

# **B.A./B.Sc. FIRST YEAR MATHEMATICS SYLLABUS**

## **SYLLABUS FOR SEMESTER – II**

### **PAPER –II–MAT 110 - SOLID GEOMETRY**

**(For the Batches admitted from 2020-21)**

**60hrs**

#### **UNIT – I : The Plane : (12hrs)**

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 :(12hrs)**

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 :(14hrs)**

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 form of the equation of two spheres.

#### **UNIT – IV : Cones :(12hrs)**

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 :(10 hrs)**

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 :** Scope as in 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.

**Reference Books :**

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

**Note :** Concentrate on Problematic parts in all above units.

**B.A./B.Sc. FIRST YEAR MATHEMATICS SYLLABUS**

**SYLLABUS FOR SEMESTER – II**

**PAPER: MAT 119 - DISCRETE MATHEMATICS**

**(COMMON FOR IT HONOURS)**

**(For the batches admitted in 2020-21)**

**60Hrs**

**Unit-I (12 hrs)**

Sets, relations, partially ordered sets, Hasse diagrams, lattices, properties of lattices.

**Unit-II (12 hrs)**

Modular Lattices and properties, Characterization theorems.

**Unit-III (12 hrs)**

Distributive Lattices and properties, Characterization theorems.

**Unit-IV (12 hrs)**

Boolean Algebras, DeMorgan laws.

**Unit-V (12 hrs)**

Boolean homomorphism, Boolean rings, Boolean polynomials.

**Additional Module**

Minimal form of Boolean Polynomials.

**Prescribed Books**

- 1) Discrete Mathematical structures by kolman and Bus by and share poss, Prentice Hall of India.
- 2) Applied abstract Algebra of Rudolf Lidl& Gunter Pilz published by Springer Verlag.

**II B.Sc., MATHEMATICS**  
**SYLLABUS FOR SEMESTER-IV**  
**PAPER IV - MAT 115 - REAL ANALYSIS**  
**(For the batch admitted in 2020-21)**

**60Hrs**

**UNIT-I :REAL NUMBERS**

(12Hrs )

The algebraic and order properties of  $\mathbb{R}$ , Absolute Value and Real line , Completeness property of  $\mathbb{R}$ , Applications of supreme property, intervals .No .Question is to be set from this portion.

**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 Sequences, Limit point of sequence ,subsequences and the Bolzano–Weierstrass Theorem – Cauchy sequences –Cauchy 's general principle of convergence Theorem .

**UNIT-II: INFINITE SERIES**

(12Hrs )

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. Geometric series test
2.  $p$ -series test
3. Limit comparison test
4. Cauchy's  $n^{\text{th}}$  Root Test
5. D'Alembert's Ratio Test
6. Raabe's Test
7. Integral Test
8. Alternating Series – Leibnitz test, Absolute convergence and Conditional convergence, semi convergence

### **UNIT-III: CONTINUITY**

(12Hrs )

**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 (12Hrs )**

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 mean value theorem, Cauchy's mean value theorem; L'Hospital's Rules,

Generalised mean value theorems: Taylor's Theorem, Maclaurin's theorem.

### **UNIT – V: RIEMANN INTEGRATION**

(12Hrs )

The Riemann Integral, Riemann integral functions, Darboux 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.

#### **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 SS 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 Raising kania Published by S chand & company Pvt. Ltd, New Delhi

#### **Suggested Activities:**

Seminar / Quiz / Assignments / Project on Real analysis and its applications.

## **II B.Sc., Mathematics**

### **SEMISTER: IV, FOUNDATION COURSE (For the batch admitted in 2020-21) Analytical Skills**

**30HRS**

#### **UNIT-I - Data analysis: (6hrs)**

The data given in a table, graph, bardigram, piechart, venn diagram or a passage is to be analyzed and the questions pertaining to the data are to be answered .

#### **UNIT-II - Sequence and Series: (6hrs)**

Analogies of numbers and alphabets completion of blank spaces following the pattern in a:b::c:d relationship odd thing out; missing numbers in a sequence or a series.

#### **UNIT-III- Arithmetic Ability: (6hrs)**

Algebraic operations BODMAS, Fractions, Divisibility rules, LCM &GCD (HCF).Date, Time and Arrangement Problems: Calendar problems, Clock problems, Blood relationship.

#### **UNIT-IV- Quantitative Aptitude: (6hrs)**

Averages , Ratios and Proportion, Problems an ages, Time -distance -speed.

#### **UNIT-V- Businesses Computations (6hrs)**

Percentages, Profit&Loss , Partnership , Simple compound interest.

#### **References:**

1. R.Sagarwal, Quantitative Aptitude for competitive examination , S.chand publications.
2. R.vpraveen, Quantitative Aptitude and Reasoning. PHI publishers
3. Pratogitaprakasan ,Kic X, Quantitative Aptitude: Numerical Ability (fully solved) Objective questions ,Kiranprakasan Publishers.
4. Abhijitguha , Quantitative Aptitude for competitive examination ,TMG Hill publications.
5. Old question papers of the Exams conducted by (Wipro, tcs, Infosys etc.) at their Recruitment process, source- internet.

### **III BSC,SYLLABUS FOR SEMESTER-VI**

#### **General Elective : Paper –VII (A)**

#### **VII(A) –MAT 114- Ring Theory &Vector Calculus**

**(For the batches admitted in 2020-21)**

**60Hrs**

#### **UNIT-I (12 hrs) RING-I**

Definition of Ring and it's basic properties, Boolean ring, Zero divisors of ring, Cancellation laws in a ring, Some special types of rings, Characteristic of ring, Subrings, Ideals

#### **Unit –II (12 hrs) RINGS-II**

Principal Ideal, Quotient Ring, Euclidean Ring, Homomorphism of Rings, Maximal and Prime Ideals.

#### **Unit-III-(12hrs) Vector Differentiation**

Vector differentiation, Ordinary derivatives of vectors, Space curves, Continuity, Differentiability, Gradient, Divergence, Curl operators, Formulae involving these operators.

#### **Unit-IV:- (12hrs) Vector Integration**

Line integrals, Surface integrals and Volume integrals.

#### **Unit – V (12 hrs) Applications of Vector Integration**

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

#### **Additional Module:Intellectual Property Rights**

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics – Types of Intellectual Property – Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement – Regulatory – Over use or Misuse of Intellectual Property Rights –

#### **Compliance and Liability Issues.**

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law.

**Prescribed Text Book for Paper-III:** III year B.A./B.Sc. Mathematics, Telugu Academy, Hyderabad.

**Reference Books for Paper-III:**

1. Linear algebra by J.N. Sharma and A.R. Vasista, Krishna Prakashan Mandir, Meerut.
2. Linear Algebra by Kenneth Hoffman and Ray Kunze, Pearson Education, New Delhi.
3. Vector Analysis by Murray. R. Spiegel, Schaum series Publishing company.
4. Text book of Vector Analysis by Shanti Narayana and P.K. Mittal, S.Chand & Company Ltd., New Delhi.
5. Mathematical Analysis by S.C.Mallik and Savitha Arora, Wiley Eastern Ltd.
6. B.Sc., Mathematics – Vol III, S.Chand & Co., New Delhi.
7. B.Sc., Mathematics – Vol II, S.Chand & Co., New Delhi.
7. B.Sc., Mathematics – Paper III, Deepthi Publications, Tenali.

**Reference Books for Intellectual Property Rights:**

1. Deborah E. Bouchoux: “Intellectual Property”. Cengage learning, New Delhi.
2. Kompal Bansal & Parishit Bansal “Fundamentals of IPR for Engineers”, BS Publications (Press.)
3. Prabhu Datta Ganguli: „ Intellectual Property Rights” Tata Mc-Graw – Hill, New Delhi.
4. Richard Stim: “Intellectual Property”, Cengage Learning, New Delhi.
5. R. Radha Krishnan, S. Balasubramanian: “Intellectual Property Rights”, Excel Books. New Delhi.
6. M. Ashok Kumar and Mohd. Iqbal Ali: “Intellectual Property Right” Serials Pub.



## **B.Sc. THIRD YEAR MATHEMATICS SYLLABUS**

### **SEMESTER – VI, PAPER – VII-(B)**

#### **ELECTIVE– VII-(B) –MAT 116 - GRAPH THEORY 60 Hours** **(For the batches admitted in 2020-21)**

##### **UNIT – I (12 hrs) 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 (12 hrs)**

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

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

##### **UNIT – III (12 hrs)**

Applications of Trees - the connector problem.

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

##### **UNIT – IV (12 hrs): 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 (12 hrs)**

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

##### **Additional Module: Intellectual Property Rights**

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law

Basics – Types of Intellectual Property – Innovations and Inventions of Trade related

Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration –

Infringement – Regulatory – Over use or Misuse of Intellectual Property Rights –

Compliance and Liability Issues.

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law – Copyright Ownership

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent

Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent

– Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent

Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention

Developers and Promoters.

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures

– Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement –

Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law.

**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. A Text Book of Discrete Mathematics by Dr. Swapan Kumar Sankar, published by S.Chand & Co. Publishers, New Delhi.
4. Graph theory and combinations by H.S. Govinda Rao published by Galgotia Publications.

**Reference Books for Intellectual Property Rights:-**

1. Deborah E. Bouchoux: “Intellectual Property”. Cengage learning, New Delhi.
2. Kompal Bansal & Parishit Bansal “Fundamentals of IPR for Engineers”, BS Publications (Press.)
3. Prabhuddha Ganguli: „ Intellectual Property Rights” Tata Mc-Graw – Hill, New Delhi.
4. Richard Stim: “Intellectual Property”, Cengage Learning, New Delhi.
5. R. Radha Krishnan, S. Balasubramanian: “Intellectual Property Rights”, Excel Books. New Delhi.
6. M. Ashok Kumar and Mohd. Iqbal Ali: “Intellectual Property Right” Serials Pub.

**THIRD YEAR B.Sc. DEGREE EXAMINATION**  
**SEMESTER VI      MATHEMATICS      PAPER –VII C**  
**GENERALECTIVE –VIIC – MAT 121: INTEGRAL TRANSFORMS**  
**(For the batches admitted in 2020-21)**  
**SYLLABUS**  
**60 Hrs**

**UNIT – 1 (12 hrs)**

Application of Laplace Transform to solutions of Differential Equations : -  
Solutions of ordinary Differential Equations. Solutions of Differential Equations with constant co-efficients. Solutions of Differential Equations with Variable co-efficients.

**UNIT – 2 (12 hrs)**

Application of Laplace Transform : - Solution of simultaneous ordinary Differential Equations. Solutions of partial Differential Equations.

**UNIT – 3 (12 hrs)**

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

**UNIT –4 (12 hrs)**

Fourier Transforms-I : - Definition of Fourier Transform – Fourier's inverse 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 (12 hrs)**

Fourier Transform-II : - Convolution Definition – Convolution Theorem for Fourier transform – parseval's Identify – 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.

**Additional Module: Intellectual Property Rights**

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics – Types of Intellectual Property – Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement – Regulatory – Over use or Misuse of Intellectual Property Rights – Compliance and Liability Issues.

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law – Copyright Ownership

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent

Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law.

**Reference Books :-**

1. Integral Transforms by A.R. Vasistha and Dr. R.K. Gupta Published by Krishna Prakashan Media Pvt. Ltd. Meerut.
2. A Course of Mathematical Analysis by ShanthiNarayana and P.K. Mittal, Published by S. Chand and Company pvt. Ltd., New Delhi.
3. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Company Pvt. Ltd., New Delhi.
4. Lapalce and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by PragathiPrakashan, Meerut.

**5. Integral Transforms by M.D. Raising hania, - H.C. Saxsena and H.K. Dass Published by S.Chand and Company pvt. Ltd., New Delhi.**

**Reference Books for Intellectual Property Rights:**

1. Deborah E.Bouchoux: “Intellectual Property”. Cengage learning, New Delhi.
2. KompalBansal&ParishitBansal “Fundamentals of IPR for Engineers”, BS Publications (Press.)
3. PrabhuddhaGanguli: „ Intellectual Property Rights” Tata Mc-Graw – Hill, New Delhi.
4. Richard Stim: “Intellectual Property”, Cengage Learning, New Delhi.
- 5.R. Radha Krishnan, S. Balasubramanian: “Intellectual Property Rights”, Excel Books. New Delhi.
6. M. Ashok Kumar and Mohd.Iqbal Ali: “Intellectual Property Right” Serials Pub.

### III BSC- SYLLABUS FOR SEMESTER-VI

#### PAPER–VIII(A-1)

#### CLUSTER- A – 1 :: MAT 117-Advanced Numerical Analysis

(For the batches admitted in 2020-21)

60Hrs

##### Unit – I (12 hrs)

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

##### UNIT-II (12 hrs)

Numerical Differentiation- Errors in numerical differentiation, Maximum and minimum values of a tabulated function- Numerical integration-Definitions - General quadrature formula- Trapezoidal rule, Simpson's 1/3- rule.

##### UNIT-III (12 hrs)

Numerical integration - Simpson's 3/8 – rule, Boole's and Weddle's rule- Linear systems of equations-Definitions- Solution of linear systems- Direct methods, Matrix inversion method- Gaussian elimination method,.

##### UNIT-IV (12 hrs)

Linear systems of equations- Method of factorization, Ill-conditioned linear systems.Iterative methods: Jacobi's method, Gauss-Siedel method- Numerical solution of ordinary differential equations -Introduction, Solution by Taylor's series.

##### UNIT-V(12 hrs)

Numerical solution of ordinary differential equations - Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge–Kutta methods, Predictor–Corrector methods, Milne's method.

**Additional Module:** Central differences – Bessel's central difference formula- Laplace- Everett's formula-Numerical integration- Error in quadrature formula-Cote's method- Gaussian integration - Romberg integration.

**Prescribed Text Book for Paper-IV:** IIIrd B.Sc., Numerical Analysis.

Deepti Publications, Tenali.

##### **Reference Books for Paper-IV:**

1. Introductory methods of Numerical Analysis by S.S Sastry, Prentice Hall India, New Delhi.
2. Numerical Analysis by G. SankarRao, New Age Intn. Publishers, New – Hyderabad.
3. Finite Differences and Numerical Analysis by H. C. Saxena, S. Chand Co. New Delhi.
4. Calculus of Finite differences and Numerical Analysis by Gupta & Malik, Krishna Prakasan media (p) Ltd., Meerut.
5. A text book of Numerical Analysis by D.Chittibabu, PragatiPrakashan publications, Meerut.
6. Numerical Analysis by B.D. Gupta, Konark publishers Pvt., Ltd.,
7. Numerical Analysis by R. Gupta, Lakshmi publications, Delhi.

## **B.Sc. THIRD YEAR MATHEMATICS SYLLABUS**

### **SEMESTER – VI PAPER – VIII(A-2)**

#### **CLUSTER ELECTIVE-VIII(A-2): MAT 118- LAPLACE TRANSFORMS (For the batches admitted in 2020-21) 60Hrs**

##### **UNIT – 1 (12 hrs) 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 (12 hrs) 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 (12 hrs) 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 (12 hrs) 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 (12 hrs) 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.

**ADDITIONAL MODULE:** Application of Laplace Transform to solutions of Differential Equations : -

Solutions of Ordinary Differential Equations- Solutions of Differential Equations with constant coefficient - Solutions of Differential Equations with Variable co-efficient.

Reference Books :-

1. Laplace Transforms by A.R. Vasistha and Dr. R.K. Gupta Published by Krishna Prakashan Media Pvt. Ltd. Meerut.
2. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Co., Pvt.Ltd., New Delhi.
3. Laplace and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by PragathiPrakashan, Meerut.
4. Integral Transforms by M.D. Raising hania, - H.C. Saxsena and H.K. Dass Published by S. Chand and Co., Pvt.Ltd., New Delhi.

### **III BSC, SYLLABUS FOR SEMESTER-VI**

#### **Cluster Elective: Paper – VIII (B-1)**

#### **VIII (B-1)-MAT 119-DISCRETE MATHEMATICS**

**(For the batches admitted in 2020-21) 60Hrs**

##### **Unit-I (12 hrs)**

Sets, relations, partially ordered sets, Hasse diagrams, lattices, properties of lattices.

##### **Unit-II (12 hrs)**

Modular Lattices and properties, Characterization theorems.

##### **Unit-III (12 hrs)**

Distributive Lattices and properties, Characterization theorems.

##### **Unit-IV (12 hrs)**

Boolean Algebras, DeMorgan laws.

##### **Unit-V (12 hrs)**

Boolean homomorphism, Boolean rings, Boolean Polynomials.

##### **Additional Module**

Minimal form of Boolean Polynomials.

##### **Prescribed Books**

- 1) Discrete Mathematical structures by kolman and Bus by and share poss, Prentice Hall of India.
- 2) Applied abstract Algebra of Rudolf Lidl & Gunter Pilz published by Springer Verlag.

## **B.Sc. THIRD YEAR MATHEMATICS SYLLABUS**

### **SEMESTER – VI: PAPER – VIII-B-2**

#### **CLUSTER ELECTIVE – VIII-B-2::MAT 120-SPECIAL FUNCTIONS (For the batches admitted in 2020-21)**

**60HRS**

##### **UNIT-I : HERMITE POLYNOMIAL(12 hrs)**

Hermite Differential Equations, Solution of Hermite Equation, Hermite's Polynomials, Generating function, Other forms for Hermite Polynomial, To find first few Hermite Polynomials, Orthogonal properties of Hermite Polynomials, Recurrence formulae for Hermite Polynomials.

##### **UNIT-II :LAGUERRE POLYNOMIALS-I(12 hrs)**

Laguerre's Differential equation, Solution of Laguerre's equation, Laguerre Polynomials, Generating function, Other forms for the Laguerre Polynomials, To find first few Laguerre Polynomials, Orthogonal property of the Laguerre Polynomials, Recurrence formula for Laguerre Polynomials, Associated Laguerre Equation.

##### **UNIT-III : LEGENDRE'S EQUATION(12 hrs)**

Definition, Solution of Legendre's Equation, Definition of  $P(x)$  and  $Q_n(x)$ , General solution of Legendre's Equation (derivation is not required). To show that  $P_n(x)$  is the coefficient of  $h^n$  in the expansion of  $(1 - 2xh + h^2)^{-\frac{1}{2}}$ , Orthogonal properties of Legendre's Equation, Recurrence formula, Rodrigues formula.

##### **UNIT-IV: BETA AND GAMMA FUNCTIONS(12 hrs)**

Euler's Integrals-Beta and Gamma Functions, Elementary properties of Gamma Functions, Transformation of Gamma Functions, Another form of Beta Function, Relation between Beta and Gamma Functions, Other Transformations.

##### **UNIT-V: BESSEL'S EQUATION(12 hrs)**

Definition, Solution of Bessel's General Differential Equations, General solution of Bessel's Equation, Integration of Bessel's equation in series for  $n=0$ , Definition of  $J(x)$ , Recurrence formulae for  $J_n(x)$ , Generating function for  $J_n(x)$ .

##### **ADDITIONAL MODULE:**

Applications of Hermite Polynomial, Applications of Laguerre Equation, Applications of Legendre's Equation

**Prescribed Text Book:** Special Functions by J.N.Sharma and Dr.R.K.Gupta.



### **III BSC, SYLLABUS FOR SEMESTER-VI**

#### **Cluster Elective: Paper – VIII (C-1)**

#### **VIII (C-1)-MAT 122-PRINCIPLES OF MECHANICS**

**(For the batches admitted in 2020-21)**

**60Hrs**

##### **Unit – I : (10 hours)**

D'Alembert's Principle and Lagrange's Equations : some definitions – Lagrange's equations for a Holonomic system – Lagrange's Equations of motion for conservative, nonholonomic system.

##### **Unit – II: (10 hours)**

Variational Principle and Lagrange's Equations: Variational Principle – Hamilton's Principle – Derivation of Hamilton's Principle from Lagrange's Equations – Derivation of Lagrange's Equations from Hamilton's Principle – Extension of Hamilton's Principle – Hamilton's Principle for Non-conservative, Non-holonomic system – Generalised Force in Dynamic System – Hamilton's Principle for Conservative, Non-holonomic system – Lagrange's Equations for Nonconservative, Holonomic system - Cyclic or Ignorable Coordinates.

##### **Unit –III: (15 hours)**

Conservation Theorem, Conservation of Linear Momentum in Lagrangian Formulation – Conservation of angular Momentum – conservation of Energy in Lagrangian formulation.

##### **Unit – IV: (15 hours)**

Hamilton's Equations of Motion: Derivation of Hamilton's Equations of motion – Routh's procedure – equations of motion – Derivation of Hamilton's equations from Hamilton's Principle – Principle of Least Action – Distinction between Hamilton's Principle and Principle of Least Action.

##### **Unit – V: (10 hours)**

Canonical Transformation: Canonical coordinates and canonical transformations – The necessary and sufficient condition for a transformation to be canonical – examples of canonical transformations – properties of canonical transformation – Lagrange's bracket is canonical invariant – poisson's bracket is canonical invariant - poisson's bracket is invariant under canonical transformation – Hamilton's Equations of motion in poisson's bracket – Jacobi's identity for poisson's brackets.

##### **Reference Text Books :**

1. Classical Mechanics by C.R.Mondal Published by Prentice Hall of India, New Delhi.
2. A Text Book of Fluid Dynamics by F. Charlton Published by CBS Publications, New Delhi.
3. Classical Mechanics by Herbert Goldstein, published by Narosa Publications, New Delhi.
4. Fluid Mechanics by T. Allen and I.L. Ditsworth Published by (McGraw Hill, 1972)
5. Fundamentals of Mechanics of fluids by I.G. Currie Published by (CRC, 2002)

### **III BSC, SYLLABUS FOR SEMESTER-VI**

#### **Cluster Elective: Paper – VIII (C-2)**

#### **VIII (C-2)- MAT 123-FLUID MECHANICS**

**(For the batches admitted in 2020-21)**

**60Hrs**

##### **Unit – I : (10 hours)**

Kinematics of Fluids in Motion Real fluids and Ideal fluids – Velocity of a Fluid at a point – Streamlines and pathlines – 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 : (10 hours)**

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 : (10 hours)**

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 : (15 hours)**

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 : (15 hours)**

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.

##### **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)
7. 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)