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

III SEMESTER **MATHEMATICS** Time: Hrs/Week

M 3301(3) **ABSTRACT ALGEBRA** Max. Marks:100

w.e.f 2016-2019("16AD") **(Number Theory & Group Theory)**

SYLLABUS

OBJECTIVES: To enable the students to –

- Learn the definitions and methods.
- Understand the problems, theorems & identities.
- Apply the principles in Engineering, Physics and other Allied Sciences.
- Understand any Science subject.
- Analyze the group theory as a part of Modern algebra.
- Apply the theories in Chemistry.

COURSE

UNIT- I: NUMBER THEORY:

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

UNIT – II: GROUP THEORY:

(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 Nubgroup – 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.

..2..

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.
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.
3. Modern Algebra by M.L. Khanna.
4. Theory of Numbers – Prakash Om (1982) – Lakshmi Publications
5. Introduction to Analytic Number Theory – Tom M. Apostol – Narosa Publishing House, New Delhi.

** ** **

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

III SEMESTER **MATHEMATICS** Time:1 Hrs/Week

M 3351(2) **ABSTRACT ALGEBRA** Max.Marks:50

w.e.f 2016-2019("16AD") **(Number Theory & Group Theory)**

PRACTICAL SYLLABUS

OBJECTIVES: To enable the students to –

- Learn the definitions and methods.
- Understand the problems, theorems & identities.
- Apply the principles in Engineering, Physics and other Allied Sciences.
- Understand any Science subject.
- Analyze the group theory as a part of Modern algebra.
- Apply the theories in Chemistry.

COURSE:

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

(b) SUBGROUPS

UNIT –III: (a) CO-SETS AND LAGRANGE'S THEOREM

(b) NORMAL SUBGROUPS

UNIT – IV: HOMOMORPHISMS

UNIT – V: (a) PERMUTATIONS AND CYCLIC GROUPS

(b) 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

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

M-A1-6301(3) **INTEGRAL TRANSFORMS** Max.Marks:100

w.e.f. 2015-2018 ("15AC") **SYLLABUS**

OBJECTIVES: To enable the students to

- Know and understand the problems and identities
- Apply the principles in engineering, physics and other Allied Sciences
- Synthesize the knowledge to formulate conclusions
- Apply the theories in every branch of science and also in commerece and Management Systems.

COURSE

UNIT – I: 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 – II: APPLICATION OF LAPLACE TRANSFORM:-
Solution of Simultaneous Ordinary Differential Equations.
Solutions of Partial Differential Equations.

UNIT – III: 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 – IV: 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 – V: 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 – 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.

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.
2. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Company Pvt. Ltd., New Delhi.
3. Lapalce and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by Pragathi Prakashan, Meerut.
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.

** ** **

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

VI SEMESTER **MATHEMATICS** TIME:1 Hr/Week

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

w.e.f. 2015-2018 ("15AC") **PRACTICAL SYLLABUS – IV A1**

OBJECTIVES : To enable the students to

- Know and understand the problems and identities
- Apply the principles in engineering, physics and other Allied Sciences
- Synthesize the knowledge to formulate conclusions
- Apply the theories in every branch of science and also in Commerce and Management Systems.

COURSE

UNIT – I: 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 – II: Application of Laplace Transform : -

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

UNIT – III: 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–IV: 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–V: 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

IV SEMESTER **MATHEMATICS** Time:7Hrs/Week

M 4301(3) **REAL ANALYSIS** Max.Marks:100

w.e.f:2016–2019("16AD") **SYLLABUS**

OBJECTIVES: To enable the students to –

a. Know and understand the definition and theorems of Real Analysis
b. Apply the knowledge in higher studies like P.G. and Research.
c. Compare with other fields like engineering , physics and other allied sciences.

COURSE

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.
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.
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.

** ** **

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

IV SEMESTER **MATHEMATICS** Time:1Hr/Week

M 4351(2) **REAL ANALYSIS** Max.Marks:50

w.e.f:2016–2019("16AD") **PRACTICAL SYLLABUS**

OBJECTIVES : To enable the students to –

a. Know and understand the definition and theorems of Real Analysis
b. Apply the knowledge in higher studies like P.G. and Research.
c. Compare with other fields like engineering , physics and other allied sciences.

COURSE

UNIT – I: (a) REAL NUMBERS :
(b) REAL SEQUENCES*:*

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:
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

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

M-E1-6302 (3) **NUMERICAL ANALYSIS** Max.Marks:100

w.e.f 2016-2019 ('16AD' batch) **SYLLABUS**

OBJECTIVES : To enable the students to

1. know and understand Numerical Methods
2. distinguish between Numerical differences, integration and classical difference and integration .
3. apply the knowledge extensively in engineering and statistics.

COURSE :

UNIT – I : The Calculus of Finite Differences : Finite differences – Introduction, Differences, Difference formulae, Fundamental theorem of the difference 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, properties of two operators E and Δ , Relation between operator E of finite differences and differential coefficient D of differential calculus, one or more missing terms, Factorial notation, To show that $x^{(-n)} = \frac{1}{(x+n)^{(n)}}$, Generalized factorial rotations, methods of representing any given polynomial in factorial notation, Differences of zero, Recurrence relation between $\Delta^n 0^m, \Delta^{n-1} 0^{m-1} and \Delta^n 0^{m-1}$.

UNIT – II: (a) **Interpolation with equal Intervals :** Introduction, methods for Interpolation, Newton's formulae for Interpolation, Illustrative examples.

(b) **Interpolation with Unequal Intervals :** Introduction, Divided differences, properties of divided differences, Newton's formulae for unequal intervals, Relation between Divided differences and Ordinary Differences, Lagrange's Interpolation formula, Illustrative examples.

UNIT – III: Central Difference Interpolation Formulae :

Introduction, Gauss central difference formulae, Stirling's Interpolation formula, Bessel's Interpolation formula, Everett's Interpolation formula, Uses of various interpolation formulae, Illustrative examples.

UNIT–IV: a.**Numerical Differentiation:** Introduction, Derivative using Newton's forward Interpolation Formula, Derivative using Newton's Backward difference formula, Derivative using Stirling's Formula , Derivative using Newton's divided difference formula, Maximum and Minimum values of a tabulated function .

b. **Numerical Integration:** Numerical Quadrature, General Quadrature formula for equidistant ordinates, The Trapezoidal rule, Simpson's one-third rule, Simpson's three eighth rule, Weddle's Rule, The Euler's Maclurin's summation formula.

UNIT V: Solution to Numerical Algebraic and Transcendental Equations : Introduction, Bisection method, Regula-Falsi Method, Iteration 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), (2008)

REFERENCES :

1. Numerical methods – Dr.V.N.Vedamurthy and Dr. N.Ch.S.N.Iyengea – Vikas Publishing House Pvt. Ltd.Jangpura, New Delhi (2005)
2. Numerical Analysis – G.Shankar Rao – New Age International Pvt. Ltd. New Dlehi (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)
6. Numerical Analysis by S.Ranganathan, M.V.S.S.N Prasad, V.Ramesh Babu – S.Chand publications.
7. Numerical Analysis by Telugu Academy, 2010.

** ** **

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

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

M-E1-6351 (2) **NUMERICAL ANALYSIS** Max.Marks:50

w.e.f 2016-2019 ('16AD' batch) **PRACTICAL SYLLABUS – IV**

OBJECTIVES: To enable the students to

- Know and understand Numerical Methods .
- Distinguish between Numerical Differences , Integration and Classical Difference & Integration .
- Apply the practical knowledge Extensively in Engineering and Statistics.

COURSE :

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.

UNIT– 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.Iyenger – 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

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

M 5302 (5) **LINEAR ALGEBRA** Max. Marks: 100

w.e.f. 2016 – 2019("16AD") **SYLLABUS**

OBJECTIVES: To enable the students to

- know and apply the principles of linear algebra.
- understand the theorem
- apply the knowledge to study matrices by means of linear transformation.

COURSE

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.
2. Matrices by Shanti Narayana, published by S.Chand Publications.
3. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
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: 1Hr/Week

M 5352 (2) **LINEAR ALGEBRA** Max. Marks: 50

w.e.f. 2017 – 2018 (16AD) **PRACTICAL SYLLABUS – III B**

OBJECTIVES : To enable the students to

- understand the theorems and problems.
- Know and understand the definition and theorems of Vector Calculus.
- Apply the theories in every branch of Science and also in commerce.
- know and apply the principles of linear algebra.
- understand the theorem
- apply the knowledge to study matrices by means of linear transformation.

COURSE CONTENT

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 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, 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.,

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

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.
2. Matrices by Shanti Narayana, published by S.Chand Publications.
3. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
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: 6 Hrs/Week

M-A3-6301 (3) **SPECIAL FUNCTIONS** Max. Marks: 100

w.e.f. 2015 – 2018 ("15AC") **SYLLABUS**

OBJECTIVES: To enable the students to

- Know and understand the problems and identities
- Apply the principles in engineering, physics and other Allied Sciences
- Synthesize the knowledge to formulate conclusions
- Apply the theories in every branch of science and also in commerece and Management Systems.

COURSE

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 .

REFFERENCE BOOKS:

1. Special Functions - E.D.Rain Ville
2. Special Functions – N.Saran

** ** **

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

VI SEMESTER **MATHEMATICS** TIME: 1 Hr/Week

M-A3-6351 (2) **SPECIAL FUNCTIONS** Max. Marks: 50

w.e.f. 2015 – 2018 ("15AC") **PRACTICAL SYLLABUS – IV A3**

OBJECTIVES : To enable the students to

- Know and understand the problems and identities
- Apply the principles in engineering, physics and other Allied Sciences
- Synthesize the knowledge to formulate conclusions
- Apply the theories in every branch of science and also in commerce and Management Systems.

COURSE

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

I SEMESTER | **MATHEMATICS** | TIME: 7 Hrs/Week

M 1301 (5) | **DIFFERENTIAL EQUATIONS** | Max. Marks: 100

w.e.f: 2016-2019('16AD'– Batch) | **SYLLABUS**

OBJECTIVES: To enable the students to

1. Learn the definitions and methods
2. Understand the problems, theorems and identities
3. Apply the principles in Engineering, Physics and other Applied Sciences

UNIT – I: DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE:

Introduction, Exact differential equations, equations reducible to exact form-methods1,2,3,4,5, Linear differential equations, differential equation reducible to linar form (Bernoulli's equations), change of variables, simultaneous differential equations

UNIT – II: ORTHOGONAL TRAJECTORIES:

Differential equation of the first order but not of first degree:

Equations solvable $for\ p, Equations$ solvable for *y*, Equations solvable for *x*, Equations do not contain *x* or *y*, Clairauts equations.

UNIT – III: HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS WITH CONSTANT COEFFICIENTS

Solutions of homogeneous linear differential equations of order 'n' with constant coefficients, solutions of non-homogeneous linear differential equations with constant coefficients by means of polynomial operators.

(i) Q(*x*) = be^{ax}

(ii) Q(*x*) = *bsinax* (or) *bcosax*

(iii) Q(*x*) = b x^k

(iv) Q(*x*) = e^{ax}.v where v is a function of *x*

(v) Q(*x*) = *x*.v where v is a function of *x*

UNIT – IV:

(A) HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS WITH NON-CONSTANT COEFFICIENTS:

1. Change of the dependent variable, when part of the C.F is known.
2. Method of variation of parameters
3. Cauchy-Euler equations
4. Legender's equations

(B) System of Linear Differential Equations

UNIT – V: 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 diferential equations.

PRESCRIBED TEXT BOOKS:

A Text book of B.Sc Mathematics –Vol -I-by S.Chand Publications – 2016 Edition

REFERENCE BOOKS:

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

** ** **

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

I SEMESTER **MATHEMATICS** TIME:1 Hrs/Week

M 1351 (2) **DIFFERENTIAL EQUATIONS** Max. Marks:100

w.e.f: 2016-2019('16AD'– Batch) **PRACTICAL SYLLABUS**

OBJECTIVES: To enable the students to

1. Learn the definitions and methods
2. Understand the problems, theorems and identities
3. Apply the principles in Engineering, Physics and other Applied Sciences

UNIT – I : Differential Equations of First Order and First Degree:

UNIT – II : Orthogonal Trajectories:

UNIT – III : Higher Order Linear Differential Equations with Constant Coefficients)

UNIT – IV : (A) Higher Order Linear Differential Equations With Non-Constant Coefficients:
(B) System Of Linear Differential Equations

UNIT – V : Partial Differential Equations:

PRESCRIBED TEXT BOOKS: A Text book of B.Sc Mathematics -Vol-I-by S.Chand Publications - 2016 Edition

REFERENCE BOOKS:

1. A Text book of Mathematics – Vol I – Vashishta & Vashishta(1998)
2. Diferential Equations - J.N.Sharma, Dr.R.K.Gupta-Krishna Prakash Media Pvt Ltd (1996)
3. Differential Equations - M.L.Khanna- Jai Prakash& Co(1954)

** ** **

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

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

M 5301 (3) **RING THEORY & VECTOR CALCULUS** Max.Marks:100

w.e.f 2016-2019("16AD") **SYLLABUS**

OBJECTIVES: To enable the students to

- know the principles of abstract algebra .
- understand the theorems and problems.
- Know and understand the definition and theorems of Vector Calculus.
- Apply the theories in every branch of Science and also in commerce.

COURSE:

RING THEORY

UNIT–I: 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–II: 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–III: VECTOR DIFFERENTIATION: Vector Differentiation, Ordinary derivatives of vectors, Differentiability, Gradient, Divergence, Curl operators, Formulae Involving these operators.

UNIT–IV: VECTOR INTEGRATION: Line Integral, Surface Integral, Volume integral with examples.

UNIT–V: 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.
2. Vector Calculus by Santhi Narayana, Published by S. Chand & Company Pvt. Ltd., New Delhi.
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.
4. Vector Calculus by R. Gupta, Published by Laxmi Publications.
5. Vector Calculus by P.C. Matthews, Published by Springer Verlag publicattions.
6. Rings and Linear Algebra by Pundir & Pundir, Published by Pragathi Prakashan.

** ** **

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

V SEMESTER **MATHEMATICS** TIME:1 Hr/Week

M 5351 (2) **RING THEORY & VECTOR CALCULUS** Max. Marks:50

w.e.f 2016-2019("16AD") **PRACTICAL SYLLABUS – III A**

OBJECTIVES : To enable the students to

- know the principles of abstract algebra .
- understand the problems and practical knowledge
- Know and understand the definition and problems of Vector Calculus.
- Apply these problems in every branch of Science and also in Commerce.

COURSE

RING THEORY

UNIT – I : RINGS – I:

- Definition of Ring and basic properties
- Boolean Rings, divisors of zero
- 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 – II: RINGS – II:

- Definition of Homomorphism
- Homorphic Image
- Kernel of a Homomorphism
- Fundamental theorem of Homomorhphism
- Maximal Ideals , Prime Ideals.

VECTOR CALCULUS

UNIT – III: VECTOR DIFFERENTIATION:

- Vector Differentiation
- 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 : -

Applications of

- Gauss Divergence Theorem
- Stokes Theorem
- Green's Theorem in plane

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-A2-6301 (3) **ADVANCED NUMERICAL ANALYSIS** Max.Marks:100

w.e.f. 2015-2018 ("15AC") **SYLLABUS**

OBJECTIVES: To enable the students to

- Know and understand Numerical Methods.
- Distinguish between Numerical differences, integration and classical difference & Integration.
- Apply the knowledge Extensively in Engineering and Statistics.

COURSE:

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:1 HR/WEEK

M-A2-6351 (2) **ADVANCED NUMERICAL ANALYSIS** MAX. MARKS: 50

w.e.f. 2015-2018 ("15AC") **PRACTICAL SYLLABUS – IV A2**

OBJECTIVES : To enable the students to

- Know and understand Numerical Methods .
- Distinguish between Numerical differences , integration and classical difference & Integration .
- Apply the knowledge Extensively in Engineering and Statistics.

COURSE:

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

II SEMESTER **MATHEMATICS** TIME: 7 Hrs/Week

M 2301(3) **SOLID GEOMETRY** Max.Marks:100

w.e.f 2016-2019 ("16AD") **SYLLABUS**

OBJECTIVES : To enable the students

a. To know the basics of Solid Geometry
b. To understand the theorems and problems
c. To apply the knowledge in Computer Sciences and Bio-Engineering
d. The geometry of the pyramid is that of a square pyramid and provides an opportunity to explore the properties of pyramids
f. In ancient Greece the philosopher Plato described the three-dimensional figures that later became known as the Platonic Solids as the basis for the Greek four elements: earth, air, fire and water.

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; Intersection of three planes; Triangular Prism.

UNIT – III: 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; 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.

UNIT – IV :Cones: Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; Enveloping cone of a sphere; Equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone; 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; Right circular cone; Equation of the right circular cone with a given vertex; axis and semi-vertical angle.

UNIT – V: Cylinders: 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.

PRESCRIBED TEXT BOOK : V Krishna Murthy & Others "A text book of Mathematics for BA/B.Sc Vol 1, Published by S. Chand & Company, New Delhi.

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.
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.

** ** **

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

II SEMESTER **MATHEMATICS** TIME:1 Hr/Week

M 2351 (2) **SOLID GEOMETRY** Max.Marks:50

w.e.f 2016-2019 ("16AD") **(PRACTICAL SYLLBUS)**

OBJECTIVES : To enable the students

e. To know the basics of Solid Geometry
f. To understand the theorems and problems
g. To apply the knowledge in Computer Sciences and Bio-Engineering
h. The geometry of the pyramid is that of a square pyramid and provides an opportunity to explore the properties of pyramids
f. In ancient Greece the philosopher Plato described the three-dimensional figures that later became known as the Platonic Solids as the basis for the Greek four elements: earth, air, fire and water.

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

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; 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; Intersection of three planes; Triangular Prism.

UNIT – III: 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; Tangent plane; Plane of contact; Polar plane; Pole of a Plane; Conjugate points; Conjugate planes; Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres

UNIT – IV: Cones : Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; Enveloping cone of a sphere; Equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone; 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; Right circular cone; Equation of the right circular cone with a given vertex; axis and semi-vertical angle.

UNIT – V: Cylinders: 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.

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

** ** **

I B.Sc. DEGREE EXAMINATION AT THE END OF II SEM.

II END SEMESTER **MATHEMATICS** **TIME : 3 hrs.**

M 2305 (3) **SOLID GEOMETRY** **MARKS:100**

M/16/AD **MODEL QUESTION PAPER**

PART – A

NOTE : Answer any **FIVE** questions choosing at least ONE from each section. Each question carries **TWELVE** marks: **5X12=60**

SECTION – A

I. Find the equation of the planes bisecting the angles between the planes .

$x + 2y + 2z = 19, \qquad 4x - 3y + 12z + 3 = 0.$

II. Prove that the equation $2x^2 – 6y^2 - 12y^2 + 18yz + 2zx + xy=0$ represents a pair of planes and find the angle between them.

SECTION – B

III. Find the image of the line.

$\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ *in* the plane x+y+z=1

IV. Find the S.D and the equations of the line of SD between the lines

$2x - 3y + 4z = 0 = x - y + z;$

$x + y + 2z - 3 = 0 = 2x + 3y + 3z - 4.$

SECTION – C

V. A sphere of constant radius K passes through the origin and intersects the axes in A,B,C. Prove that the centroid of ΔABC lies on the sphere $9(x^2 + y^2 + z^2) = 4k^2$.

VI. Find the limiting points of the coaxal system determined by the two spheres whose equations are $x^2 + y^2 + z^2 - 8x + 2y - 2z + 32 = 0, x^2 + y^2 + z^2 - 7x + z + 23 = 0.$

SECTION – C

VII. Prove that if the angle between the lines of intersection of the plane $x + y + z = 0,$ and the cone $ayz + bzx + cxy = 0$ is $\pi/2, then$ a+b+c=0.

VIII. If the line $x = \frac{1}{2}y = z,$ represents one of the three mutually perpendicular generators of the cone 11yz + 6zx – 14xy = 0, find the equations of the other two.

SECTION – D

IX. Find the equation of the enveloping cylinder of the sphere.

$x^2 + y^2 + z^2 - 2x + 4y - 1 = 0,$ having its generators parallel to the line x=y=z.

X. Find the equation of the cylinder whose generators parallel to the line

$\frac{x}{1} = \frac{y}{-2} = \frac{z}{3}$ and whose base curve is $x^2 + 2y^2 = 1, z = 3.$

PART – B

XI Answer any **EIGHT** questions. Each question carries **FIVE** marks: **8X5=40**

1. Find the equation of the plane passing through (1,0,-2) and perpendicular to the planes 2x+y-z=2 and x-y-z=3
2. Find the equation to the plane through the intersection of the planes

   x + 2y +3z +4=0 and 4x + 3y + 3z + 1=0 and perpendicular to the plane

   x + y + z + 9=0.

3. Find K so that the lines $\frac{x+1}{-3}=\frac{y+2}{2k}=\frac{z-3}{2}$ and $\frac{x-1}{3k}=\frac{y+5}{1}=\frac{z+6}{7}$ are perpendicular.

4. Prove that the lines $x+2y-5z+9=0=3x-y+2z-5;$.
   $4x-5y+z+3=0=2x+3y-z-3$ are coplanar.

5. Examine the nature of intersection of the planes

   x – 2y + z – 3=0, x + y -2z – 3 = 0 and x – z – 1=0.

6. Show that the plane 2x – 2y + z +12=0 touches the sphere

   $x^2 + y^2 + z^2$ – 2x – 4y + 2z – 3=0 and find the point of contact.

7. Find the point of intersection of the line $\frac{x-8}{4}=\frac{y}{1}=(z-1)$ and the sphere

   $x^2+y^2+z^2-4x+6y-2z+5=0$

8. Find the polar line of the line $6(x+3)=3(y+1)=2(z-2)$ with respect to the sphere $x^2+y^2+z^2=1.$

9. Find the angle between the lines of intersection of the plane x-3y+z=0 and the cone $x^2-5y^2+z^2=0$.

10. Find the enveloping cone of the sphere $x^2+y^2+z^2+2x-4y=0$ with its vertex at (1,1,1)

11. Find the equation of the cone whose vertex is (1,1,0) and whose guiding curve is y=0; $x^2+z^2=4.$

12. Find the equation of the right circular cylinder whose axis is

    $x-2=z,\ y=0$ and passes through the point (3,0,0).

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

II SEMESTER MATHEMATICS TIME: 2 Hrs/Week

M 2352 (1) SOLID GEOMETRY Max. Marks : 50

w.e.f 2016-2017 PRACTICAL SYLLBUS (NEW)

(AD batch) COURSE CONTENT

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

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; 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; Intersection of three planes; Triangular Prism.

UNIT – III :

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; Tangent plane; Plane of contact; Polar plane; Pole of a Plane; Conjugate points; Conjugate planes; Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres

UNIT – IV :

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

UNIT – V :

Cylinders : 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.

Prescribed Text Book :

V Krishna Murthy & Others "A text book of Mathematics for BA/ B.Sc Vol 1, Published by S. Chand & Company, New Delhi.

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.

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.