# SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL

# Department of Mathematics

## B.Sc(MATHEMATICS)-2024-2025

## (FOR MPC,MPCs,MCCs, Single Major Mathematics)
## Syllabus

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|---|---|
| **EMPLOYABILITY** | <span style="color:green">████████</span> |
| **ENTREPRENEURSHIP** | <span style="color:yellow">████████</span> |
| **SKILL DEVELOPMENT** | <span style="color:blue">████████</span> |

# SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL

# WEST GODAVARI DISTRICT, ANDHRA PRADESH- 534260

# SEMESTER-I, MATHEMATICS

## COURSE 1: ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL ANDCHEMICAL SCIENCES

Theory                                    Credits: 4                                    5 hrs/week

**Course Objective:**

The objective of this course is to provide students with a comprehensive understanding of the essential concepts and applications of mathematical, physical, and chemical sciences. The course aims to develop students' critical thinking, problem-solving, and analytical skills in these areas, enabling them to apply scientific principles to real-world situations.

**Learning outcomes:**

1. Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.

2. To Explain the basic principles and concepts underlying a broad range of fundamentalareas of physics and to Connect their knowledge of physics to everyday situations

3. To Explain the basic principles and concepts underlying a broad range of fundamentalareas of chemistry and to Connect their knowledge of chemistry to daily life.

4. Understand the interplay and connections between mathematics, physics, and chemistry invarious applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.

5 . To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures.

## UNIT I: ESSENTIALS OF MATHEMATICS:

**Complex Numbers:** Introduction of the new symbol i – General form of a complex number – Modulus-Amplitude form and conversions

**Trigonometric Ratios:** Trigonometric Ratios and their relations – Problems on calculation of angles**Vectors:** Definition of vector addition – Cartesian form – Scalar and vector product and problems **Statistical Measures**: Mean, Median, Mode of a data and problems

## UNIT II: ESSENTIALS OF PHYSICS:

Definition and Scope of Physics- Measurements and Units - Motion of objects: Newtonian Mechanics and relativistic mechanics perspective - Laws of Thermodynamics and Significance- Acoustic waves and electromagnetic waves- Electric and Magnetic fields and their interactions- Behaviour of atomic and nuclear particles- Wave-particle duality, the uncertainty principle- Theories and understanding of universe.

## UNIT III: ESSENTIALS OF CHEMISTRY:

Definition and Scope of Chemistry- Importance of Chemistry in daily life -Branches of chemistry and significance- Periodic Table- Electronic Configuration, chemical changes, classification of matter, Biomolecules- carbohydrates, proteins, fats and vitamins.

## UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY:

**Applications of Mathematics in Physics & Chemistry:** Calculus , Differential Equations & Complex Analysis

**Application of Physics in Industry and Technology**: Electronics and Semiconductor Industry, Robotics and Automation, Automotive and Aerospace Industries, Quality Control and Instrumentation, Environmental Monitoring and Sustainable Technologies.

**Application of Chemistry in Industry and Technology:** Chemical Manufacturing, Pharmaceuticals and Drug Discovery, Materials Science, Food and Beverage Industry.

## UNIT V: ESSENTIALS OF COMPUTER SCIENCE:

Milestones of computer evolution - Internet, history, Internet Service Providers, Types of Networks, IP, Domain Name Services, applications.
**Ethical and social implications:** Network and security concepts- Information Assurance Fundamentals, Cryptography-Symmetric and Asymmetric, Malware, Firewalls, Fraud Techniques- Privacy and Data Protection

## SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL

## SEMESTER-I, MATHEMATICS

### COURSE 2: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICALSCIENCES

| Theory | Credits: 4 | 5 hrs/week |
|---|---|---|

**Course Objective:**

The objective of this course is to provide students with an in-depth understanding of the recent advances and cutting-edge research in mathematical, physical, and chemical sciences. The course aims to broaden students' knowledge beyond the foundational concepts and expose them to the latest developments in these disciplines, fostering critical thinking, research skills, and the ability to contribute to scientific advancements.

**Learning outcomes:**

1. Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems.

2. To Explain the basic principles and concepts underlying a broad range of fundamental areasof physics and to Connect their knowledge of physics to everyday situations.

3. Understand the different sources of renewable energy and their generation processes and advances in Nanomaterials and their properties, with a focus on quantum dots. To study the emerging field of quantum communication and its potential applications. To gain an understanding of the principles of biophysics in studying biological systems. Explore the properties and applications of shape memory materials.

3. Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of nanosensors. Explore the effects of chemical pollutants on ecosystems and human health.

4. Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.

5 Understand and convert between different number systems, such as binary, octal, decimal, and hexadecimal. Differentiate between analog and digital signals and understand their characteristics.Gain knowledge of different types of transmission media, such as wired (e.g., copper cables, fiber optics) and wireless (e.g., radio waves, microwave, satellite)..

## UNIT I: ADVANCES IN BASICS MATHEMATICS

**Straight Lines:** Different forms – Reduction of general equation into various forms – Point ofintersection of two straight lines

**Limits and Differentiation:** Standard limits – Derivative of a function –Problems on product ruleand quotient rule

**Integration:** Integration as a reverse process of differentiation – Basic methods of integration

**Matrices:** Types of matrices – Scalar multiple of a matrix – Multiplication of matrices – Transpose ofa matrix and determinants

## UNIT II: ADVANCES IN PHYSICS:

**Renewable energy**: Generation, energy storage, and energy-efficient materials and devices. **Recent advances in the field of nanotechnology**: Quantum dots, Quantum Communication- recent advances in biophysics- recent advances in medical physics- Shape Memory Materials.

## UNIT III: ADVANCES IN CHEMISTRY:

Computer aided drug design and delivery, nano sensors, Chemical Biology, impact of chemical pollutants on ecosystems and human health, Dye removal - Catalysis method

## UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

**Mathematical Modelling applications in physics and chemistry**

**Application of Renewable energy**: Grid Integration and Smart Grids,

**Application of nanotechnology**: Nanomedicine,

**Application of biophysics**:  Biophysical Imaging, Biomechanics, Neurophysics,

**Application of medical physics**:  Radiation Therapy, Nuclear medicine

Solid waste Management, Environmental remediation- Green Technology, Water treatment.

## UNIT V: Advanced Applications of computer Science

Number System-Binary, Octal, decimal, and Hexadecimal, Signals-Analog, Digital, Modem, Codec, Multiplexing, Transmission media, error detection and correction- Parity check and CRC, Networking devices- Repeater, hub, bridge, switch, router, gateway.

**SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT**
(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)
(Accredited with NAAC "B⁺" Grade with 2.67 CGPA )
I B.Sc Mathematics ( w.e.f 2023-24)
**Paper III, Syllabus for II semester**
**Differential Equations**
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**UNIT - I:** (12 Hours) **Differential equations of first order and first degree**
Bridge Course- Basics of Differential equations and Integration (No question to be given from this portion)
Linear differential equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors.

**UNIT – II** (12 Hours) **Differential Equations of first order but not of the first degree :**

Equations solvable for p, Equations solvable for y, Equations solvable for x, Equations homogenious in x and y, Equations of the first degree in x and y- Clairaut's Equation.

**UNIT-III:** (12 Hours) **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 $f(D)y=Q$, where Q is a function of x.

$\dfrac{1}{f(D)}$ is Expressed as partial fractions.

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

P.I. of $f(D)y = Q$ when $Q = b \sin ax$ or $b \cos ax$.

**UNIT-IV:** (12 Hours) **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 $Q = xV$ ,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.

**UNIT-V:** (12 Hours) **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.
**ADDITIONAL INPUT: Orthogonal trajectories**

**Prescribed Text Book:** (1) A Text Book of B.Sc Mathematics Volume-I (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry )
**Reference Books:** (1) Ordinary and Partial Differential Equations Raisinghania, published by
S. Chand & Company, New Delhi.

(2) Differential Equations with applications and programs – S. Balachandra
Rao & HR Anuradha- universities press.

(3) Differential Equations and Their Applications by Zafarpublished by Prentice-Hall of India Learning Pvt. Ltd. New Delhi-
Second edition.     **Suggested Activities:**Seminar/ Quiz/ Assignments

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I B.Sc Mathematics ( w.e.f 2023-24)
Paper IV, Syllabus for II semester
Analytical Solid Geometry

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## UNIT – I (12 hrs) : 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 (12 hrs) : 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 (12 hrs) : 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(12 hrs):Sphere&Cones :

Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres;  limiting points.

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; Condition that a cone may have three mutually perpendicular generators.

## UNIT – V (12 hrs)  Cones:

Enveloping cone of a sphere , Right circular cone, Equation of the right circular cone with a given vertex; axis and semi-vertical angle. Condition that a cone may have three mutually perpendicular generators.Intersection of a line and a quadric cone; Tangent lines and tangent plane at a point; Condition that a plane may touch a cone; Reciprocal cones; Intersection of two cones with a common vertex.

**Prescribed Text Book:**  (1) A Text Book of B.Sc Mathematics Volume-I (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry )

## Reference Books :

**1.** Analytical Solid Geometry by  Shanti  Narayan and  P.K.  Mittal,  Published by  S. Chand & Company Ltd. 7th Edition.

**2.** A text Book of Analytical Geometry of Three Dimensions, by  P.K. Jain and Khaleel Ahmed,  Published by 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.

**Suggested Activities**:    Seminar/ Quiz/ Assignments / Group discussins

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**II B.Sc Mathematics**
**Paper III, Syllabus for III semester**
**Abstract Algebra**

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## UNIT – 1 : (10 Hrs) 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.

## UNIT – 2 : (14 Hrs) Subgroups, Co-Sets and Lagrange's Theorem

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.

Cosets Definition – properties of Cosets–Index of a subgroups of a finite groups–Lagrange's Theorem.

## UNIT –3 : (12 Hrs) 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-4 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.

### Permutation Group:

Definition of permutation – permutation multiplication – Inverse of a permutation – cyclic permutations – transposition – even and odd permutations – Cayley's theorem.

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## UNIT – 5 : (14 Hrs) Rings:

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.

**Prescribed Text Book:**  A Text Book of B.Sc Mathematics Volume-II (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry )

**Reference Books :**
**1.** A. First course in Abstract Algebra, by J.B. Fraleigh Published by Narosa Publishinghouse.
**2.** Modern Algebra by M.L. Khanna.
**Suggested Activities**:  Seminar/ Quiz/ Assignments /Group  discussions/project works

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## (Affiliated to Adikavi Nannaya University, Rajahmahendravaram)
## (Accredited with NAAC B⁺ Grade with 2.67 CGPA )
### II B.Sc Mathematics
### Paper 10, Syllabus for IV semester
### Real Analysis
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**UNIT – I (12 hrs) : REAL NUMBERS**

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

**Real Sequences (**10 Marks-2, 5 Marks-2**)**

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 theorem.

**UNIT –II (12 hrs) : INFINITIE SERIES**

**Series :** Introduction to series, convergence of series. Cauchy's general principle of convergence for series tests for convergence of series, Series of Non-Negative Terms.

1. P-test
2. Canchy's n^th root test or Root Test.
3. D-Alembert's Test or Ratio Test.
4. Alternating Series – Leibnitz Test.

Absolute convergence and conditional convergence, semi convergence.

**UNIT – III (12 hrs) : 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 (12 hrs) : DIFFERENTIATION & 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; Rolle's Theorem, Lagrange's Theorem, Cauchy's Mean value Theorem.

**UNIT – V (12 hrs) : RIEMANN INTEGRATION**

Riemann Integral, Riemann integral functions, Darboux theorem. Necessary and sufficient condition for R – integrability, Properties of integrable functions, Fundamental theorem of integral calculus, First mean value theorem.

**REFERENCE TEXT BOOKS :**

**1.**"Introduction to Real Analysis" by RABERT g BARTELY and .D.R. SHERBART Published by
John Wiley.

**2.** Elements of Real Analysis on per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisinghania
Published by S. Chand & Company Pvt. Ltd., New Delhi.

**Suggested Activities**:Seminar/ Quiz/ Assignments /Group discussions/project works

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III B.Sc Mathematics
**Syllabus for V semester**
**Course-6A: Numerical Methods**

## Unit – 1:   Finite Differences and Interpolation with Equal intervals          (15h)

1. Introduction, Forward differences, Backward differences, Central Differences, Symbolic relations, nth Differences of Some functions,

2. Advancing Difference formula, Differences of Factorial Polynomial, Summation ofSeries.

3. Newton's formulae for interpolation. Central Difference Interpolation Formulae.

## Unit – 2: Interpolation with Equal and Unequal intervals          (15h)

1. Gauss's Forward interpolation formulae, Gauss's backward interpolation formulae, Stirling'sformula, Bessel's formula.

2. Interpolation with unevenly spaced points, divided differences and properties, Newton'sdivided differences formula.

3. Lagrange's interpolation formula, Lagrange's Inverse interpolation formula.

## Unit – 3: Numerical Differentiation (15h)

1. Derivatives using Newton's forward difference formula, Newton's back ward difference formula,

2. Derivatives using central difference formula, Stirling's interpolation formula,

3. Newton's divided difference formula, Maximum and minimum values of a tabulatedfunction

## Unit – 4: Numerical Integration (15h)

1. General Quadrature formula one errors, Trapezoidal rule,
2. Simpson's1/3– rule, Simpson's 3/8 – rule, and Weddle's rules,
3. Euler – Maclaurin Formula of summation and quadrature, The Euler transformation.

## Unit – 5:  Numerical solution of ordinary differential equations   (15h)

1. Introduction, Solution by Taylor's Series,
2. Picard's method of successive approximations,
3. Euler's method, Modified Euler's method, Runge – Kutta methods.

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## (Accredited with NAAC B⁺ Grade with 2.67 CGPA)
II B.Sc Mathematics
**Syllabus for III$^{rd}$ semester**
**Course-7: Laplace Transforms**
**Unit – 1**

**LAPLACE TRANSFORMS – I**

Definition of Laplace Transform - Linearity Property - Piecewise Continuous Function - Existence of Laplace Transform - Functions of Exponential order and of Class A.
**Unit – 2**
**LAPLACE TRANSFORMS – II**

First Shifting Theorem, Second Shifting Theorem, Change of Scale Property, Laplace transform of thederivative of f(t), Initial value theorem and Final value theorem.
**Unit – 3**
**LAPLACE TRNASFORM – 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 TRANSFORMS – 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 TRANSFORMS – 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 itsApplications.

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III B.Sc Mathematics
**Syllabus for V semester**
**Course-7A: Mathematical Special Functions**

**Unit – 1: Beta and Gamma functions, Chebyshev polynomials**                    (15h)

1. Euler's Integrals-Beta and Gamma Functions, Elementary properties of Gamma Functions, Transformation of Gamma Functions.
2. Another form of Beta Function, Relation between Beta and Gamma Functions.
3. Chebyshev polynomials, orthogonal properties of Chebyshev polynomials, recurrence relations, generating functions for Chebyshev polynomials.

**Unit – 2: Power series and Power series solutions of ordinary differential equations** (15h)
1. Introduction, summary of useful results, power series, radius of convergence, theorems on Power series
2. Introduction of power series solutions of ordinary differential equation
3. Ordinary and singular points, regular and irregular singular points, power series solution.

**Unit – 3: Hermite polynomials**                    (15h)
1. Hermite Differential Equations, Solution of Hermite Equation, Hermite polynomials, generating function for Hermite polynomials.
2. Other forms for Hermite Polynomials, Rodrigues formula for Hermite Polynomials, to find first few Hermite Polynomials.
3. Orthogonal properties of Hermite Polynomials, Recurrence formulae for Hermite Polynomials.

**Unit – 4: Legendre polynomials**                    (15h)

1. Definition, Solution of Legendre's equation, Legendre polynomial of degree  n, generating function of Legendre polynomials.

2. Definition of $P_n(x)$ and $Q_n(x)$, General solution of Legendre's Equation (derivations not required) to show that $\text{Pn}(x)$ is the coefficient of $h^n$, in the expansion of  of

$$(1 - 2xh + h^2)^{\frac{-1}{2}}$$
3. Orthogonal properties of Legendre's polynomials, Recurrence formulas for Legendre'sPolynomials.

**Unit – 5: Bessel's equation** (15h)

1. Definition, Solution of Bessel's equation, Bessel's function of the first kind of order n, Bessel's function of the second kind of order n.

2. Integration of Bessel's equation in series form=0, Definition of $J_n(x)$, recurrence for mulae for $J_n(x)$.

3. Generating function for $J_n(x)$, orthogonally of Bessel functions.

   **ADDITIONAL INPUT: Rodrigue's formula and its applications**

**SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT**
**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**
**(Accredited with NAAC B⁺ Grade with 2.67 CGPA)**
**SKILL ENHANCEMENT COURSE - ANALYTICAL SKILLS**
**Syllabus, For all Degree Programmes.**
**Semester – I (  w.e.f. 2023-24 )**

(Total 30 Hrs)

**Course Objective:** Intended to inculcate quantitative analytical skills and reasoning as an inherent ability in students.

**Course Outcomes:**

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

1) Understand the basic concepts of arithmetic ability, quantitative ability, logical reasoning, business computations and data interpretation and obtain the associated skills.
2) Acquire competency in the use of verbal reasoning.
3) Apply the skills and competencies acquired in the related areas
4) Solve problems pertaining to quantitative ability, logical reasoning and verbal ability inside and outside the campus.

**UNIT – I** :
**Arithmetic ability: (10 Questions)**
 Algebraic operations BODMAS, Fractions, Divisibility rules, LCM & GCD (HCF).

**Verbal Reasoning : (10 Questions)**
Number Series, Coding & Decoding, Blood relationship, Clocks, Calendars.

**UNIT – II** :
**Quantitative aptitude (10 Questions)**
Averages, Ratio and proportion, Problems on ages, Time-distance – speed.

**Business computations (10 Questions)**
Percentages, Profit &loss, Partnership, simple compound interest.

**UNIT – 3**:
**Data Interpretation: (2 Questions)**
Tabulation, Bar Graphs, Pie Charts, Line Graphs, Venn diagram.

**Reference Books:**

1. Quantitative Aptitude for Competitive Examination by R S Agrawal, S.Chand  publications.
2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
3. Quantitative Aptitude : Numerical Ability (Fully Solved) Objective Questions, Kiran Prakashan, Pratogitaprakasan, Kic X, Kiran Prakasan publishers
4. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata Mc Graw hill publications. Old question Paper of the exams conducted by (Wipro, TCS, Infosys, Etc) at their recruitment process, source-Internet.

II B.Sc Mathematics
**Syllabus for III$^{rd}$ Semester**
**Course-8:  Special Functions**

**Unit – 1: Beta and Gamma functions, Chebyshev polynomials**            (15h)

4. Euler's Integrals-Beta and Gamma Functions, Elementary properties of Gamma Functions,  Transformation of Gamma Functions.
5. Another form of Beta Function, Relation between Beta and Gamma Functions.
6. Chebyshev polynomials, orthogonal properties of Chebyshev polynomials, recurrence relations,    generating functions for Chebyshev polynomials.

**Unit – 2: Power series and Power series solutions of ordinary differential equations** (15h)
4. Introduction, summary of useful results, power series, radius of convergence, theorems on Power series
5. Introduction of power series solutions of ordinary differential equation
6. Ordinary and singular points, regular and irregular singular points, power series solution.

**Unit – 3: Hermite polynomials**                                      (15h)
4. Hermite Differential Equations, Solution of Hermite Equation, Hermite polynomials, generating function for Hermite polynomials.
5. Other forms for Hermite Polynomials, Rodrigues formula for Hermite Polynomials, to find first few Hermite Polynomials.
6. Orthogonal properties of Hermite Polynomials, Recurrence formulae for Hermite Polynomials.

**Unit – 4: Legendre polynomials**                                      (15h)

4. Definition, Solution of Legendre's equation, Legendre polynomial of degree  n, generating function of Legendre polynomials.

**5.** Definition of $P_n(x)$ and $Q_n(x)$, General solution of Legendre's Equation (derivations not required) to show that $\text{Pn}(x)$ is the coefficient of $h^n$, in the expansion of  of
$(1 - 2\text{xh} + \text{h}^{2)^{\frac{-1}{2}}}$
6. Orthogonal properties of Legendre's polynomials, Recurrence formulas for Legendre's Polynomials.

**Unit – 5: <mark>Bessel's equation</mark>** (15h)

4. Definition, Solution of Bessel's equation, Bessel's function of the first kind of order n, Bessel's function of the second kind of order n.
5. Integration of Bessel's equation in series form=0, Definition of $J_n(x)$, recurrence for mulae for $J_n(x)$.

6. Generating function for $J_n(x)$, orthogonally of Bessel functions.

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II B.Sc Mathematics ( w.e.f 2024-25)
**Syllabus for IV$^{th}$ Semester**
**Course-9:  RING THEORY**

**Course Content**
## Unit – 1 Rings and  Fields

Definition of a ring and Examples –Basic properties – Boolean rings - Fields – Divisors of 0 and Cancellation Laws– Integral Domains – Division ring - The Characteristic of a Ring, Integral domain and Field – Non Commutative Rings - Matrices over a field – The Quaternion ring.
## Unit – 2 Sub rings and Ideals
Definition and examples of Sub rings – Necessary and sufficient conditions for a subset to be a sub ring – Algebra of Sub rings – Centre of a ring – left, right and two sided ideals – Algebra of ideals –Equivalence of a field and a commutative ring without proper ideals
## Unit III: Principal ideals and Quotient rings
Definition of a Principal ideal ring(Domain) – Every field is a PID – The ring of integers is a PID – Example of a ring which is not a PIR – Cosets – Algebra of cosets – Quotient rings – Construction of composition tables for finite quotient rings of the ring $Z$ of integers and the ring $Z_n$ of integers modulo n.
## Unit – 4 Homomorphism of Rings
Homomorphism of Rings – Definition and Elementary properties – Kernel of a homomorphism – Isomorphism – Fundamental theorems of homomorphism of rings – Maximal and prime Ideals – PrimeFields
## Unit – 5
## Rings of Polynomials

Polynomials in an indeterminate – The Evaluation morphism -- The Division Algorithm in $F[x]$ – Irreducible Polynomials – Ideal Structure in $F[x]$ – Uniqueness of Factorization $F[x]$.

**SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT**
(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)
(Accredited with NAAC B⁺ Grade with 2.67 CGPA)
II B.Sc Mathematics
**Syllabus for IVᵗʰ Semester**
**Course-11: Integral Transforms**

## Learning Outcomes

Students after successful completion of the course will be able to

1. understand the application of Laplace transforms to solve ODEs
2. understand the application of Laplace transforms to solve Simultaneous DEs
3. understand the application of Laplace transforms to Integral equations
4. basic knowledge of Fourier-Transformations
5. Comprehend the properties of Fourier transforms and solve
   problems related to finite Fourier transforms.

### Unit – 1

**Application of Laplace Transform to solutions of Differential Equations**

Solutions of ordinary Differential Equations - Solutions of Differential Equations with constantscoefficients - Solutions of Differential Equations with Variable coefficients.

### Unit – 2
**Application of Laplace Transform to solutions of Differential Equations**

Solutions of Simultaneous Ordinary Differential equations - Solutions of Partial Differential Equations**.**

### Unit – 3
**Application of Laplace Transforms to Integral Equations**

Definitions of 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 sine 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 Transforms – II

Definition of Convolution - Convolution theorem for Fourier transform - Parseval's Identity - 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**.**