear differential equation and simultaneous linear differential equations
- Compute all the solutions of Higher Order Linear Differential Equations with Constant Coefficients and non-Constant Coefficients

Course Outcomes:

At the end of the course student will

- **CO1:** Analyze real-world problems in fields such as Biology, Chemistry, Economics, Engineering, and Physics, including problems related to population dynamics, mixtures, growth and decay, heating and cooling, electronic circuits, and Newtonian mechanics.
- **CO2:**Identify, analyze and learn physical situations which can be described by ordinary differential equations and modeling simple electrical circuits, projectile motion
- **CO3:** Recognize and solve first-order ordinary differential equations
- **CO4:** Recognize and solve second-order ordinary differential equations with constant coefficients, modeling free electrical and mechanical oscillations
- **CO5:**Acquire knowledge to find general solution of first order, second order and higher order homogeneous and non-homogeneous differential equations by manual and technology – based methods.
- **CO6:**Identify a general method for constructing solutions to non-homogeneous linear constant coefficient's of second order equations.

- **CO7:**Analyze a variety of differential equations analytically and numerically
- **CO8:**Develop skill to formulate models of natural phenomena using differential Equations
- **CO9:** Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.
- **CO10:** Describe exponential growth and decay, the population of growth of the species or the change in investment return over time.

Course Syllabus:

UNIT – I

Differential Equations of first order and first degree:

Linear Differential Equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors; Change of variables.

UNIT – II

(a) Orthogonal Trajectories: Definitions,Cartesian Coordinates, Working rule to find the Orthogonal Trajectories of a given Family of Curves, Self-Orthogonal Family of Curves, Polar Coordinates

(b) 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); Equations homogeneous in x and y; Equations of the first degree in *x* and*y*– Clairaut's Equation.

UNIT – III

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 when Q is a function of *x*, $\frac{1}{f(D)}$is expressed as partial fractions.

P.I. of f(D)y = Q when Q = be^{ax}be

P.I. of f(D)y = Q when Q is bsinax or bcosax.

UNIT – IV

(a) Higher order linear differential equations - II:

Solution of the non-homogeneous linear differential equations with constant coefficients

P.I. of f(D)y = Q when Q = bx^k

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

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

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

(b) System of Linear Differential Equations:

Definitions, Solution of a system of linear equations with constant questions, Degenerate and non-degenerate system, General solution of the system of two linear differential equations with constant coefficients, An equivalent triangular system, Degenerate case, The system of three linear equations

UNIT –V

(a) Higher order linear differential equations - III:

Method of variation of parameters; Linear Differential Equations with non-constant coefficients; The Cauchy-Euler Equation, Legendre's linear equations, miscellaneous differential equations.

(b) Partial Differential Equations: Formation of partial differential equations, equations of first order, Lagrange's linear equations, charpit's method, standard types of first order non-linear partial differential equations.

Co-Curricular Activities

Seminar/ Quiz/ Assignments/ Applications of Differential Equations to Real life Problem /Problem Solving.

Prescribed text books:

A Text book of B.Sc Mathematics, Vol-I (First Semester) by S.Chand Publications - 2020 Edition

Reference Books:

1. A Text book of Mathematics – Vol I – Vashishta&Vashishta (1998)

2. Differential Equations - J.N.Sharma, Dr.R.K.Gupta-Krishna Prakash Media Pvt Ltd (1996)

3. Differential Equations - M.L.Khanna- Jai Prakash&Co(1954)

4. Differential Equations and Their Applications by ZafarAhsan, published by Prentice-Hall of India Pvt. Ltd, New Delhi-Second edition.

5. Ordinary and Partial Differential Equations by Dr. M.D,Raisinghania, published by S. Chand & Company, New Delhi.

6. Differential Equations with applications and programs – S. BalachandraRao& HR Anuradha-Universities Press.

7. Differential Equations -SrinivasVangala&Madhu Rajesh, published by Spectrum University Press.

St. Joseph's College for Women (Autonomous), Visakhapatnam

I SEMESTER **MATHEMATICS** **TIME: 2 Hrs/Week**

M 1352 (2) **DIFFERENTIAL EQUATIONS** **Max. Marks : 50**

w.e.f 2020-2021(AH Batch)

PRACTICAL SYLLABUS

Course Objectives:

To enable the students to –

- Analyze the solution of differential equations of the first order and of the first degree by variables separable, Homogeneous and Non-Homogeneous methods.
- Evaluate a solution of differential equations of the first order and of a degree higher than the first by using methods of solvable for p, x and y.
- Compute all the solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients.
- Solve simultaneous linear equations with constant coefficients and total differential equations
- Find the solution of First order partial differential equations for some standard types
- Apply Laplace transform to solve second order linear differential equation and simultaneous linear differential equations
- Compute all the solutions of Higher Order Linear Differential Equations with Constant Coefficients and non-Constant Coefficients

Course Outcomes:

At the end of the course student will

- **CO1:** Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:**Analyze real-world problems in fields such as Biology, Chemistry, Economics, Engineering, and Physics, including problems related to population dynamics, mixtures, growth and decay, heating and cooling, electronic circuits, and Newtonian mechanics.
- **CO3:**Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- **CO4:**Identify, analyze and learn physical situations which can be described by ordinary differential equations and modeling simple electrical circuits, projectile motion
- **CO5:**Recognize and solve first-order ordinary differential equations
- **CO6:**Recognize and solve second-order ordinary differential equations with constant coefficients, modeling free electrical and mechanical oscillations

- **CO7:**Acquire knowledge to find general solution of first order, second order and higher order homogeneous and non-homogeneous differential equations by manual and technology – based methods.
- **CO8:**Identify a general method for constructing solutions to non-homogeneous linear constant coefficient's of second order equations.
- **CO9:**Analyze a variety of differential equations analytically and numerically
- **CO10:**Ability to analyze a problem, identify and define the computing requirements, which may be appropriate to its solution
- **CO11:**Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- **CO12:**Problem solving on differential equations
- **CO13:**Develop skill to formulate models of natural phenomena using differential Equations
- **CO14:**Describe exponential growth and decay, the population of growth of the species or the change in investment return over time.

Course Syllabus:

UNIT – I

Differential Equations of first order and first degree:

Linear Differential Equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors; Change of variables.

UNIT – II

(a) Orthogonal Trajectories: Definitions, Cartesian Coordinates, Working rule to find the Orthogonal Trajectories of a given Family of Curves, Self-Orthogonal Family of Curves, Polar Coordinates

(b) 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); Equations homogeneous in x and y; Equations of the first degree in *x* and *y* – Clairaut's Equation.

UNIT – III

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 when Q is a function of *x*, $\frac{1}{f(D)}$is expressed as partial fractions.

P.I. of f(D)y = Q when Q = be^{ax}be

P.I. of f(D)y = Q when Q is bsinax or bcosax.

UNIT – IV

(a) Higher order linear differential equations - II:

Solution of the non-homogeneous linear differential equations with constant coefficients

P.I. of f(D)y = Q when Q = bx^k

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

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

P.I. of f(D)y = Q when Q = $x^m V$**,** where V is a function of *x*.

(b) System of Linear Differential Equations:

Definitions, Solution of a system of linear equations with constant questions, Degenerate and non-degenerate system, General solution of the system of two linear differential equations with constant coefficients, An equivalent triangular system, Degenerate case, The system of three linear equations

UNIT –V

(a) Higher order linear differential equations - III :

Method of variation of parameters; Linear Differential Equations with non-constant coefficients; The Cauchy-Euler Equation, Legendre's linear equations, miscellaneous differential equations.

(b) Partial Differential Equations: Formation of partial differential equations, equations of first order, Lagrange's linear equations, Charpit's method, standard types of first order non-linear partial differential equations.

Co-Curricular Activities

Seminar/ Quiz/ Assignments/ Applications of Differential Equations to Real life Problem /Problem Solving.

Prescribed text books:

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3. Differential Equations - M.L.Khanna- Jai Prakash&Co(1954)

4. Differential Equations and Their Applications by ZafarAhsan, published by Prentice-Hall of India Pvt. Ltd, New Delhi-Second edition.

5. Ordinary and Partial Differential Equations by Dr. M.D,Raisinghania, published by S. Chand & Company, New Delhi.

6. Differential Equations with applications and programs – S. BalachandraRao& HR Anuradha-Universities Press.

7. Differential Equations -SrinivasVangala&Madhu Rajesh, published by Spectrum University Press.

St. Joseph's College for Women (Autonomous), Visakhapatnam

II SEMESTER MATHEMATICS TIME: 5 Hrs./Week

M 2302 (3) Three Dimensional Analytical Solid GeometryMax.Marks : 100

w.e.f 2020-2021(AH Batch)

SYLLABUS

Course Objectives:

To enable the students to –

1. Describe the various forms of equation of a plane, straight line, Sphere, Cone and Cylinder

2. Find the angle between planes, Bisector planes, Perpendicular distance from a point to a plane, Image of a line on a plane, Inter section of two lines

3. Define coplanar lines and illustrate

4. Compute the angle between a line and a plane, length of perpendicular from a point to a line

5. Define skew lines and calculate the shortest distance between two skew lines

.

Course Outcomes:

At the end of the course student will

- **CO1:**Acquire a level of proficiency in particular in using equation of plane in terms of its intercepts on axis and the equation of the planes through the given point length of the perpendicular from a given point to a given plane
- **CO2:**Explore the basic concept of the equation of a line, angle between the line and a plane, and the shortest distance between two lines.
- **CO3:**Develop their knowledge and apply the skills in the study of the sphere.
- **CO4:**Gain a broader understanding on cones
- **CO5:**Use the facts, formulas and techniques learned in this course to prove applications to cylinders.
- **CO6:**Give the knowledge of geometry using maxima software
- **CO7:**Apply skill in the real world including Computer aided design for construction blue print, the design of assembly systems in manufacturing, nanotechnology and Computer graphics, visual graphs, video game programming and virtual reality creation.

Course Syllabus:

UNIT – I

The Plane:

Equation of plane in terms of its intercepts on the axis, Equations of the plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes, Combined equation of two planes, Orthogonal projection on a plane.

UNIT – II

The Line:

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 straight line; Sets of conditions which determine a line; The shortest distance between two lines; The length and equations of the line of shortest distance between two straight lines; Length of the perpendicular from a given point to a given line.

UNIT – III

The Sphere: Definition and equation of the sphere; Equation of the sphere through four given points; Plane sections 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

UNIT – IV

The Sphere and the Cone:

The Sphere: Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres; Simplified from of the equation of two spheres.

The Cone: Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone; Enveloping cone of a sphere; Right circular cone: equation of the right circular cone with a given vertex, axis and semi vertical angle.

UNIT – V

The Cone and the Cylinder:

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.

The Cylinder: Definition of a cylinder; Equation to the cylinder whose generators intersect a given conic and are parallel to a given line; Enveloping cylinder of a sphere; The right circular cylinder; Equation of the right circular cylinder with a given axis and radius. The general equation of the second degree and the various surfaces represented by it, shapes of some surfaces, Nature of Ellipsoid, Nature of Hyperboloid of one sheet.

Co-Curricular Activities:

Seminar/ Quiz/ Assignments/Three dimensional analytical Solid geometry and its applications/ Problem Solving.

Prescribed Text Book :V Krishna Murthy & Others "A text book of Mathematics for BA/B.Sc Vol 1(Second Semester), Published by S. Chand & Company, New Delhi. (– 2016)

Reference Books :

1. Analytical Solid Geometry by Shanti Narayan and P.K. Mittal Published by S. Chand & Company Ltd. Seventeenth Edition.Sections :- 2.4, 2.7, 2.9, 3.1 to 3.8, 6.1 to 6.9, 7.1 to 7.8. - 2015

2. P.K. Jain and Khaleel Ahmed, "A text Book of Analytical Geometry of Three Dimensions", Wiley Eastern Ltd., 1999.

3. 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. (2000)

4. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, Published by Wiley Eastern Ltd., 1999.

5. 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.

6. Solid Geometry by B.RamaBhupal Reddy, published by Spectrum University Press.

St. Joseph's College for Women (Autonomous), Visakhapatnam

II SEMESTER MATHEMATICS TIME: 2 Hrs./Week

M 2352 (3) Three Dimensional Analytical Solid Geometry Max. Marks : 50

w.e.f 2020-2021(AH Batch)

PRACTICAL SYLLABUS

Course Outcomes:

After successful completion of this course, the student will be able to;

1. get the knowledge of planes.
2. basic idea of lines, sphere, cone and cylinder.
3. understand the properties of planes, lines, spheres, cones and cylinders.
4. express the problems geometrically and then to get the solution.

Course Outcomes:

At the end of the course student will

- acquire a level of proficiency in particular in using equation of plane in terms of its intercepts on axis and the equation of the planes through the given point length of the perpendicular from a given point to a given plane
- explore the basic concept of the equation of a line, angle between the line and a plane, and the shortest distance between two lines.
- develop their knowledge and apply the skills in the study of the sphere.
- gain a broader understanding on cones
- use the facts, formulas and techniques learned in this course to prove applications to cylinders.
- apply skill in the real world include Computer aided design for construction blue print, the design of assembly systems in manufacturing, nanotechnology and Computer graphics, visual graphs, video game programming and virtual reality creation.

Course Syllabus:

UNIT – I

The Plane:

Equation of plane in terms of its intercepts on the axis, Equations of the plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes, Combined equation of two planes; Problem solving method

UNIT – II

The Line:

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; The shortest distance between two lines; The length and equations of the line of shortest distance between two straight lines; Length of the perpendicular from a given point to a given line; Problem solving method

UNIT – III

The Sphere:

Definition and equation of the sphere; Equation of the sphere through four given points; Plane sections 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; Problem solving method

UNIT – IV

The Sphere and the Cone:

The Sphere:

Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres; Simplified from of the equation of two spheres; Problem solving method

The Cone:

Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone; Enveloping cone of a sphere; Right circular cone: equation of the right circular cone with a given vertex, axis and semi vertical angle; Problem solving method

UNIT – V

The Cone and the Cylinder:

The Cone(Continuation): 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; Problem solving method

The Cylinder: Definition of a cylinder; Equation to the cylinder whose generators intersect a given conic and are parallel to a given line; Enveloping cylinder of a sphere; The right circular cylinder; Equation of the right circular cylinder with a given axis and radius. The general equation of the second degree and the various surfaces represented by it, shapes of some surfaces, Nature of Ellipsoid, Nature of Hyperboloid of one sheet; Problem solving method

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3. 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. (2000)

4. A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, published by Wiley Eastern Ltd., 1999.

5. 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.

6. Solid Geometry by B.RamaBhupal Reddy, published by Spectrum University Press.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) , VISAKHAPATNAM

III SEMESTER MATHEMATICS

ABSTRACT ALGEBRA 5 Hrs/Week

M 3301(4) (Number Theory & Group Theory) Max. Marks : 100

w.e.f 2017-2018 SYLLABUS

Course Objectives:

To enable the students to –

- Learn the definitions and methods.
- Understand the problems, theorems & identities
- Illustrate the Division and Euclidean Algorithm
- Describe the properties of prime numbers
- Define congruence and describe the properties of congruence
- understand the concept of binary operations by definition and examples.
- determine whether a given binary operation on the given set gives a group structure by applying the axioms.
- determine whether a given group is abelian by checking the properties.
- describe all elements in a cyclic subgroup by using generators.
- understand the importance of algebraic properties with regard to working within various number systems
- compute the expression of permutation groups by using permutation multiplication.

Course Outcomes:

At the end of the course student will

- **CO1:**Be able to study the properties of sets, and check whether the given set are groups or not and study various theorems which can be applied to study various algebraic structures.
- **CO2:**Be able to understand the concept of equivalence relation by applying different examples to the definition
- **CO3:**Identify necessary and sufficient conditions for a non-empty subset of a group to become a subgroup and develop skills in solving problems in groups which facilitate and solving of problems in Cosets
- **CO4:**Advance their ability to apply the necessary and sufficient conditions studied, to solve the problems in Normal Subgroups and learn the concept of Quotient group
- **CO5:**Be able to deduce other homomorphism theorems from fundamental theorem of Homomorphism and also illustrate the concept of automorphisms and related theorems
- **CO5:**Be able to understand the concepts of permutation groups, cyclic groups, finding the number of generators of a cyclic group.

COURSE SYLLABUS

NUMBER THEORY

UNIT I :

a) Divisibility and primes: the Euclid's Division Algorithm–Divisor–Even and Odd integers–Greatest Common Divisor (G.C.D), Construction of G.C.D from Division Algorithm – Relatively Prime or Co prime Integers – Least Common Multiple (L.C.M), PRIMES AND Composite Numbers–Euclid's Lemma–The Fundamental theorem of arithmetic – Canonicals from – The number of divisors of a positive integer n, - The sum of all the distinct positive integral divisors of a positive integer n, - Perfect number – Bracket function.

b) Congruences and the Function: Congruences–Linear Congruences–Euler-ϕ Function – Fermat's theorem – Wilson's theorem.

GROUP THEORY

UNIT – II :

(a) GROUPS

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.

(b) SUBGROUPS

Complex Definition – Multiplication of Two Complexes - Inverse of a Complex-Subgroup Definition – Examples - Criterion for a Complex to be a Subgroups, Criterion for the Product of Two Subgroups to be a Subgroup-Union and Intersection of Subgroups.

UNIT –III :

(a) CO-SETS AND LAGRANGE'S THEOREM

Cosets Definition – Properties of Cosets – Index of a Subgroups of a Finite Groups–Lagrange's Theorem.

(b) NORMAL SUBGROUPS

Definition of Normal Subgroup – Proper and Improper Normal Subgroup–Hamilton Group – Criterion for a Subgroup to be a Normal Subgroup – Intersection of Two Normal Subgroups – Sub group of Index 2 is a Normal Sub Group – Simple Group – Quotient Group – Criteria for the Existence of a Quotient Group.

UNIT – IV : HOMOMORPHISM

Definition of Homomorphism – Image of Homomorphism Elementary Properties of Homomorphism – Isomorphism – Automorphism - Definitions and Elementary Properties – Kernel of a Homomorphism – Fundamental Theorem on Homomorphism and Applications.

UNIT – V :

(a) PERMUTATIONS AND CYCLIC GROUPS

Definition of Permutation – Permutation Multiplication – Inverse of a Permutation – Cyclic Permutations – Transposition – Even and Odd Permutations – Cayley's Theorem.

(b) CYCLIC GROUPS

Definition of Cyclic Group – Elementary Properties – Classification of Cyclic Groups.

Prescribed Text Book :A Text of Mathematics B.Sc. Mathematics Vol – II by S. CHAND Publications(2016)

Reference Books :

1. Abstract Algebra, by J.B. Fraleigh, Published by Narosa Publishing house. (2006)
2. A text book of Mathematics for B.A. / B.Sc. by B.V.S.S. SARMA and others, Published by S.Chand & Company, New Delhi. (2003)
3. Modern Algebra by M.L. Khanna.(1998)
4. Theory of Numbers – Prakash Om (1982) – Lakshmi Publications
5. Introduction to Analytic Number Theory – Tom M. Apostol – Narosa Publishing House, New Delhi. (2001)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) , VISAKHAPATNAM

III SEMESTER MATHEMATICS

ABSTRACT ALGEBRA Time: 2 Hrs/Week

M 3351(2) (Number Theory & Group Theory) Max. Marks : 50

w.e.f 2017-2018 PRACTICAL SYLLABUS

Course Objectives:

To enable the students to –

- Learn the definitions and methods.
- Understand the problems, theorems & identities
- Illustrate the Division and Euclidean Algorithm
- Describe the properties of prime numbers
- Define congruence and describe the properties of congruence
- understand the concept of binary operations by definition and examples.
- determine whether a given binary operation on the given set gives a group structure by applying the axioms.
- determine whether a given group is abelian by checking the properties.
- describe all elements in a cyclic subgroup by using generators.
- understand the importance of algebraic properties with regard to working within various number systems
- compute the expression of permutation groups by using permutation multiplication.

Course Outcomes:

At the end of the course student will

- **CO1:**Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:**Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- **CO3:**Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- **CO4:**Problem solving on Number Theory and Group Theory
- **CO5:**Be able to study the properties of sets, and check whether the given set are groups or not and study various theorems which can be applied to study various algebraic structures.
- **CO6:**Be able to understand the concept of equivalence relation by applying different examples to the definition
- **CO7:**Identify necessary and sufficient conditions for a non-empty subset of a group to become a subgroup and develop skills in solving problems in groups which facilitate, solving of problems in Cosets
- **CO8:**Advance their ability to apply the necessary and sufficient conditions studied, to solve the problems in Normal Subgroups and learn the concept of Quotient group
- **CO9:**Be able to deduce other homomorphism theorems from fundamental theorem of Homomorphism and also illustratethe concept of automorphisms and related theorems

COURSE SYLLABUS

NUMBER THEORY

UNIT I :

b) Divisibility and primes: the Euclid's Division Algorithm–Divisor–Even and Odd integers–Greatest Common Divisor (G.C.D), Construction of G.C.D from Division Algorithm – Relatively Prime or Co prime Integers – Least Common Multiple (L.C.M), PRIMES AND Composite Numbers–Euclid's Lemma–The Fundamental theorem of arithmetic – Canonicals from – The number of divisors of a positive integer n, - The sum of all the distinct positive integral divisors of a positive integer n, - Perfect number – Bracket function.

b) Congruences and the Function: Congruences–Linear Congruences–Euler-ϕ Function – Fermat's theorem – Wilson's theorem.

GROUP THEORY

UNIT – II :

(a) GROUPS

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.

(b) SUBGROUPS

Complex Definition – Multiplication of Two Complexes - Inverse of a Complex-Subgroup Definition – Examples - Criterion for a Complex to be a Subgroups, Criterion for the Product of Two Subgroups to be a Subgroup-Union and Intersection of Subgroups.

UNIT –III :

(a) CO-SETS AND LAGRANGE'S THEOREM

Cosets Definition – Properties of Cosets–Index of a Subgroups of a Finite Groups–Lagrange's Theorem.

(b) NORMAL SUBGROUPS

Definition of Normal Subgroup – Proper and Improper Normal Subgroup–Hamilton Group – Criterion for a Subgroup to be a Normal Subgroup – Intersection of Two Normal Subgroups – Sub group of Index 2 is a Normal Sub Group – Simple Group – Quotient Group – Criteria for the Existence of a Quotient Group.

UNIT – IV : HOMOMORPHISM

Definition of Homomorphism – Image of Homomorphism Elementary Properties of Homomorphism – Isomorphism – Automorphism - Definitions and Elementary Properties – Kernel of a Homomorphism – Fundamental Theorem on Homomorphism and Applications.

UNIT – V :

(a) PERMUTATIONS AND CYCLIC GROUPS

Definition of Permutation – Permutation Multiplication – Inverse of a Permutation – Cyclic Permutations – Transposition – Even and Odd Permutations – Cayley's Theorem.

(b) CYCLIC GROUPS

Definition of Cyclic Group – Elementary Properties – Classification of Cyclic Groups.

Prescribed Text Book :A Text of Mathematics B.Sc. Mathematics Vol – II by S. CHAND Publications(2016)

Reference Books :

1. Abstract Algebra, by J.B. Fraleigh, Published by Narosa Publishing house. (2006)
2. A text book of Mathematics for B.A. / B.Sc. by B.V.S.S. SARMA and others, Published by S.Chand & Company, New Delhi. (2003)
3. Modern Algebra by M.L. Khanna.(1998)
4. Theory of Numbers – Prakash Om (1982) – Lakshmi Publications
5. Introduction to Analytic Number Theory – Tom M. Apostol – Narosa Publishing House, New Delhi. (2001)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

IV SEMESTER **MATHEMATICS** **5 Hrs/Week**
M 4301 (3)

REAL ANALYSIS **Max.Marks : 100**

w.e.f : 2017 - 2018 **SYLLABUS**

Course Objectives:

To enable the students to –

a. know and understand the definition and theorems of Real Analysis
b. apply mathematical concepts and principles to perform numerical and symbolic computations.
c. prove properties of convergent and divergent sequence.
d. verify the given sequence in convergent and divergent by using behavior of Monotonic sequence.
e. prove Cauchy's first limit theorem, Cesaro's theorem, Cauchy's Second limit theorem.
f. explain subsequences, upper and lower limits of a sequence.
g. give examples for convergence, divergence and oscillating series.
h. prove theorems on different test of convergence and divergence of a series of positive terms.
i. verify the given series is convergent or divergent by using different test and To inculcate knowledge on real numbers and their properties & proofs.
j. compare with other fields like engineering , physics and other allied sciences.

Course Outcomes
At the end of the course student will

- **CO1:**Be able to gain knowledge and concepts of Real analysis and it's applications
- **CO2:**Develop a higher level of mathematical knowledge combined with the ability to think analytically
- **CO3:**Ability to understand the different math concepts and be able to implement them in our everyday problems
- **CO4:**Be able to write simple proofs on their own and study bigger theorems
- **CO5:**Be able to demonstrate the power to integrate data and ideas of differentiation and integration during a coherent and substantive manner and use acceptable techniques for resolution connected issues and establishing theoretical results
- **CO6:** Gain Knowledge of fundamental concepts of real numbers.
- **CO7:**Verify the value of the limit of a function at a point using the definition of the limit
- **CO8:**Learn to check function is continuous understand the consequences of the intermediate value theorem for continuous functions
- **CO9:**Apply the knowledge in higher studies like P.G. and Research.

COURSE SYLLABUS

UNIT – I :

(a) REAL NUMBERS :

The algebraic and order properties of R, Absolute value and Real line, Completeness property of R, Applications of supremum property, intervals.
No Question is to be set from this portion.

(b) REAL SEQUENCES:

Sequences and their limits, Range and Boundedness of Sequences, Limit of a sequence and Convergent sequence, The Cauchy's criterion, properly divergent sequences, Monotone Sequences, Necessary and Sufficient condition for Convergence of Monotone Sequence, Limit Point of Sequence, Subsequences and the Bolzano-Weierstrass theorem – Cauchy Sequences – Cauchy's General Principle of Convergence or Convergence theorem, Cauchy's first theorem on limits, Cauchy's second theorem, Cesaro's theorem

UNIT –II :

INFINITIE SERIES :

Introduction to Series, Convergence of Series. Cauchy's General Principle of Convergence, Series of Non-Negative Terms
1.Comparison Tests
2.Auxiliary Series or P - Series Test
3. Cauchy's n^{th} Root test or Root Test.
4. D'-Alemberts' Test or Ratio Test.
5. Raabe's Test
Alternating Series – Leibnitz Test, Absolute Convergence and Conditional Convergence, Semi Convergence.

UNIT – III :

CONTINUITY :

Limits : Real valued Functions, Boundedness of a function, Limits of functions. Some extensions of the limit concept, Infinite Limits, Limits at infinity.
No. Question is to be set from this portion.

Continuous Functions : Continuous functions, Combinations of continuous functions, Continuous Functions on intervals, uniform continuity.

UNIT – IV :

DIFFERENTIATION AND MEAN VALUE THEORMS :

The derivability of a function, on an interval, at a point, Derivability and continuity of a function, Graphical meaning of the Derivative, Mean value Theorems : Role's Theorem, Lagrange's Theorem, Cauchy's Mean value Theorem

UNIT – V :

RIEMANN INTEGRATION :

Upper and Lower Riemann Sums, Upper and Lower Riemann Integrals, The Riemann Integral, Riemann Integral Functions, Darboux's Theorem. Necessary and Sufficient Condition for R – Integrability, Properties of Integrable Functions, Fundamental Theorem of Integral Calculus, Integral as the Limit of a Sum, Mean value Theorems.

Prescribed Text Book :A Text of Mathematics B.Sc. Mathematics Vol – II by S. CHAND Publications(2016)

Reference Books :

1. Real Analysis by Rabert & Bartely and .D.R. Sherbart, Published by John Wiley. (1997)
2.A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others, Published by S. Chand & Company Pvt. Ltd., New Delhi.(2007)
3.Elements of Real Analysis as per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisingkania Published by S. Chand & Company Pvt. Ltd., New Delhi. (2006)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

IV SEMESTER **MATHEMATICS** **2 Hrs/Week**
M 4351 (2)

REAL ANALYSIS **Max.Marks : 50**

w.e.f : 2017 - 2018 **PRACTICAL SYLLABUS**

Course Objectives:

To enable the students to –

k. know and understand the definition and theorems of Real Analysis

l. apply mathematical concepts and principles to perform numerical and symbolic computations.

m. prove properties of convergent and divergent sequence.

n. verify the given sequence in convergent and divergent by using behavior of Monotonic sequence.

o. prove Cauchy's first limit theorem, Cesaro's theorem, Cauchy's Second limit theorem.

p. explain subsequences, upper and lower limits of a sequence.

q. give examples for convergence, divergence and oscillating series.

r. prove theorems on different test of convergence and divergence of a series of positive terms.

s. verify the given series is convergent or divergent by using different test and To inculcate knowledge on real numbers and their properties & proofs.

t. compare with other fields like engineering , physics and other allied sciences.

Course Outcomes

At the end of the course student will

- **CO1:**Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:**Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- **CO3:**Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- **CO4:**Problem solving on Real Numbers, Sequences, Series, Continuity, Differentiation, Mean Value Theorems and Riemann Integration
- **CO5:**Be able to gain knowledge and concepts of Real analysis and it's applications
- **CO6:**Develop a higher level of mathematical knowledge combined with the ability to think analytically

- **CO7:**Ability to understand the different math concepts and be able to implement them in our everyday problems
- **CO8:**Be able to write simple proofs on their own and study bigger theorems
- **CO9:**Be able to demonstrate the power to integrate data and ideas of differentiation and integration during a coherent and substantive manner and use acceptable techniques for resolution connected issues and establishing theoretical results
- **CO10:**Apply the knowledge in higher studies like P.G. and Research.

COURSE SYLLABUS

UNIT – I :

(a) REAL NUMBERS :

The algebraic and order properties of R, Absolute value and Real line, Completeness property of R, Applications of supremum property, intervals.
No Question is to be set from this portion.

(b) REAL SEQUENCES:

Sequences and their limits, Range and Boundedness of Sequences, Limit of a sequence and Convergent sequence, The Cauchy's criterion, properly divergent sequences, Monotone Sequences, Necessary and Sufficient condition for Convergence of Monotone Sequence, Limit Point of Sequence, Subsequences and the Bolzano-Weierstrass theorem – Cauchy Sequences – Cauchy's General Principle of Convergence or Convergence theorem, Cauchy's first theorem on limits, Cauchy's second theorem, Cesaro's theorem

UNIT –II :

INFINITIE SERIES :

Introduction to Series, Convergence of Series. Cauchy's General Principle of Convergence, Series of Non-Negative Terms
1.Comparison Tests
2.Auxiliary Series or P - Series Test
3. Cauchy's n^{th} Root test or Root Test.
4. D'-Alemberts' Test or Ratio Test.
5. Raabe's Test
Alternating Series – Leibnitz Test, Absolute Convergence and Conditional Convergence, Semi Convergence.

UNIT – III :

CONTINUITY :

Limits : Real valued Functions, Boundedness of a function, Limits of functions. Some extensions of the limit concept, Infinite Limits, Limits at infinity.
(No. Question is to be set from this portion)

Continuous Functions : Continuous functions, Combinations of continuous functions, Continuous Functions on intervals, uniform continuity.

UNIT – IV :

DIFFERENTIATION AND MEAN VALUE THEOREMS:

The derivability of a function, on an interval, at a point, Derivability and continuity of a function, Graphical meaning of the Derivative, Mean value Theorems : Role's Theorem, Lagrange's Theorem, Cauchy's Mean value Theorem

UNIT – V :

RIEMANN INTEGRATION :

Upper and Lower Riemann Sums, Upper and Lower Riemann Integrals, The Riemann Integral, Riemann Integral Functions, Darboux's Theorem. Necessary and Sufficient Condition for R – Integrability, Properties of Integrable Functions, Fundamental Theorem of Integral Calculus, Integral as the Limit of a Sum, Mean value Theorems.

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1. Real Analysis by Rabert & Bartely and .D.R. Sherbart, Published by John Wiley. (1997)
2.A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others, Published by S. Chand & Company Pvt. Ltd., New Delhi.(2007)
3.Elements of Real Analysis as per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisingkania Published by S. Chand & Company Pvt. Ltd., New Delhi. (2006)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

V SEMESTER **MATHEMATICS** **TIME: 5 Hrs/Week**

M 5301 (3)

Ring Theory & Vector Calculus

Max. Marks: 100

w.e.f 2017-2018

SYLLABUS

Course Objectives:

To enable the students to

- know the principles of abstract algebra .
- understand the theorems and problems.
- inculcate knowledge on algebraic equations and their relations with properties
- define Homomorphism, Homorphic Image, Elementary Properties of Homomorphism
- define Kernel of a Homomorphism and explain Fundamental theorem of Homomorhphism on Groups and Rings
- define Integral Domains, Division Ring and Fields
- define The characteristic of a ring ,The characteristic of an Integral domain
- Define the characteristic of a Field. Sub Rings, Ideals and
- Boolean Rings, divisors of zero and cancellation laws Rings
- Know and understand the definition and theorems of Vector Calculus.
-
- Apply the theories in every branch of Science and also in commerce.

Course Outcomes:

At the end of the course student will

- **CO1:**Acquire basic knowledge in define and recognize the mathematical logic, the mathematical induction, the function and sets concepts of the relations and its properties of the group theory
- **CO2:**Develop skills to analyze, improve and outline the logical thinking. Interpret how to know the ring theory using the internet.
- **CO3:**Develop skills in designing mathematical models to illustrate, how to search the internet and use software programs to deal with problems
- **CO4:**Develop numerical skills in solving the problems involving to evaluate line integrals, surface integrals and volume integrals. Evaluate double and triple integrals in Euclidean, cylindrical and spherical coordinate systems.
- **CO5:**Use relevant numerical techniques to determine, and apply, the important quantities associated with vector fields such as the gradient of a scalar, divergence of a vector, curl of a

vector, and scalar potential. Evaluate integrals using Green's theorem, Gauss divergence theorem and Stoke's theorem.

Course Syllabus:

RING THEORY

UNIT – 1

RINGS-I :

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring - The characteristic of an Integral Domain, The characteristic of a Field. Sub Rings, Ideals

UNIT – 2

RINGS-II :

Definition of Homomorphism – Homorphic Image – Elementary Properties of Homomorphism – Kernel of a Homomorphism – Fundamental theorem of Homomorhphism –
Maximal Ideals – Prime Ideals.

VECTOR CALCULUS

UNIT –3

VECTOR DIFFERENTIATION :

Vector Differentiation, Ordinary derivatives of vectors, Differentiability, Gradient, Divergence, Curl operators, Formulae Involving these operators.

UNIT – 4

VECTOR INTEGRATION :

Line Integral, Surface Integral, Volume integral with examples.

UNIT – 5

VECTOR INTEGRATION APPLICATIONS : -

Theorems of Gauss divergence theorem, Stokes theorem andGreen's theorem in plane and applications of these theorems.

Prescribed Text Book :A Text of Mathematics B.Sc. Mathematics Vol – III by S. CHAND Publications(2016)

Reference Books :-

1. Abstract Algebra by J. Fralieh, Published by Narosa Publishing house. (2006)
2. Vector Calculus by Santhi Narayana, Published by S. Chand & Company Pvt. Ltd., New Delhi. (2006)
3. A text Book of B.Sc., Mathematics by B.V.S.S.Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi. (2016)
4. Vector Calculus by R. Gupta, Published by Laxmi Publications. (2002)
5. Vector Calculus by P.C. Matthews, Published by Springer Verlag publications. (1998)
6. Rings and Linear Algebra by Pundir & Pundir, Published by Pragathi Prakashan.(1996)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

V SEMESTER **MATHEMATICS** **TIME: 2 Hrs/Week**

M 5351 (2)

Ring Theory & Vector Calculus

Max. Marks: 50

w.e.f 2017-2018

PRACTICAL SYLLABUS

Course Objectives:

To enable the students to

- know the principles of abstract algebra .
- understand the theorems and problems.
- inculcate knowledge on algebraic equations and their relations with properties
- define Homomorphism, Homorphic Image, Elementary Properties of Homomorphism
- define Kernel of a Homomorphism and explain Fundamental theorem of Homomorhphism on Groups and Rings
- define Integral Domains, Division Ring and Fields
- define The characteristic of a ring ,The characteristic of an Integral domain
- Define the characteristic of a Field. Sub Rings, Ideals and
- Boolean Rings, divisors of zero and cancellation laws Rings
- Know and understand the definition and theorems of Vector Calculus.
-
- Apply the theories in every branch of Science and also in commerce.

Course Outcomes:

At the end of the course student will

- **CO1:** Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:** Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- **CO3:** Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- **CO4:** Problem solving on Ring Theory, Vector differentiation and Vector integration
- **CO5:** Acquire basic knowledge in define and recognize the mathematical logic, the mathematical induction, the function and sets concepts of the relations and its properties of the group theory

- **CO6:** Develop skills to analyze, improve and outline the logical thinking. Interpret how to know the ring theory using the internet.
- **CO7:** Develop skills in designing mathematical models to illustrate, how to search the internet and use software programs to deal with problems
- **CO8:** Develop numerical skills in solving the problems involving to evaluate line integrals, surface integrals and volume integrals. Evaluate double and triple integrals in Euclidean, cylindrical and spherical coordinate systems.
- **CO9:** Use relevant numerical techniques to determine, and apply, the important quantities associated with vector fields such as the gradient of a scalar, divergence of a vector, curl of a vector, and scalar potential. Evaluate integrals using Green's theorem, Gauss divergence theorem and Stoke's theorem.

COURSE SYLLABUS

RING THEORY

UNIT – 1

RINGS-I :

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring - The characteristic of an Integral Domain, The characteristic of a Field. Sub Rings, Ideals

UNIT – 2

RINGS-II :

Definition of Homomorphism – Homorphic Image – Elementary Properties of Homomorphism – Kernel of a Homomorphism – Fundamental theorem of Homomorhphism –
Maximal Ideals – Prime Ideals.

VECTOR CALCULUS

UNIT –3

VECTOR DIFFERENTIATION :

Vector Differentiation, Ordinary derivatives of vectors, Differentiability, Gradient, Divergence, Curl operators, Formulae Involving these operators.

UNIT – 4

VECTOR INTEGRATION :

Line Integral, Surface Integral, Volume integral with examples.

UNIT – 5

VECTOR INTEGRATION APPLICATIONS : -

Theorems of Gauss and Stokes, Green's theorem in plane and applications of these theorems.

Prescribed Text Book :A Text of Mathematics B.Sc. Mathematics Vol – III by S. CHAND Publications(2016)

Reference Books :-

1. Abstract Algebra by J. Fralieh, Published by Narosa Publishing house. (2006)
2. Vector Calculus by Santhi Narayana, Published by S. Chand & Company Pvt. Ltd., New Delhi. (2006)
3. A text Book of B.Sc., Mathematics by B.V.S.S.Sarma and others, published by S. Chand & Company Pvt. Ltd., New Delhi. (2016)
4. Vector Calculus by R. Gupta, Published by Laxmi Publications. (2002)
5. Vector Calculus by P.C. Matthews, Published by Springer Verlag publications. (1998)
6. Rings and Linear Algebra by Pundir & Pundir, Published by Pragathi Prakashan.(1996)

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 5 Hrs/week**
M 5302 (3)

LINEAR ALGEBRA **Max. Marks: 100**

w.e.f. 2017 – 2018

SYLLABUS

Course Objectives:

To enable the students to

- define Vector Space, Quotient space Direct sum, linear span and linear independence, basis and inner product.
- discuss the linear transformations, rank, nullity
- find the characteristic equation, eigen values and eigen vectors of a matrix.
- prove Cayley- Hamilton theorem, Schwartz inequality, Gramschmidt orthogonalisation process.
- solve the system of simultaneous linear equations and be able to apply matrices, systems of equations, regression, and eigenvectors to real world situations.
- know vocabulary, notation, and operations for matrices and vectors.
- solve linear systems of equations using a variety of techniques and to select the best technique for a given system.
- be able to define Linear Transformations and find the find the Domain, Range, Kernel, rank, and nullity of a linear transformation.
- be able to apply vectors, inner products, and linear transformations to real world situations.
- develop lesson plans that demonstrate their ability to explain concepts related to vectors and matrices.

Course Outcomes:

At the end of the course student will

- **CO1:** Be able to gain proficiency in solving systems of Linear equations using matrices and demonstrate a working knowledge of algebraic properties of matrices.
- **CO2:** Be able to understand Euclidean Vector spaces, their inherent and algebraic structure and the accompanying geometry.
- **CO3:** Be able to acquire facility working with general vector spaces, linear transformations, coordinate vectors and the changing of bases.

- **CO4:** Be able to develop an algebraic and geometric understanding of eigenvalues and eigenvectors and Eigen spaces.
- **CO5:** Be able to prove Cayley- Hamilton theorem, Schwartz inequality, Gramschmidt Orthogonalization process
- **CO6:** Be able to use mathematical software and calculators to solve a variety of applications in Physical science, Computer science or Economics
- **CO7:** Be able to solve linear systems of equations using a variety of techniques and to select the best technique for a given system.
- **CO8:** Be able to define Linear Transformations and find the find the domain, range, kernel, rank, and nullity of a linear transformation.
- **CO9:** Be able to apply vectors, inner products, and linear transformations to real world situations.
- **CO10:** Use computational techniques and algebraic skills essential for the study of systems of Linear equations, matrix algebra, vector spaces, eigenvalues and eigenvectors, Orthogonality and Diagonalization.

COURSE SYLLABUS

UNIT – I : Vector Spaces-I :
Vector Spaces, General properties of vector spaces, n-dimensional Vectors, Addition and Scalar multiplication of Vectors, Internal and External composition, Null space, Vector subspaces, 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 :
Basis of Vector Space, Finite Dimensional Vector spaces, Basis extension, Co-ordinates, Dimension of a Vector space, Dimension of a subspace, Quotient space and Dimension of Quotient space.

UNIT –III : Linear Transformations :
Linear transformations, Linear operators, Properties of L.T, Sum and Product of L.Ts, Algebra of Linear Operators, Range and Null space of Linear Transformation, Rank and Nullity of Linear transformations – Rank and Nullity Theorem.

UNIT –IV : Matrix :
Characteristic Roots, Characteristic Values & Vectors of Square Matrix, Cayley – Hamilton Theorem., Derogatory, non-Derogatory, Diagonalizability

UNIT –V : Inner product space :
Inner Product Spaces, Euclidean and Unitary Spaces, Norm or length of a Vector, Schwartz Inequality, Triangular Inequality, Parallelogram law, Orthogonality, Orthonormal Set, Complete Orthonormal set, Gram – Schmidt Orthogonalization Process, Bessel's inequality and Parseval's Identity.

Prescribed Text Book :A Text of Mathematics B.Sc. Mathematics Vol – III by S. CHAND Publications(2016)

Reference Books :

1.Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut- 250002.(1996)
2.Matrices by Shanti Narayana, published by S.Chand Publications.(1998)
3. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition),New Delhi. (1992)
4. Linear Algebra by Stephen H. Friedberg et al published by Prentice Hall of India Pvt. Ltd. 4th Edition (2007).

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 2 Hrs/week**
M 5352 (2) **LINEAR ALGEBRA** **Max. Marks: 50**

w.e.f. 2017 – 2018 **PRACTICAL SYLLABUS**

Course Objectives:

To enable the students to

- define Vector Space, Quotient space Direct sum, linear span and linear independence, basis and inner product.
- discuss the linear transformations, rank, nullity
- find the characteristic equation, eigen values and eigen vectors of a matrix.
- prove Cayley- Hamilton theorem, Schwartz inequality, Gramschmidt orthogonalisation process.
- solve the system of simultaneous linear equations and be able to apply matrices, systems of equations, regression, and eigenvectors to real world situations.
- know vocabulary, notation, and operations for matrices and vectors.
- solve linear systems of equations using a variety of techniques and to select the best technique for a given system.
- be able to define Linear Transformations and find the find the Domain, Range, Kernel, rank, and nullity of a linear transformation.
- be able to apply vectors, inner products, and linear transformations to real world situations.
- develop lesson plans that demonstrate their ability to explain concepts related to vectors and matrices.

Course Outcomes:

At the end of the course student will

- **CO1:** Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:** Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study

- **CO3:** Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- **CO4:** Problem solving on Vector Spaces, Linear Transformations, Matrices and Inner Product Spaces
- **CO5:** Be able to gain proficiency in solving systems of Linear equations using matrices and demonstrate a working knowledge of algebraic properties of matrices.
- **CO6:** Be able to understand Euclidean Vector spaces, their inherent and algebraic structure and the accompanying geometry.
- **CO7:** Be able to acquire facility working with general vector spaces, linear transformations, coordinate vectors and the changing of bases.
- **CO8:** Be able to develop an algebraic and geometric understanding of eigenvalues and eigenvectors.
- **CO9:** Be able to prove Cayley- Hamilton theorem, Schwartz inequality, Gramschmidt orthogonalisation process
- **CO10:** Be able to solve linear systems of equations using a variety of techniques and to select the best technique for a given system.
- **CO11:** Be able to define Linear Transformations and find the find the domain, range, kernel, rank, and nullity of a linear transformation.
- **CO12:** Be able to apply vectors, inner products, and linear transformations to real world situations.

COURSE SYLLABUS

UNIT – I : Vector Spaces-I :
Vector Spaces, General properties of vector spaces, n-dimensional Vectors, Addition and Scalar multiplication of Vectors, Internal and External composition, Null space, Vector subspaces, 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 :
Basis of Vector Space, Finite Dimensional Vector spaces, Basis extension, Co-ordinates, Dimension of a Vector space, Dimension of a subspace, Quotient space and Dimension of Quotient space.

UNIT –III : Linear Transformations :
Linear transformations, Linear operators, Properties of L.T, Sum and Product of L.Ts, Algebra of Linear Operators, Range and Null space of Linear Transformation, Rank and Nullity of Linear transformations – Rank and Nullity Theorem.

UNIT –IV:Matrix :
Characteristic Roots, Characteristic Values & Vectors of Square Matrix, Cayley – Hamilton Theorem., Derogatory, non-Derogatory, Diagonalizability

UNIT –V : Inner product space :
Inner Product Spaces, Euclidean and Unitary Spaces, Norm or length of a Vector, Schwartz Inequality, Triangular Inequality, Parallelogram law, Orthogonality, Orthonormal Set, Complete Orthonormal set, Gram – Schmidt Orthogonalization Process, Bessel's inequality and Parseval's Identity.

Prescribed Text Book : A Text of Mathematics B.Sc. Mathematics Vol – III by S. CHAND Publications(2016)

Reference Books :

1.Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut- 250002.(1996)
2. Matrices by Shanti Narayana, published by S.Chand Publications.(1998)
3. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition),New Delhi. (1992)
4. Linear Algebra by Stephen H. Friedberg et al published by Prentice Hall of India Pvt. Ltd. 4th Edition (2007).

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER MATHEMATICS TIME: 5 Hrs/Week

M-E$_1$-6301-(3) NUMERICAL ANALYSIS Max. Marks:100

w.e.f. 2017-2018

SYLLABUS

Course Objectives:

To enable the students to

- Define Basic concepts of operators Δ, E, ∇
- Define The Calculus of Finite Differences
- Find the difference of polynomial and define Interpolation with Equal Intervals
- Prove theorems and Solve problems using Newton forward formula and Newton backward formula.
- Find the difference of polynomial and define Interpolation with unequal Intervals
- Derive Gauss's formula and Stirling formula using Newton forward formula and Newton backward formula
- Discuss about Numerical Differentiation and Integration
- Find maxima and minima for differential equation
- Derive Trapezoidal rule, Simpson's 1/3, 3/8 rules by using General Quadrature formula

Course Outcomes:

At the end of the course student will

- **CO1:** acquire basic knowledge in solving interpolation with equal interval problems by various numerical methods. Estimate the missing terms through interpolation methods.
- **CO2:** develop skills in analyzing the methods of interpolating a given data, properties of interpolation with unequal intervals and derive conclusions, approximate a function using an appropriate numerical method.
- **CO3:** implement numerical methods for a variety of multidisciplinary applications and a variety of numerical algorithms using appropriate technology.
- **CO4:** use relevant numerical techniques for interpolation with equal and unequal intervals by using various central difference formulae and code a numerical method in a modern computer language.
- **CO5:** apply appropriate numerical methods to solve the problem with most accuracy.
- **CO6:** Compare different methods in numerical analysis with accuracy and efficiency of solution

COURSE SYLLABUS:

UNIT I :THE CALCULUS OF FINITE DIFFERENCES :

Finite Differences – Introduction , Forward and Backward Differences, Differences Formulae, Fundamental theorem of the differential calculus. The Difference table. Effects of an error in a tabular value – To express any value of the function in terms of leading term and the leading differences of a difference table, The Operator E of finite differences and differential coefficient D of differential calculus, one or more missing terms, Factorial Notation. Generalized factorial notations, Methods of representing any given polynomial in factorial notation. Differences of zero, Recurrence relation between $\Delta^n O^m, \Delta^{n-1} O^{m-1} and \Delta^n O^{m-1}$, method of separation of symbols

UNIT II : INTERPOLATION WITH EQUAL INTERVALS :

Newton-Gregory forward formula for Interpolation, Newton-Gregory formula for backward Interpolation.

INTERPOLATION WITH UNEQUAL INTERVALS :

Introduction, Divided differences, Properties of divided differences, Relation between divided differences and ordinary differences, Newton's divided difference formula, Lagrange's interpolation formula for unequal intervals.

UNITI III:CENTRAL DIFFERENCE INTERPOLATION FORMULAE : Introduction , Gauss's Forward interpolation formula, Gauss's Backward Interpolation formula, Stirling's formula, Bessel's formula, Laplace-Everett formula, The Central Difference Operator (δ) , The Average Difference Operator (μ) , Uses of various interpolation formulae.

NUMERICAL DIFFERENTIATION : Introduction, Illustration examples of Newton – Gregory forward (backward) formula, Central Difference Formulae, Newton's divided difference formula .

UNIT IV : NUMERICAL INTEGRATION : Introduction – A general quadrature formula for equidistant ordinates – The Trapezoidal rule, Simpson's one third rule, Simpson's three-eighth's rule, Weddle's rule, The Euler's Maclaurin's Summation Formula.

UNIT V : SOLUTION TO NUMERICAL ALGEBRAIC AND TRANSCENDENTAL EQUATIONS : Introduction, Bisection Method, Method of Successive Approximation

or Iteration Method, Method of False position or Regula False Method, Newton-Raphson method.

TEXT BOOK : Calculus of Finite Differences And Numerical Analysis by Prof. P.P.Gupta and G.S. Malik – Krishna Prakashan Media (P) Ltd. Meerut (U.P) (2006)

REFERENCES :

1. Numerical Methods – Dr. V.N.Vedamurthy & Dr. N.Ch.S.N.lyenger – Vikas Publishing House Pvt. Ltd. Jangpura, New Delhi (2005)
2. Numerical Analysis – G.Shankar Rao – New Age International Pvt. Ltd. New Delhi.(1997)
3. Numerical Analysis – R.Gupta – Laxmi Publications, New Delhi (1997)
4. Numerical Analysis – B.S.Goyal & S.K.Mittal – Pragathi Prakashan , Meerut(U.P) (1973)
5. Introductory Methods of Numerical Analysis – S.S.Sastry – Prentice Hall of India (Pvt) Ltd. New Delhi (1985)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER MATHEMATICS TIME: 2 Hrs/Week

M-E$_1$-6351(2) NUMERICAL ANALYSIS Max. Marks: 50

w.e.f. 2017-2018

PRACTICAL SYLLABUS

Course Objectives:

To enable the students to

- Define Basic concepts of operators Δ,E,∇
- Define The Calculus of Finite Differences
- Find the difference of polynomial and define Interpolation with Equal Intervals
- Prove theorems and Solve problems using Newton forward formula and Newton backward formula.
- Find the difference of polynomial and define Interpolation with unequal Intervals
- Derive Gauss's formula and Stirling's formula using Newton forward formula and Newton backward formula
- Discuss about Numerical Differentiation and Integration
- Find maxima and minima for differential equation
- DeriveTrapezoidalrule,Simpson's1/3,3/8rules by using General Quadrature formula

Course Outcomes:

At the end of the course student will

- **CO1:** apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:** enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- **CO3:** enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- **CO4:** problem solving on Calculus of finite differences, Interpolation with equal and unequal intervals, central interpolation formulae, Numerical differentiation and integration, Transcendental and algebraic equations
- **CO5:** acquire basic knowledge in solving interpolation with equal interval problems by various numerical methods. Estimate the missing terms through interpolation methods.

- **CO6:** develop skills in analyzing the methods of interpolating a given data, properties of interpolation with unequal intervals and derive conclusions, approximate a function using an appropriate numerical method.

- **CO7:**implement numerical methods for a variety of multidisciplinary applications and a variety of numerical algorithms using appropriate technology.
- **CO8:**use relevant numerical techniques for interpolation with equal and unequal intervals by using various central difference formulae and code a numerical method in a modern computer language.
- **CO9:** apply appropriate numerical methods to solve the problem with most accuracy.

- **CO10:** Compare different methods in numerical analysis with accuracy and efficiency of solution

COURSE SYLLABUS:

UNIT I :THE CALCULUS OF FINITE DIFFERENCES :

Finite Differences – Introduction , Forward and Backward Differences, Differences Formulae, Fundamental theorem of the differential calculus. The Difference table. Effects of an error in a tabular value – To express any value of the function in terms of leading term and the leading differences of a difference table, The Operator E of finite differences and differential coefficient D of differential calculus, one or more missing terms, Factorial Notation. Generalized factorial notations, Methods of representing any given polynomial in factorial notation. Differences of zero, Recurrence relation between $\Delta^n O^m, \Delta^{n-1} O^{m-1} and \Delta^n O^{m-1}$, method of separation of symbols

UNIT II : INTERPOLATION WITH EQUAL INTERVALS :

Newton-Gregory forward formula for Interpolation, Newton-Gregory formula for backward Interpolation.

INTERPOLATION WITH UNEQUAL INTERVALS :

Introduction, Divided differences, Properties of divided differences, Relation between divided differences and ordinary differences, Newton's divided difference formula, Lagrange's interpolation formula for unequal intervals.

UNITI III: CENTRAL DIFFERENCE INTERPOLATION FORMULAE : Introduction , Gauss's Forward interpolation formula, Gauss's Backward Interpolation formula, Stirling's formula, Bessel's formula, Laplace-Everett formula, The Central Difference

Operator (δ) , The Average Difference Operator (μ) , Uses of various interpolation formulae.

NUMERICAL DIFFERENTIATION : Introduction, Illustration examples of Newton – Gregory forward (backward) formula, Central Difference Formulae, Newton's divided difference formula .

UNIT IV : NUMERICAL INTEGRATION : Introduction – A general quadrature formula for equidistant ordinates – The Trapezoidal rule, Simpson's one third rule, Simpson's three-eighth's rule, Weddle's rule, The Euler's Maclaurin's Summation Formula.

UNIT V: SOLUTION TO NUMERICAL ALGEBRAIC AND TRANSCENDENTAL EQUATIONS : Introduction, Bisection Method, Method of Successive Approximation or Iteration Method, Method of False position or Regula False Method, Newton-Raphson method.

TEXT BOOK : Calculus of Finite Differences And Numerical Analysis by Prof. P.P.Gupta and G.S. Malik – Krishna Prakashan Media (P) Ltd. Meerut (U.P) (2006)

REFERENCES :

6. Numerical Methods – Dr. V.N.Vedamurthy & Dr. N.Ch.S.N.lyenger – Vikas Publishing House Pvt. Ltd. Jangpura, New Delhi (2005)
7. Numerical Analysis – G.Shankar Rao – New Age International Pvt. Ltd. New Delhi.(1997)
8. Numerical Analysis – R.Gupta – Laxmi Publications, New Delhi (1997)
9. Numerical Analysis – B.S.Goyal & S.K.Mittal – Pragathi Prakashan , Meerut(U.P) (1973)
10. Introductory Methods of Numerical Analysis – S.S.Sastry – Prentice Hall of India (Pvt) Ltd. New Delhi (1985)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) , VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 5 Hrs/Week**
M-E2-6301 (3) **Max.Marks : 100**
w.e.f 2017-2018 **LAPLACE TRANSFORMS**

SYLLABUS

Course Objectives:

To enable the students to

1. Know the definition of the Laplace Transform.
2. Calculate the Laplace Transform of basic functions using the definition.
3. Find the Laplace Transform derivatives and anti-derivatives of functions.
4. Compute inverse Laplace Transforms.
5. Learn the definition of the Dirac delta generalized function, understand it as an impulse and solve ODE's with forcing terms involving impulses.

Learning Outcomes:

After studying this course, students should be able to:

- **CO 1:** Learn the applications of Laplace Transform in engineering analysis.
- **CO 2:** Apply knowledge of basic engineering courses as appropriate to the field of electronics and telecommunication engineering.
- **CO 3:** Learn to use partial fraction and convolution methods in inverse Laplace Transforms.
- **CO 4:** Learn how to use Laplace Transform methods to solve ordinary and partial differential equations.
- **CO 5:** Apply Laplace Transform and its inverse to solve intitial value and other related problems.
- **CO 6:** Solve engineering problems using the principles of solution of differential equations.
- **CO 7:** Find the Laplace transform of a function by definition and by use of table.
- **CO 8:** Able to write piece wise functions using the unit step function.
- **CO 9:** Find transforms using the first and second translation theorems.
- **CO 10: Solve linear Differential equations with constant coefficients and unit step input functions using the** Laplace transforms.

UNIT – 1 Laplace Transform I : -

Definition of - Integral Transform – Laplace Transform Linearity, Property, Piecewise continuous Functions, Existence of Laplace Transform, Functions of Exponential order, and of Class A.

UNIT – 2 Laplace Transform II : -

First Shifting Theorem, Second Shifting Theorem, Change of Scale Property, Laplace Transform of the derivative of f(t), Initial Value theorem and Final Value theorem.

UNIT – 3 Laplace Transform III : -

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 Transform of Sine and cosine integrals.

UNIT –4 Inverse Laplace Transform I : -

Definition of Inverse Laplace Transform. Linearity, Property, First Shifting Theorem, Second Shifting Theorem, Change of Scale property, use of partial fractions, Examples.

UNIT –5 Inverse Laplace Transform II : -

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.

Prescribed Text Book : Laplace Transforms by A.R. Vasistha and Dr. R.K. Gupta Published by Krishna Prakashan Media Pvt. Ltd. Meerut (2012)

Reference Books :-

1. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Co., Pvt. Ltd., New Delhi.(2012)

2. Laplace and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by Pragathi Prakashan, Meerut.(2016)

3. Integral Transforms by M.D. Raising hania, - H.C. Saxsena and H.K. Dass Published by S. Chand and Co., Pvt.Ltd., New Delhi.(2016)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) , VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 2Hrs/Week**
M-E2-6351 (2) **Max.Marks : 50**
w.e.f 2017-2018 **LAPLACE TRANSFORMS**

PRACTICAL SYLLABUS

Course Objectives:

To enable the students to

1. Know the definition of the Laplace Transform.
2. Calculate the Laplace Transform of basic functions using the definition.
3. Find the Laplace Transform derivatives and anti-derivatives of functions.
4. Compute inverse Laplace Transforms.
5.Learn the definition of the Dirac delta generalized function, understand it as an impulse and solve ODE's with forcing terms involving impulses.

Learning Outcomes:

After studying this course, students should be able to:

- **CO1:** Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:** Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- **CO3:** Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- **CO4:** Problem solving on Laplace Transform I, Laplace Transform II, Laplace Transform III, Inverse Laplace Transform I, Inverse Laplace Transform II
- **CO 5:** Learn the applications of Laplace Transform in engineering analysis.
- **CO 6:** Apply knowledge of basic engineering courses as appropriate to the field of electronics and telecommunication engineering.
- **CO 7:** Learn to use partial fraction and convolution methods in inverse Laplace Transforms.
- **CO 8:** Learn how to use Laplace Transform methods to solve ordinary and partial differential equations.
- **CO 9:** Apply Laplace Transform and its inverse to solve intitial value and other related problems.
- **CO 10:** Solve engineering problems using the principles of solution of differential equations.
- **CO 11:** Find the Laplace transform of a function by definition and by use of table.

- **CO 12:** Able to write piece wise functions using the unit step function.
- **CO 13:** Find transforms using the first and second translation theorems.
- **CO 14:** Solve linear Differential equations with constant coefficients and unit step input functions using the Laplace transforms.

COURSE SYLLABUS:

UNIT – 1 Laplace Transform I : -

Definition of - Integral Transform – Laplace Transform Linearity, Property, Piecewise continuous Functions, Existence of Laplace Transform, Functions of Exponential order, and of Class A.

UNIT – 2 Laplace Transform II : -

First Shifting Theorem, Second Shifting Theorem, Change of Scale Property, Laplace Transform of the derivative of f(t), Initial Value theorem and Final Value theorem.

UNIT – 3 Laplace Transform III : -

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 Transform of Sine and cosine integrals.

UNIT –4 Inverse Laplace Transform I : -

Definition of Inverse Laplace Transform. Linearity, Property, First Shifting Theorem, Second Shifting Theorem, Change of Scale property, use of partial fractions, Examples.

UNIT –5 Inverse Laplace Transform II : -

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.

Prescribed Text Book : Laplace Transforms by A.R. Vasistha and Dr. R.K. Gupta Published by Krishna Prakashan Media Pvt. Ltd. Meerut (2012)

Reference Books :-

1. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Co., Pvt. Ltd., New Delhi.(2012)

2. Laplace and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by Pragathi Prakashan, Meerut.(2016)

3. Integral Transforms by M.D. Raising hania, - H.C. Saxsena and H.K. Dass Published by S. Chand and Co., Pvt.Ltd., New Delhi.(2016)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 5 Hrs/Week**

M- A_1-6301(3)
w.e.f. 2017-2018 **INTEGRAL TRANSFORMS** **Max. Marks: 100**

Course Objectives:

To enable the students to

- Know and understand the problems and identities
- Synthesize the knowledge to formulate conclusions
- Solve simultaneous ordinary differential equations and partial differential equations using the Laplace transforms.
- Solve the various types of integral equations by using Laplace transforms.
- Find the Fourier transforms of sine and cosine transforms
- Find the convolution of two functions and relation between Fourier and Laplace transforms.

Learning Outcomes:

After successful completion of the course students should be able to:

- **CO1:** Laplace transforms is widely used by electronic engineers to **solve quickly differential equations** occurring in the analysis of electronic circuits.
- **CO2:** Simplify calculations in system modeling, one cannot imagine solving digital signal processing problems, without employing Laplace transforms.
- **CO3:** In order to get the true form of radioactive decay a Laplace transforms is used. It makes easy to study analytic part of Nuclear physics possible.
- **CO4:** Laplace transforms is a veritable tool in virtually all science related fields as it helps in dealing majorly with differential equations arising from these fields.
- **CO5:** Fourier transforms useful in the **study of solution of partial differential equations** to solve initial boundary value problems.
- **CO6:** Fourier transforms use in signal and image processing, cell phones.
- **CO7:** Fourier transforms resolves function or signals into its mode of vibration. It is used in designing electrical circuits, signal processing, cell phones, signal analysis, image processing and filtering.
- **CO8:** Apply the principles in engineering, physics and other Allied Sciences
- **CO9:** Apply the theories in every branch of science and also in Commerce and Management Systems.

COURSE SYLLABUS:

UNIT – 1 Application of Laplace Transform to solutions of Differential Equations :

Solutions of Ordinary Differential Equations, Solutions of Differential Equations with Constants Co-efficient Solutions of Differential Equations with Variable Co-efficient

UNIT – 2 Applications of Laplace Transform :

Solutions of Simultaneous Ordinary Differential Equations, Solutions of Partial Differential Equations.

UNIT – 3 Application of Laplace Transforms to Integral Equations :

Definitions : Integral Equations - Abel's Integral Equation-Integral Equation of Convolution Type, Integral Differential Equations, Application of L.T. to Integral Equations.

UNIT –4 Fourier Transforms-I :

Definition of Fourier Transform – Fourier's in Transform – Fourier cosine Transform – Linear Property of Fourier Transform – Change of Scale Property for Fourier Transform – sine Transform and cosine transform, shifting property – modulation theorem.

UNIT – 5 Fourier Transform-II :

Convolution Definition – Convolution Theorem for Fourier transform – parseval's Indentify – Relationship between Fourier and Laplace transforms – problems related to Integral Equations.

Finite Fourier Transforms:

Finite Fourier Sine Transform – Finite Fourier Cosine Transform – Inversion formula for sine and cosine Transforms (only statement and related problems).

Prescribed Text Book:

Integral Transforms by A.R. Vasistha and Dr. R.K. Gupta Published by Krishna Prakashan Media Pvt. Ltd. Meerut. (2010).

Reference Books :-

1. A Course of Mathematical Analysis by Shanthi Narayana and P.K. Mittal, Published by S. Chand and Company pvt. Ltd., New Delhi.(2006)
2. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Company Pvt. Ltd., New Delhi.(2016)
3. Lapalce and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by Pragathi Prakashan, Meerut. (2016)
4. Integral Transforms by M.D. Raising hania, - H.C. Saxsena and H.K. Dass Published by S.Chand and Company pvt. Ltd., New Delhi. (2014)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 2 Hrs /Week**

M-A1-6351(2) **INTEGRAL TRANSFORMS** **Max. Marks: 50**

PRACTICAL SYLLABUS

Course Objectives:

To enable the students to

- Know and understand the problems and identities
- Synthesize the knowledge to formulate conclusions
- Solve simultaneous ordinary differential equations and partial differential equations using the Laplace transforms.
- Solve the various types of integral equations by using Laplace transforms.
- Find the Fourier transforms of sine and cosine transforms
- Find the convolution of two functions and relation between Fourier and Laplace transforms.

Course Outcomes:

After successful completion of the course students should be able to:

- **CO1:** Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:** Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- **CO3:** Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- **CO4:** Problem solving on Basic Integral Calculus, Ordinary Differential Equations, Application of Laplace Transform to solutions of Differential Equations, Application of Laplace Transforms to Integral Equations and Fourier Transforms
- **CO5:**Laplace transforms is widely used by electronic engineers to **solve quickly differential equations** occurring in the analysis of electronic circuits.
- **CO6:** Simplify calculations in system modeling, one cannot imagine solving digital signal processing problems, without employing Laplace transforms.
- **CO7:** In order to get the true form of radioactive decay a Laplace transforms is used. It makes easy to study analytic part of Nuclear physics possible.

- **CO8:** Laplace transforms is a veritable tool in virtually all science related fields as it helps in dealing majorly with differential equations arising from these fields.
- **CO9:** Fourier transforms useful in the **study of solution of partial differential equations** to solve initial boundary value problems.
- **CO10:** Fourier transforms use in signal and image processing, cell phones.
- **CO11:** Fourier transforms resolves function or signals into its mode of vibration. It is used in designing electrical circuits, signal processing, cell phones, signal analysis, image processing and filtering.
- **CO12:**Apply the principles in engineering, physics and other Allied Sciences and Apply the theories in every branch of science and also in Commerce and Management Systems

COURSE SYLLABUS:

UNIT – 1 Application of Laplace Transform to solutions of Differential Equations : -

Solutions of Ordinary Differential Equations.
Solutions of Differential Equations with Constants Co-efficient
Solutions of Differential Equations with Variable Co-efficient

UNIT – 2 Application of Laplace Transform : -

Solution of Simultaneous Ordinary Differential Equations.
Solutions of Partial Differential Equations.

UNIT – 3 Application of Laplace Transforms to Integral Equations : -

Definitions : Integral Equations - Abel's Integral Equation-Integral Equation of Convolution Type, Integral Differential Equations, Application of L.T. to Integral Equations.

UNIT –4 Fourier Transforms-I : -

Definition of Fourier Transform – Fourier's in Transform – Fourier cosine Transform – Linear Property of Fourier Transform – Change of Scale Property for Fourier Transform – sine Transform and cosine transform, shifting property – modulation theorem.

UNIT – 5 Fourier Transform-II : -

Convolution Definition – Convolution Theorem for Fourier transform – parseval's Indentify – Relationship between Fourier and Laplace transforms – problems related to Integral Equations.

Finte Fourier Transforms : -

Finte Fourier Sine Transform – Finte Fourier Cosine Transform – Inversion formula for sine and cosine Transforms (only statement and related problems).

Prescribed Text Book :

Integral Transforms by A.R. Vasistha and Dr. R.K. Gupta Published by Krishna Prakashan Media Pvt. Ltd. Meerut. (2010)

Reference Books :-

1. A Course of Mathematical Analysis by Shanthi Narayana and P.K. Mittal, Published by S. Chand and Company pvt. Ltd., New Delhi.(2006)
2. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Company Pvt. Ltd., New Delhi.(2016)
3. Lapalce and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by Pragathi Prakashan, Meerut. (2016)
4. Integral Transforms by M.D. Raising hania, - H.C. Saxsena and H.K. Dass Published by S.Chand and Company pvt. Ltd., New Delhi. (2014)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 5 Hrs/Week**

M-A_2-6301(3) **Advanced Numerical Analysis** **Max. Marks: 100**

w.e.f. 2017-2018 **SYLLABUS**

Course Objectives:

To enable the students to

- Find the solution of the first order and second order equation with constant coefficient
- Find the summation of series finite difference techniques
- Find the solution of ordinary differential equation of first order by Euler, Taylor and Runge-Kutta methods
- Derive Least – Squares curve fitting procedures, fitting a straight line, nonlinear curve fitting, Curve fitting by a sum of exponentials.
- Find the derivatives using Newton's forward difference formula, Newton's backward difference formula, Derivatives using central difference formulae, Stirling's interpolation formula, Newton's divided difference formula, Maximum and minimum values of a tabulated function.
- Derive Trapozoidal rule, Simpson's 1/3 – rule, Simpson's 3/8 – rule, and Weddle's rules from General Quadrature formula and find the Euler – Maclaurin Formula of summation and The Euler transformation.
- Find the solution of linear systems by using Direct methods, Matrix inversion method, Gaussian elimination methods, Gauss-Jordan Method, Method of factorization, Solution of Tridiagonal Systems,.

Course Outcomes:

At the end of the course student will

- **CO1:** Acquire basic knowledge in solving interpolation with equal interval problems by various numerical methods. Estimate the missing terms through interpolation methods.
- **CO2:** Develop skills in analyzing the methods of interpolating a given data, properties of interpolation with unequal intervals and derive conclusions, approximate a function using an appropriate numerical method.
- **CO3:**Implement numerical methods for a variety of multidisciplinary applications and a variety of numerical algorithms using appropriate technology.
- **CO4:**Use relevant numerical techniques for interpolation with equal and unequal intervals by using various central difference formulae and code a numerical method in a modern computer language.
- **CO5:** Apply appropriate numerical methods to solve the problem with most accuracy.
- **CO6:** Be able to derive Least – Squares curve fitting procedures, fitting a straight line, fitting a parabola, nonlinear curve fitting, Curve fitting by a sum of exponentials.

- **CO7:** Be able to find the derivatives using Newton's forward difference formula, Newton's backward difference formula, Derivatives using central difference formulae, Stirling's interpolation formula, Newton's divided difference formula, Maximum and minimum values of a tabulated function.
- **CO8:** Be able to derive Trapozoidal rule, Simpson's 1/3 – rule, Simpson's 3/8 – rule, and Weddle's rules from General Quadrature formula and find the Euler – Maclaurin Formula of summation and The Euler transformation.
- **CO9:** Be able to find the solution of linear systems by using Direct methods, Matrix inversion method, Gaussian elimination methods, Gauss-Jordan Method, Method of factorization, Solution of Tridiagonal Systems,.
- **CO10:** Be able to find the find the solution of ordinary differential equation of first order by Euler, Taylor and Runge-Kutta methods
- **CO11:** Compare different methods in numerical analysis with accuracy and efficiency of solution

COURSE SYLLABUS:

Unit – I

Curve Fitting: Least – Squares curve fitting procedures, fitting a straight line, nonlinear curve fitting, Curve fitting by a sum of exponentials.

UNIT- II :

Numerical Differentiation: Derivatives using Newton's forward difference formula, Newton's backward difference formula, Derivatives using central difference formula, Stirling's interpolation formula, Newton's divided difference formula, Maximum and minimum values of a tabulated function.

UNIT- III :

Numerical Integration: General Quadrature formula on errors, Trapozoidal rule, Simpson's 1/3 – rule, Simpson's 3/8 – rule, and Weddle's rules, Euler – Maclaurin Formula of summation and quadrature, The Euler transformation.

UNIT – IV:

Solutions of Simultaneous Linear Systems of Equations: Solution of linear systems – Direct methods, Matrix inversion method, Gaussian elimination methods, Gauss-Jordan Method ,Method of factorization, Solution of Tridiagonal Systems,. Iterative methods.Jacobi's method, Gauss-siedal method.

UNIT – V

Numerical Solution of Ordinary Differential Equations: Introduction, Solution by Taylor's Series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge – Kutta methods.

TEXT BOOK : Calculus of Finite Differences And Numerical Analysis by Prof. P.P.Gupta and G.S. Malik – Krishna Prakashan Media (P) Ltd. Meerut (U.P) (2006)

Reference Books :

1. Numerical Analysis by S.S.Sastry, published by Prentice Hall India (Latest Edition).(2015)
2. Numerical Analysis by G. Sankar Rao, published by New Age International Publishers, New – Hyderabad.(2006)
3. Finite Differences and Numerical Analysis by H.C Saxena published by S. Chand and Company, Pvt. Ltd., New Delhi.(2009)
4. Numerical methods for scientific and engineering computation by M.K.Jain, S.R.K.Iyengar, R.K. Jain.(2002)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 2 Hrs/Week**

M-A_2-6351(2) **Advanced Numerical Analysis** **Max. Marks: 50**

w.e.f. 2017-2018 **PRACTICAL SYLLABUS**

Course Objectives:

To enable the students to

- Find the solution of the first order and second order equation with constant coefficient
- Find the summation of series finite difference techniques
- Find the solution of ordinary differential equation of first order by Euler, Taylor and Runge-Kutta methods
- Derive Least – Squares curve fitting procedures, fitting a straight line, nonlinear curve fitting, Curve fitting by a sum of exponentials.
- Find the derivatives using Newton's forward difference formula, Newton's backward difference formula, Derivatives using central difference formulae, Stirling's interpolation formula, Newton's divided difference formula, Maximum and minimum values of a tabulated function.
- Derive Trapozoidal rule, Simpson's 1/3 – rule, Simpson's 3/8 – rule, and Weddle's rules from General Quadrature formula and find the Euler – Maclaurin Formula of summation and The Euler transformation.
- Find the solution of linear systems by using Direct methods, Matrix inversion method, Gaussian elimination methods, Gauss-Jordan Method, Method of factorization, Solution of Tridiagonal Systems,.

Course Outcomes:

At the end of the course student will

- **CO1:** Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:** Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- **CO3:** Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.

- **CO4:** Problem solving on Calculus of finite differences, Interpolation with equal and unequal intervals, central interpolation formulae, Numerical differentiation and integration, Linear equations and solution to ODE
- **CO5:** Acquire basic knowledge in solving interpolation with equal interval problems by various numerical methods. Estimate the missing terms through interpolation methods.
- **CO6:** Develop skills in analyzing the methods of interpolating a given data, properties of interpolation with unequal intervals and derive conclusions, approximate a function using an appropriate numerical method.
- **CO7:**Implement numerical methods for a variety of multidisciplinary applications and a variety of numerical algorithms using appropriate technology.
- **CO8:**Use relevant numerical techniques for interpolation with equal and unequal intervals by using various central difference formulae and code a numerical method in a modern computer language.
- **CO9:** Apply appropriate numerical methods to solve the problem with most accuracy.
- **CO10:** Be able to derive Least – Squares curve fitting procedures, fitting a straight line, fitting a parabola, nonlinear curve fitting, Curve fitting by a sum of exponentials.
- **CO11:** Be able to find the derivatives using Newton's forward difference formula, Newton's backward difference formula, Derivatives using central difference formulae, Stirling's interpolation formula, Newton's divided difference formula, Maximum and minimum values of a tabulated function.
- **CO12:** Be able to derive Trapozoidal rule, Simpson's 1/3 – rule, Simpson's 3/8 – rule, and Weddle's rules from General Quadrature formula and find the Euler – Maclaurin Formula of summation and The Euler transformation.
- **CO13:** Be able to find the solution of linear systems by using Direct methods, Matrix inversion method, Gaussian elimination methods, Gauss-Jordan Method, Method of factorization, Solution of Tridiagonal Systems,.
- **CO14:** Be able to find the find the solution of ordinary differential equation of first order by Euler, Taylor and Runge-Kutta methods
- **CO15:** Be able to use appropriate numerical methods to determine approximate solution of ODE and system of linear equation.
- **CO16:** Compare different methods in numerical analysis with accuracy and efficiency of solution

COURSE SYLLABUS:

Unit – I

Curve Fitting: Least – Squares curve fitting procedures, fitting a straight line, nonlinear curve fitting, Curve fitting by a sum of exponentials.

UNIT- II :

Numerical Differentiation: Derivatives using Newton's forward difference formula, Newton's backward difference formula, Derivatives using central difference formula, Stirling's interpolation formula, Newton's divided difference formula, Maximum and minimum values of a tabulated function.

UNIT- III :

Numerical Integration: General Quadrature formula on errors, Trapozoidal rule, Simpson's 1/3 – rule, Simpson's 3/8 – rule, and Weddle's rules, Euler – Maclaurin Formula of summation and quadrature, The Euler transformation.

UNIT – IV:

Solutions of simultaneous Linear Systems of Equations: Solution of linear systems – Direct methods, Matrix inversion method, Gaussian elimination methods, Gauss-Jordan Method ,Method of factorization, Solution of Tridiagonal Systems,. Iterative methods.Jacobi's method, Gauss-siedal method.

UNIT – V

Numerical solution of ordinary differential equations: Introduction, Solution by Taylor's Series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge – Kutta methods.

TEXT BOOK : Calculus of Finite Differences And Numerical Analysis by Prof. P.P.Gupta and G.S. Malik – Krishna Prakashan Media (P) Ltd. Meerut (U.P) (2006)

Reference Books :

1. Numerical Analysis by S.S.Sastry, published by Prentice Hall India (Latest Edition).(2015)
2. Numerical Analysis by G. Sankar Rao, published by New Age International Publishers, New – Hyderabad.(2006)
3. Finite Differences and Numerical Analysis by H.C Saxena published by S. Chand and Company, Pvt. Ltd., New Delhi.(2009)
4. Numerical methods for scientific and engineering computation by M.K.Jain, S.R.K.Iyengar, R.K. Jain.(2002)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 5 Hrs / Week**

M-A3-6301(3) **SPECIAL FUNCTIONS** **Max. Marks: 100 w.e.f. 2017-2018**

SYLLABUS

Course Objectives:

To enable the students to

- Derive Euler's Integrals –Beta and Gamma Functions, Elementary PropertiesofGamma Functions, Transformation of Gamma functions
- Derive Another form of Beta functions, Relation between Beta and Gamma functions, Other transformations, Legendre Duplication Formula
- Define Legendre's equation, Pn(x) and Qn(x) , show that Pn(x) is the coefficient of h^n in the expansion in ascending powers of $(1-2xh+h^2)^{-1\backslash 2}$
- Derive Laplace definite integral for Pn(x), Orthogonal properties of Legendre's Polynomials ,Recurrence formulae, Beltrami'sresults, Christoffer'ssummationFormula, Rodrigue's Formula
- Derive Laguerr's Differential Equation, Lagurre Polynomials, Generating Function, other forms for the Laguerre Polynomials (RodriguesFormula).
- Findfirst few Laguerre Polynomials, Orthogonal Property of the Laguerre Polynomials. Recurrence formulae for Laguerre Polynomials
- Derive Hermite Differential Equation , Hermite Polynomials, Generating Function, Other forms for the Hermite Polynomials
- Find first few Hermite Polynomials, Orthogonal Properties of Hermite Polynomials, Recurrence formulae for Hermite Polynomials
- Derive Bessel's equation, General Solution of Bessel's equation and Define of $J_o(X)$, Recurrence Formulae for $J_n(X)$.

Course Outcomes:

After studying this course, students should be able to:

- **CO1:** Use Gamma and Beta functions to **evaluate integrals**, Beta functions come up in string theory. Gamma function is useful in statistics and in physics. The Gamma function is used in actual computation for approximating statistical values.
- **CO2:** Legendre polynomials were introducing in spherical harmonics are an important class of special functions that are closely related to these polynomials.
- **CO3:** Laguerre polynomials are found in many important physical problems.
- **CO4:** The most important single application of the Laguerre polynomials is in the solution of the schrodinger wave equation for the hydrogen atom.
- **CO5:** Hermite polynomials are used to describe the transversal profile, but mainly to analyze the quantum mechanical simple harmonic oscillator.

- **CO6:** The main advantage of this methods lies in its easiness. **This methods contrasts in simplicity with standard methods based on solving the differential equation using power series,** generating function, Rodrigue's formula.
- **CO7:** Bessel functions to the theory of heat conduction, which include dynamical system and heat conduction in spherical or cylindrical objects.

COURSE SYLLABUS:

UNIT – I :

Beta and Gamma Functions : Euler's Integrals – Beta and Gamma Functions, Elementary Properties of Gamma Functions, Transformation of Gamma functions, Another form of Beta functions, Relation between Beta and Gamma functions, Other transformations, Legendre Duplication Formula

UNIT – II :

(a) Legendre's Equation : Definition of Legendre's equation, Definitions of $P_n(x)$ and $Q_n(x)$,To show that $P_n(x)$ is the coefficient of h^n in the expansion in ascending powers of $(1-2xh+h^2)^{-1\backslash 2}$,Laplace definite integral for $P_n(x)$, Orthogonal properties of Legendre's Polynomials ,Recurrence formulae, Beltrami's results, Christoffer's summation Formula , Rodrigue's Formula .

(b) Lagurre Polynomials: Laguerr's Differential Equation, Lagurre Polynomials, Generating Function, other forms for the Laguerre Polynomials(Rodrigues Formula). To find first few Laguerre Polynomials, Orthogonal Property of the Laguerre Polynomials. Recurrence formulae for Laguerre Polynomials.

UNIT-III:

Hermite Polynomials: Hermite Differential Equation , Hermite Polynomials, Generating Function, Other forms for the Hermite Polynomials, To find first few Hermite Polynomials, Orthogonal Properties of Hermite Polynomials, Recurrence formulae for Hermite Polynomials.

UNIT-IV :

Bessel's equation , General Solution of Bessel's equation . Definition of $J_o(X)$,Recurrence Formulae for $J_n(X)$.

Prescribed Text Book : Special functions – J..N..Sharma and R..K..Gupta, Krishna Prakashan Media(P) Ltd.Meerut .(2006)

REFFERENCE BOOKS:

1. Special Functions - E.D.Rain Ville (2006)

2. Special Functions – N.Saran(2002)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 2 Hrs / Week**

M-A3-6351(2) **SPECIAL FUNCTIONS** **Max. Marks: 50**
w.e.f. 2017-2018

PRACTICAL SYLLABUS

Course Objectives:

To enable the students to

- Derive Euler's Integrals –Beta and Gamma Functions, Elementary Properties of Gamma Functions, Transformation of Gamma functions
- Derive Another form of Beta functions, Relation between Beta and Gamma functions, Other transformations, Legendre Duplication Formula
- Define Legendre's equation, Pn(x) and Qn(x) , show that Pn(x) is the coefficient of h^n in the expansion in ascending powers of $(1-2xh+h^2)^{-1\backslash 2}$
- Derive Laplace definite integral for Pn(x), Orthogonal properties of Legendre's Polynomials ,Recurrence formulae, Beltrami's results, Christoffer's summation Formula, Rodrigue's Formula
- Derive Laguerr's Differential Equation, Lagurre Polynomials, Generating Function,other forms for the Laguerre Polynomials (Rodrigues Formula).
- Find first few Laguerre Polynomials, Orthogonal Property of the Laguerre Polynomials.Recurrence formulae for Laguerre Polynomials
- Derive Hermite Differential Equation, Hermite Polynomials, Generating Function, Other forms for the Hermite Polynomials
- Find first few Hermite Polynomials, Orthogonal Properties of Hermite Polynomials, Recurrence formulae for Hermite Polynomials
- Derive Bessel's equation, General Solution of Bessel's equation and Defineof $J_o(X)$, Recurrence Formulae for $J_n(X)$.

Course Outcomes:

After studying this course, students should be able to:

- **CO1:** Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:** Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- **CO3:** Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.

- **CO4:** Problem solving on Beta and Gamma Functions, Legendre's Equation, Lagurre Polynomials, Hermite Polynomials and Bessel's Equation
- **CO5:** Use Gamma and Beta functions to **evaluate integrals**, Beta functions come up in string theory. Gamma function is useful in statistics and in physics. The Gamma function is used in actual computation for approximating statistical values.
- **CO6:** Legendre polynomials were introducing in spherical harmonics are an important class of special functions that are closely related to these polynomials.
- **CO7:** Laguerre polynomials are found in many important physical problems.
- **CO8:** The most important single application of the Laguerre polynomials is in the solution of the schrodinger wave equation for the hydrogen atom.
- **CO9:** Hermite polynomials are used to describe the transversal profile, but mainly to analyze the quantum mechanical simple harmonic oscillator.
- **CO10:** The main advantage of these methods lies in its easiness. **This methods contrasts in simplicity with standard methods based on solving the differential equation using power series,** generating function, Rodrigue's formula.
- **CO11:** Bessel functions to the theory of heat conduction, which include dynamical system and heat conduction in spherical or cylindrical objects.

COURSE SYLLABUS

UNIT – I :

Beta and Gamma Functions : Euler's Integrals – Beta and Gamma Functions, Elementary Properties of Gamma Functions, Transformation of Gamma functions, Another form of Beta functions, Relation between Beta and Gamma functions, Other transformations, Legendre Duplication Formula

UNIT – II :

(a) Legendre's Equation : Definition of Legendre's equation, Definitions of $P_n(x)$ and $Q_n(x)$,To show that $P_n(x)$ is the coefficient of h^n in the expansion in ascending powers of $(1-2xh+h^2)^{-1\backslash 2}$,Laplace definite integral for $P_n(x)$, Orthogonal properties of Legendre's Polynomials ,Recurrence formulae, Beltrami's results, Christoffer's summation Formula , Rodrigue's Formula .

(b) Lagurre Polynomials: Laguerr's Differential Equation, Lagurre Polynomials, Generating Function, other forms for the Laguerre Polynomials(Rodrigues Formula). To find first few Laguerre Polynomials, Orthogonal Property of the Laguerre Polynomials. Recurrence formulae for Laguerre Polynomials.

UNIT-III:

Hermite Polynomials: Hermite Differential Equation , Hermite Polynomials, Generating Function, Other forms for the Hermite Polynomials, To find first few Hermite Polynomials, Orthogonal Properties of Hermite Polynomials, Recurrence formulae for Hermite Polynomials.

UNIT-IV :

Bessel's Equation: General Solution of Bessel's equation . Definition of $J_o(X)$,Recurrence Formulae for $J_n(X)$.

Prescribed Text Book : Special functions – J..N..Sharma and R..K..Gupta, Krishna Prakashan Media(P) Ltd.Meerut (2006)

REFFERENCE BOOKS:

1. Special Functions - E.D.Rain Ville (2006)

2. Special Functions – N.Saran(2002)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 5 Hrs/Week**

M-B$_1$-6301 (3) **GRAPH THEORY** **Max. Marks:100**

w.e.f. 2017-2018

SYLLABUS

Course Objectives: To enable the students to

- Know and understand the problems and identities of Graph Theory
- Apply the Principles in engineering, physics and other Allied Sciences
- Synthesize the knowledge to formulate conclusions
- Analyze and interpret the data using graphs.
- Study the properties of trees and connectivity.
- Determine whether graphs are Hamiltonian and/ or Eulerian.

Course Outcomes:

At the end of the course student will

- **CO 1: A**cquire basic knowledge to solve problems using basic graph theory.
- **CO 2**: Develop skills in analyzing and determining whether graphs are Hamiltonian and/or Eulerian.
- **CO 3:** Solve problems involving vertex and edge connectivity and solve real world problems using graph theory.
- **CO 4:** Be able to reproduce the proofs of some fundamental statements on graphs.
- **CO 5:** Be able to solve new graph problems
- **CO 6:** Be able to understand the fundamental definitions and properties of graphs.
- **CO7:**Be ability to read and write rigorous mathematical proofs involving graphs.
- **CO8:** Be Recognition of the numerous applications of graph theory.
- **CO9:**Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.

COURSE SYLLABUS

UNIT – I Graphs and Sub Graphs :

Graphs , Simple graph, graph isomorphism, the incidence and adjacency matrices, sub graphs, vertex degree, Hand shaking theorem, paths and connection, cycles.

UNIT – II

Applications, the shortest path problem, Sperner's lemma.

Trees :

Trees, cut edges and Bonds, cut vertices, Cayley's formula.

UNIT – III :

Applications of Trees - the connector problem.

Connectivity

Connectivity, Blocks and Applications, construction of reliable communication Networks,

UNIT – IV :

Euler tours and Hamilton cycles

Euler tours, Euler Trail, Hamilton path, Hamilton cycles , dodecahedron graph, Petersen graph, hamiltonian graph, closure of a graph.

UNIT – V

Applications of Eulerian graphs, the Chinese postman problem, Fleury's algorithm - the travelling salesman problem.

Prescribed Text Book : A Text Book of Discrete Mathematics by Dr. Swapan Kumar Sankar, published by S.Chand & Co. Publishers, New Delhi.

Reference Books :

1. Graph theory with Applications by J.A. Bondy and U.S.R. Murthy published by Mac. Millan Press

2. Introduction to Graph theory by S. Arumugham and S. Ramachandran, published by Scitech Publications, Chennai-17.

3. Graph theory and combinations by H.S. Govinda Rao published by Galgotia Publications.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 5 Hrs/Week**

M-B$_1$-6351 (2) **GRAPH THEORY** **Max. Marks:100**

w.e.f. 2017-2018

PRACTICAL SYLLABUS

Course Objectives: To enable the students to

- Know and understand the problems and identities of Graph Theory
- Apply the Principles in engineering, physics and other Allied Sciences
- Synthesize the knowledge to formulate conclusions
- Analyze and interpret the data using graphs.
- Study the properties of trees and connectivity.
- Determine whether graphs are Hamiltonian and/ or Eulerian.

Course Outcomes:

At the end of the course student will

- **CO1:** Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:** Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- **CO3:** Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- **CO4:** Problem solving on Graphs and Sub Graphs**,** shortest path problem, Sperner's lemma, *Trees,* Euler tours and Hamilton cycles
- **CO 5: A**cquire basic knowledge to solve problems using basic graph theory.
- **CO6**: Develop skills in analyzing and determining whether graphs are Hamiltonian and/or Eulerian.
- **CO 7:** Solve problems involving vertex and edge connectivity and solve real world problems using graph theory.
- **CO 8:** Be able to reproduce the proofs of some fundamental statements on graphs.
- **CO 9:** Be able to solve new graph problems
- **CO 10:** Be able to understand the fundamental definitions and properties of graphs.
- **CO11:**Be ability to read and write rigorous mathematical proofs involving graphs.
- **CO12:** Be Recognition of the numerous applications of graph theory.
- **CO13:**Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.

COURSE SYLLABUS

UNIT – I Graphs and Sub Graphs :

Graphs , Simple graph, graph isomorphism, the incidence and adjacency matrices, sub graphs, vertex degree, Hand shaking theorem, paths and connection, cycles.

UNIT – II

Applications, the shortest path problem, Sperner's lemma.

Trees :

Trees, cut edges and Bonds, cut vertices, Cayley's formula.

UNIT – III :

Applications of Trees - the connector problem.

Connectivity

Connectivity, Blocks and Applications, construction of reliable communication Networks,

UNIT – IV :

Euler tours and Hamilton cycles

Euler tours, Euler Trail, Hamilton path, Hamilton cycles , dodecahedron graph, Petersen graph, hamiltonian graph, closure of a graph.

UNIT – V

Applications of Eulerian graphs, the Chinese postman problem, Fleury's algorithm - the travelling salesman problem.

Prescribed Text Book : A Text Book of Discrete Mathematics by Dr. Swapan Kumar Sankar, published by S.Chand & Co. Publishers, New Delhi.

Reference Books :

1. Graph theory with Applications by J.A. Bondy and U.S.R. Murthy published by Mac. Millan Press

2. Introduction to Graph theory by S. Arumugham and S. Ramachandran, published by Scitech Publications, Chennai-17.

3. Graph theory and combinations by H.S. Govinda Rao published by Galgotia Publications.

St. Joseph's College For Women (Autonomous), Visakhapatnam

VI SEMESTER **MATHEMATICS** **TIME: 6 Hrs/Week**

M-B_2-6301(3) **Applied Graph Theory** **Max. Marks:100**

w.e.f. 2017-2018

SYLLABUS

Course Objectives:

To enable the students to

- Know and understand the problems and identities of Applied Graph Theory
- Apply the Principles in engineering, physics and other Allied Sciences
- Understand personal assignment problems and optimal assignment problems.
- Synthesize the knowledge to formulate conclusions
- Pick naturally the good model when facing a "real-life" problem in the future.

Course Outcomes:

At the end of the course student will

- **CO1:** Be able to formulate and prove fundamental theorems on trees, matching's, connectivity, colorings, plane and Hamiltonian graphs.
- **CO2:** Have knowledge on elementary Ramsey theory.
- **CO3:** Be able to use graphs as a tool to model real-life problems.
- **CO4:** Be matching's and coverings, Tutte's theorem on perfect matching's, Egervary's algorithm
- **CO5:** Be able to know some applications of graphs in natural science, timetabling and computer science.
- **CO6:** Be able to use graph theory as a modeling tool.

COURSE SYLLABUS

UNIT – I : *Matchings:*

Matchings – Alternating Path, Augmenting Path - Matchings and coverings in Bipartite graphs, Marriage Theorem, Minimum Coverings.

UNIT –II :

Perfect Matchings, Tutte's Theorem, Applications, The personal Assignment problem -The optimal Assignment problem, Kuhn-Munkres Theorem.

UNIT –III :*Edge Colorings*

Edge Chromatic Number, Edge Coloring in Bipartite Graphs - Vizing's theorem.

UNIT –IV :

Applications of Matchings, The timetabling problem.

Independent sets and Cliques:

Independent sets, Covering number , Edge Independence Number, Edge Covering Number - Ramsey's theorem.

UNIT –V :

Determination of Ramsey's Numbers – Erdos Theorem, Turan's theorem and Applications, Sehur's theorem. A Geometry problem.

Prescribed Text Book : A text book of Discrete Mathematics by Dr. Swapan Kumar Sarkar, published by S. Chand Publishers.

Reference Books :-

1**.** Graph theory with Applications by J.A. Bondy and U.S.R. Murthy, published by Mac. Millan Press.

2. Introduction to graph theory by S. Arumugham and S. Ramachandran published by SciTech publications, Chennai-17.

3**.** Graph theory and combinations by H.S. Govinda Rao, published by Galgotia Publications.

St. Joseph's College For Women (Autonomous), Visakhapatnam

VI SEMESTER **MATHEMATICS** **TIME: 2 Hrs / Week**

M-B_2-6351(2) **Applied Graph Theory** **Max. Marks:50**

w.e.f. 2017-2018

PRACTICAL SYLLABUS

Course Objectives:

To enable the students to

- Know and understand the problems and identities of Applied Graph Theory
- Apply the Principles in engineering, physics and other Allied Sciences
- Understand personal assignment problems and optimal assignment problems.
- Synthesize the knowledge to formulate conclusions
- Pick naturally the good model when facing a "real-life" problem in the future.

Course Outcomes:

At the end of the course student will

- **CO1:** Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:** Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- **CO3:** Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- **CO4:** Problem solving on Mathings, Perfect Matchings, Edge colorings, Applications of Matchings, The timetabling problem, Determination of Ramsey's Numbers
- **CO5:** Be able to formulate and prove fundamental theorems on trees, matching's, connectivity, colorings, plane and Hamiltonian graphs.
- **CO6:** Have knowledge on elementary Ramsey theory.
- **CO7:** Be able to use graphs as a tool to model real-life problems.
- **CO8:** Be matching's and coverings, Tutte's theorem on perfect matching's, Egervary's algorithm

- **CO9:** Be able to know some applications of graphs in natural science, timetabling and computer science.

- **CO10:** Be able to use graph theory as a modeling tool.

COURSE SYLLABUS

UNIT – I :*Matchings*
Matchings – Alternating Path, Augmenting Path - Matchings and coverings in Bipartite graphs, Marriage Theorem, Minimum Coverings.

UNIT –II : Perfect Matchings: Tutte's Theorem, Applications, The personal Assignment problem -The optimal Assignment problem, Kuhn-Munkres Theorem.

UNIT –III :*Edge Colorings*
Edge Chromatic Number, Edge Coloring in Bipartite Graphs - Vizing's theorem.

UNIT –IV : Applications of Matchings, The timetabling problem.
Independent sets and Cliques
Independent sets, Covering number , Edge Independence Number, Edge Covering Number - Ramsey's theorem.

UNIT –V : Determination of Ramsey's Numbers – Erdos Theorem, Turan's theorem and Applications, Sehur's theorem. A Geometry problem.

Prescribed Text Book : A text book of Discrete Mathematics by Dr. Swapan Kumar Sarkar, published by S. Chand Publishers.

Reference Books :-
1. Graph theory with Applications by J.A. Bondy and U.S.R. Murthy, published by Mac. Millan Press.
2. Introduction to graph theory by S. Arumugham and S. Ramachandran published by SciTech publications, Chennai-17.
3. Graph theory and combinations by H.S. Govinda Rao, published by Galgotia Publications.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 6 Hrs/Week**

M-B3-6301(3) **FLUID MECHANICS** **Max. Marks:100**

w.e.f. 2017-2018

SYLLABUS

Course Objectives:

To enable the students to

- Get the foundation in the fundamentals of fluid mechanics.
- Know and understand the problems and identities of Fluid Mechanics.
- Practice in the analytical formulation of fluid mechanics problems.
- Apply the Principles in engineering, physics and other Allied Sciences.
- Synthesize the knowledge to formulate conclusions.
- External flow of incompressible and viscous fluids.

Course Outcomes:

After studying this course, students should be able to

- **CO1:** Identify how to derive basic equations and know the related assumptions.
- **CO2:** Describe the principles of motion for fluids.
- **CO3:** Apply the equation of conservation of mass, momentum and energy.
- **CO4:** Use Euler's and Bernoulli's equations and the conservation of mass to determine velocities, pressure and accelerations for incompressible and in viscid fluids.
- **CO5:** Study analytical solutions to variety of simplified problems.
- **CO6:** Grasp the basic ideas of dimensional flows and fluid flows.

COURSE SYLLABUS

Unit – I :

Kinematics of Fluids in Motion, Real fluids and Ideal fluids – Velocity of a Fluid at a point – Streamlines and Pthlines – Steady and Unsteady flows – the velocity potential – The Vorticity vector – Local and Particle Rates of Change – The equation of Continuity – Acceleration of a fluid – Conditions at a rigid boundary – General Analysis of fluid motion.

Unit – II :

Equations of motion of a fluid- Pressure at a point in fluid at rest – Pressure at a point in a moving fluid – Conditions at a boundary of two inviscid immiscible fluids – Euler's equations of motion – Bernoulli's equation – Worked examples.

Unit – III :

Discussion of the case of steady motion under conservative body forces - Some flows involving axial symmetry – Some special two-dimensional flows – Impulsive motion – Some further aspects of vortex motion.

Unit – IV :

Some Two – dimensional Flows, Meaning of two-dimensional flow – Use of Cylindrical polar coordinates – The stream function – The complex potential for two - Dimensional, Irrotational, Incompressible flow – Uniform Stream – The Milne-Thomson Circle theorem – the theorem of Blasius.

Unit – V :

Viscous flow, Stress components in a real fluid – Relations between Cartesian components of stress – Translational motion of fluid element – The rate of strain quadric and principal stresses – Some further properties of the rate of strain quadric – Stress analysis in fluid motion – Relations between stress and rate of strain – the coefficient of viscosity and laminar flow - The Navier-Stokes equations of motion of a viscous fluid.

Prescribed Text Book : Introduction to Fluid Mechanics by R.W Fox, A.T Mc Donald and P.J. Pritchard published by (John Wiley and Sons Pvt. Ltd., 2003

Reference Text Books :

1. A Text Book of Fluid Dynamics by F. Charlton Published by CBS Publications, New Delhi.
2. Classical Mechanics by Herbert Goldstein, published by Narosa Publications, New Delhi.
3. Fluid Mechanics by T. Allen and I.L. Ditsworth published by (McGraw Hill, 1972)
4. Fundamentals of Mechanics of fluids by I.G. Currie published by (CRC, 2002)
5. Fluid Mechanics, An Introduction to the theory by Chia-shun Yeh published by (McGraw Hill, 1974)
6. Fluids Mechanics by F.M White published by (McGraw Hill, 2003)

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER **MATHEMATICS** **TIME: 2 Hrs/Week**

M-B3-6351(2) **FLUID MECHANICS** **Max. Marks: 50**

w.e.f. 2017-2018

PRACTICAL SYLLABUS

Course Objectives:

To enable the students to

- Get the foundation in the fundamentals of fluid mechanics.
- Know and understand the problems and identities of FluidMechanics.
- Practice in the analytical formulation of fluid mechanics problems.
- Apply the Principles in engineering, physics and other Allied Sciences.
- Synthesize the knowledge to formulate conclusions.
- External flow of incompressible and viscous fluids.

Course Outcomes:

After studying this course, students should be able to

- **CO1:** Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:** Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- **CO3:** Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- **CO4:** Problem solving on Kinematics of Fluids in Motion, Real fluids and Ideal fluids, Equations of motion of a fluid, Discussion of the case of steady motion under conservative body forces
- **CO5:** Identify how to derive basic equations and know the related assumptions.
- **CO6:** Describe the principles of motion for fluids.
- **CO7:** Apply the equation of conservation of mass, momentum and energy.
- **CO8:** Use Euler's and Bernoulli's equations and the conservation of mass to determine velocities, pressure and accelerations for incompressible and in viscid fluids.
- **CO9:** Study analytical solutions to variety of simplified problems.
- **CO10:** Grasp the basic ideas of dimensional flows and fluid flows.

COURSE SYLLABUS

Unit – I : Kinematics of Fluids in Motion, Real fluids and Ideal fluids – Velocity of a Fluid at a point – Streamlines and Pthlines – Steady and Unsteady flows – the velocity potential – The Vorticity vector – Local and Particle Rates of Change – The equation of Continuity – Acceleration of a fluid – Conditions at a rigid boundary – General Analysis of fluid motion.

Unit – II : Equations of motion of a fluid- Pressure at a point in fluid at rest – Pressure at a point in a moving fluid – Conditions at a boundary of two inviscid immiscible fluids – Euler's equations of motion – Bernoulli's equation – Worked examples.

Unit – III : Discussion of the case of steady motion under conservative body forces - Some flows involving axial symmetry – Some special two-dimensional flows – Impulsive motion – Some further aspects of vortex motion.

Unit – IV : Some Two – dimensional Flows, Meaning of two-dimensional flow – Use of Cylindrical polar coordinates – The stream function – The complex potential for two - Dimensional, Irrotational, Incompressible flow – Uniform Stream – The Milne-Thomson Circle theorem – the theorem of Blasius.

Unit – V : Viscous flow, Stress components in a real fluid – Relations between Cartesian components of stress – Translational motion of fluid element – The rate of strain quadric and principal stresses – Some further properties of the rate of strain quadric – Stress analysis in fluid motion – Relations between stress and rate of strain – the coefficient of viscosity and laminar flow - The Navier-Stokes equations of motion of a viscous fluid.

Prescribed Text Book : Introduction to Fluid Mechanics by R.W Fox, A.T Mc Donald and P.J. Pritchard published by (John Wiley and Sons Pvt. Ltd., 2003

Reference Text Books :

1. A Text Book of Fluid Dynamics by F. Charlton Published by CBS Publications, New Delhi.

2. Classical Mechanics by Herbert Goldstein, published by Narosa Publications, New Delhi.

3. Fluid Mechanics by T. Allen and I.L. Ditsworth published by (McGraw Hill, 1972)

4. Fundamentals of Mechanics of fluids by I.G. Currie published by (CRC, 2002)

5. Fluid Mechanics, An Introduction to the theory by Chia-shun Yeh published by (McGraw Hill, 1974)

6. Fluids Mechanics by F.M White published by (McGraw Hill, 2003)

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER	**MATHEMATICS**	**TIME: 6 Hrs/Week**
M-A3-6302(3)	**PROJECT WORK**	**Max. Marks: 150**
w.e.f 2019-2020		**(100+50)**

SYLLABUS
(Theory and Practical)

Objectives:

- ✓ Extensive Survey of Literature
- ✓ Identification of Topic
- ✓ Developing research questions and areas
- ✓ Preparing the Research Design including Sample Design
- ✓ Publication of papers on related topics

Methodology :

- ✓ Collection of the Data
- ✓ Analysis of Data
- ✓ Generalization and Interpretation
- ✓ Preparation of the Report or Presentation of Results-Formal write ups of Conclusions reached.

Evaluation Process for Theory: 100

For the Field Work : 40
For the Project Report : 60

Evaluation Process for Practical: 50

For Viva Voce : 20
For Seminar Presentation on Project Work : 30

Total : 150

References

1. **Abbas, M. and Jungck, G.** "Common fixed point results for noncommuting mappings without continuity in cone metric spaces", J.Math.Anal.Appl.341,(2008), 416-420.

2. **Abbas, M. and Rhoades,B. E.** "Fixed and periodic results in cone metricspaces" Appl.Math.Lett, (2008), 22 (4), 511-515
3. **Amit Singh , Dimri, R. C. and Sandeep Bhatt.** "A Unique Common Fixed Point Theorem for Four Maps in Cone Matric Spaces", Int. Journal of Math. Analysis, Vol. 4, (2010), No. 31, 1511-1517.
4. **Azam, A. and Arshad, M**. "Common fixed points of generalized contractive maps in cone metric spaces;" Bulleton of the Iranian Mathematical Society Vol.35, (2009), No.2, 255-264.
5. **Banach, S. "**Surles operations dans les assembles abstract at leur applications aux equations integrables", Fund. Math. Soc. 3, (1922), 131-181.
6. **Branciari,A.** "A fixed point theorem of Banach-Caccioppoli type on a class of generalized metric spaces", Publ. Math. Debrecen, 57 (1-2),(2000), 31{37. 1, 1.1, 1}
7. **Brouwer, L.E.J. "**Uber eineindeutige, stetiger Transformationen" , von Flaachen in sich. Math. Ann. 69, (1910), 176-180.
8. **Deza, M. and Deza, E.** "Encyclopedia of Distances" ,Springer-Verlag, (2009), i – x.
9. **Dhanorkar, G.A. and Salunke, J.N. "**A Generalization Common Fixed Points of Multifunctions on Cone Matrix Spaces,Applied Mathematical Sciences",Vol.5, (2011), no. 45, 2241 – 2247.
10. **Dhanorkar, G. A. and Salunke, J. N. "**A Generalization on Fixed Point Theorem on Cone Metric Spaces with w-Distance**"** , International Mathematical Forum, Vol. 6, (2011), no. 39 , 1915 - 1919
11. **Dimri, R.C. , Amit Singh and Sandeep Bhatt.** "Common Fixed Point Theorems for Multivalued Maps in Cone Metric Spaces" , Int. Math. Forum,Vol. 5 , (2010), no. 46 , pp. 2271-2278.
12. **Frechet, M. "** Sur quelques points du clacul fonctionnel, Rendiconti decircolo Matematic O di Palermo**"**, 22, (1906), 1-76.
13. **Hausdorff, F. "**Grundzüge der Mengenlehre, Verlag Von Veit & Company**"**, Leipzig (1914). Reprinted by Chelsea Publishing Company, New York (1949).

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

III / IV SEMESTER **GENERAL EDUCATION** **TIME: 2 Hrs/Week**

(For all II Degree Students)

Code: AS3003(2) /AS4003(2) **ANALYTICAL SKILLS** **Max. Marks: 50**

w.e.f. 2019-2020 **SYLLABUS**

Mode of Exam: Online (MSE& ESE)

COURSE OBJECTIVES :

To enable the students to -

- Know and understand the concepts of Ages and Averages
- Ability to visualize, gather information, articulate, analyze, solve complex problems from Missing terms, Odd man out, Time and Distance , Time and Work
- Understand the concepts of Profit & Loss, Ratio & Proportion, Percentages & Partnership
- Analyze the data from the information collected, and come up with a solution to a problems of Simple interest and Compound Interest

COURSE OUTCOMES:

At the end of the course student will

- **CO1:** Develop the ability to solve problems quickly and effectively.
- **CO2:** Make real time decisions by rapidly assessing the facts and assumptions.
- **CO3:** Detect and take definitive action to prevent potential problems which are required at work place.
- **CO4:** Equip them with training in time management and decision making for competitive exams which are time based.
- **CO5:** Uses of charts and graphs-avoiding ambiguity and "visual manipulation"
- **CO6:** Be detecting logical errors and false conclusions.

COURSE SYLLABUS

UNIT - I :

1. AGES

2. AVERAGES

3. PROFIT & LOSS

UNIT – II:

4. RATIO & PROPORTION

5.PERCENTAGES

6.PARTNERSHIP

UNIT – III:

7. TIME and DISTANCE

8. TIME and WORK

9. SIMPLE INTEREST

UNIT – IV:

10. COMPOUND INTEREST

11. NUMBER SERIES : MISSING NUMBERS

12. NUMBER SERIES : ODD MAN OUT

UNIT – V:

13. SEATING ARRANGEMENTS

14. BLOOD RELATIONS

15. VENN DIAGRAMS

Prescribed Text Book:

Analytical Skills by Pratiek Malhotra, Kalyani Publications, 2018

Reference Books :

1. Analytical Skills by Showick Thorpe, published by S. CHAND , 2018

2. Quantitative Aptitude for Competitive Examinations by S. CHAND, published by VIKAS publications, 2016

3. Analytical Thinking Skills in Reading by Andrew YauHauTse, published by LAMBERT Academic Publishing, 2016

4. Analytical Skills by DR. R. Bharavi Sharma, Kalyani publications, 2018

5. Magical Book on Quicker Maths by M. TYRA, 2018
