

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), COIMBATORE-18.

DEPARTMENT OF MATHEMATICS

B.Sc., Degree Course

UG - SCHEME OF EXAMINATIONS: CBCS PATTERN

(For the students admitted during the academic year 2018-2019 and onwards)

| Part | Sub Code | Title of the Paper | Hrs (wk) | Internal (CA) Marks | External Marks | Total Marks | Ext- Min. | Total Pass Mark | Credits |
|----------------------|----------|--|----------|---------------------|----------------|-------------|-----------|-----------------|---------|
| Semester – 1 | | | | | | | | | |
| I | 18TAM11L | Part-I: Language:Tamil I | 6 | 25 | 75 | 100 | 30 | 40 | 3 |
| II | 18ENG12L | Part-II: English I | 6 | 25 | 75 | 100 | 30 | 40 | 3 |
| III | 18BMA13C | Core-I: Algebra | 5 | 25 | 75 | 100 | 30 | 40 | 4 |
| III | 18BMA14C | Core-II: Calculus | 5 | 25 | 75 | 100 | 30 | 40 | 4 |
| III | 18BMA15A | Allied – I: Numerical Analysis | 6 | 25 | 75 | 100 | 30 | 40 | 4 |
| IV | 18ENV1GE | Environmental Studies | 2 | 25 | 75 | 100 | 30 | 40 | 2 |
| Semester – II | | | | | | | | | |
| I | 18TAM21L | Part-I: Language:Tamil II | 6 | 25 | 75 | 100 | 30 | 40 | 3 |
| II | 18ENG22L | Part-II: English II | 6 | 25 | 75 | 100 | 30 | 40 | 3 |
| III | 18BMA23C | Core-III: Differential Equations And Laplace Transforms | 5 | 25 | 75 | 100 | 30 | 40 | 4 |
| III | 18BMA24C | Core-IV: Analytical Geometry Of 2D & 3D | 5 | 25 | 75 | 100 | 30 | 40 | 4 |
| III | 18BMA25A | Allied – II: Discrete Mathematical Structures | 6 | 25 | 75 | 100 | 30 | 40 | 4 |
| IV | 18VAL2GE | Value Education– Gandhian Thoughts | 2 | 25 | 75 | 100 | 30 | 40 | 2 |

| Part | Sub Code | Title of the Paper | Hrs (wk) | Internal (CA) Marks | External Marks | Total Marks | Ext- Min. | Total Pass Mark | Credits |
|-----------------------|----------|---|----------|---------------------|----------------|-------------|-----------|-----------------|---------|
| Semester – III | | | | | | | | | |
| I | 18TAM31L | Part-I: Language:Tamil III | 6 | 25 | 75 | 100 | 30 | 40 | 3 |
| II | 18ENG32L | Part-II: English III | 6 | 25 | 75 | 100 | 30 | 40 | 3 |
| III | 18BMA33C | Core -V : Trigonometry, Vector Calculus And Fourier Series | 6 | 25 | 75 | 100 | 30 | 40 | 4 |
| III | 18BMA34A | Allied – III: Physics –I(Theory) | 6 | 15 | 60 | 75 | 24 | 30 | 3 |
| III | | Allied – III: Physics –I(Practical) | 2 | | | | | | |
| IV | 18BMA35S | Skill Based Subject–I: Optimization Techniques - I | 4 | 25 | 75 | 100 | 30 | 40 | 3 |
| Semester – IV | | | | | | | | | |
| I | 18TAM41L | Part-I: Language:Tamil III | 6 | 25 | 75 | 100 | 30 | 40 | 3 |
| II | 18ENG42L | Part-II: English III | 6 | 25 | 75 | 100 | 30 | 40 | 3 |
| III | 18BMA43C | Core - VI: Abstract Algebra | 6 | 25 | 75 | 100 | 30 | 40 | 4 |
| III | 18BMA44A | Allied – IV: Physics –II (Theory) | 6 | 15 | 60 | 75 | 24 | 30 | 3 |
| III | 18BMA45P | Allied – IV: Physics –I&II (Practical) | 2 | 20 | 30 | 50 | 12 | 20 | 4 |
| IV | 18BMA46S | Skill Based Subject – II: Optimization Techniques – II | 4 | 25 | 75 | 100 | 30 | 40 | 3 |
| V | 18EXA4GE | Extension Activities: NCC/NSS/SPORTS//YRC | | | | | | | 1 |

| Part | Sub Code | Title of the Paper | Hrs (wk) | Internal (CA) Marks | External Marks | Total Marks | Ext- Min. | Total Pass Mark | Credits |
|----------------------|----------|---|----------|---------------------|----------------|-------------|-----------|-----------------|------------|
| Semester – V | | | | | | | | | |
| III | 18BMA51C | Core -VII : Linear Algebra | 6 | 25 | 75 | 100 | 30 | 40 | 5 |
| III | 18BMA52C | Core –VIII : Real Analysis - I | 5 | 25 | 75 | 100 | 30 | 40 | 5 |
| III | 18BMA53C | Core – IX : Statics | 5 | 25 | 75 | 100 | 30 | 40 | 5 |
| III | 18BMA54C | Core – X : Mathematical Statistics-I | 5 | 25 | 75 | 100 | 30 | 40 | 4 |
| III | | Project | 2 | | | | | | |
| IV | 18BMA55S | Skill Based Subject – III: C Programming | 4 | 25 | 75 | 100 | 30 | 40 | 3 |
| IV | 18BMA5EL | Non-Major Elective Paper – I: Arithmetic For All - I | 3 | 25 | 75 | 100 | 30 | 40 | 2 |
| Semester – VI | | | | | | | | | |
| III | 18BMA61C | Core -XI: Real Analysis - II | 6 | 25 | 75 | 100 | 30 | 40 | 5 |
| III | 18BMA62C | Core -XII: Dynamics | 5 | 25 | 75 | 100 | 30 | 40 | 5 |
| III | 18BMA63C | Core -XIII: Complex Analysis | 5 | 25 | 75 | 100 | 30 | 40 | 5 |
| III | 18BMA64C | Core –XIV: Mathematical Statistics – II | 5 | 25 | 75 | 100 | 30 | 40 | 4 |
| III | 18BMA65P | Project & Viva – Voce | 2 | 20 | 80 | 100 | 32 | 40 | 15 |
| IV | 18BMA65S | Skill Based Subject – IV: Latex | 4 | 25 | 75 | 100 | 30 | 40 | 3 |
| IV | 18BMA6EL | Non-Major Elective Paper – II: Arithmetic For All - II | 3 | 25 | 75 | 100 | 30 | 40 | 2 |
| | | Total/Credits | | | | 3600 | | | 140 |

GOVERNMENT ARTS COLLEGE (AUTONMOUS), COIMBATORE-18.

DEPARTMENT OF MATHEMATICS

B.Sc., Degree Course

UG ALLIED - SCHEME OF EXAMINATIONS: CBCS PATTERN

(For the students admitted during the academic year 2018-2019 and onwards)

| Sub Code | Title of the Paper | Hrs (wk) | Internal (CA) Marks | External Marks | Total Marks | Ext- Min. | Total Pass Mark | Credits |
|----------|--|----------|---------------------|----------------|-------------|-----------|-----------------|---------|
| 18BPH14A | Allied I: Mathematics –I (For Physics and Chemistry) | 8 | 25 | 75 | 100 | 30 | 40 | |
| 18BST14A | Allied I: Mathematics For Statistics-I | 8 | 25 | 75 | 100 | 30 | 40 | |
| 18BPH24A | Allied II: Mathematics -II (For Physics and Chemistry) | 8 | 25 | 75 | 100 | 30 | 40 | |
| 18BST25A | Allied I: Mathematics For Statistics –II | 8 | 25 | 75 | 100 | 30 | 40 | |
| 18BCS24A | Allied II: Discrete Mathematics For Computer Science | 8 | 25 | 75 | 100 | 30 | 40 | |
| 18BCS34A | Allied III: Operations Research For Computer Science | 8 | 25 | 75 | 100 | 30 | 40 | |
| 18BIT14A | Allied I: Mathematical Foundations for Information Technology | 8 | 25 | 75 | 100 | 30 | 40 | |
| 18BCO34A | Allied III: Business Mathematics | 8 | 25 | 75 | 100 | 30 | 40 | |
| 18BIB25A | Allied I: Mathematics For Business | 8 | 25 | 75 | 100 | 30 | 40 | |

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| Year | Subject Title | Sem. | Sub Code |
|---------------------|---------------|------|----------|
| 2018 -19 Onwards | ALGEBRA | I | 18BMA13C |

OBJECTIVES:

1. To learn fundamental concepts of convergent.
2. To learn the concepts of Binomial expansions, Logarithmic expansions, Exponential expansions and Limits of the series.
3. To learn the method of finding roots of algebraic equations and to find the nature of roots.

UNIT: I

CONVERGENCY AND DIVERGENCY OF SERIES: Infinite series – Geometric series – some general theorems concerning infinite series- The series is convergent when k is greater than unity and divergent when k equal to or less than unity – Cauchy’s condensation test- D’Alembert’s Ratio test – Cauchy’s Root test – Raabe’s test.
(Chapter 2 - Sections: 8 to 19)

UNIT: II

BINOMIAL THEOREM: Binomial theorem for rational index – Application of the Binomial theorem to the summation of series – Approximate values.
(Chapter 3 - Sections: 5 to 10 and 14)

UNIT: III

EXPONENTIAL AND LOGARITHMIC SERIES: The Exponential theorem – Summation - The Logarithmic series – Euler’s constant – summation – The application of the exponential and logarithmic series to limits and approximations.
(Chapter 4 - Sections: 1 to 11)

UNIT: IV

THEORY OF EQUATIONS: Roots of an equation – Relations between the roots and coefficient of equations – Symmetric functions of the roots – Transformation of equations – Reciprocal equations
(Chapter 6 - Sections: 1 to 12, 15 & 16)

UNIT: V

THEORY OF EQUATIONS (Cont.): To increase or decrease the roots of a given equation by a given quantity – Removal of terms – Descartes' Rule of signs - Rolle's theorem – Multiple roots – Horner's method of approximation.

(Chapter 6 – Sections: 17, 19, 24 to 26 and 30. (Omit section 30.1))

TEXT BOOK:

ALGEBRA VOL I - T.K.MANICAVACHAGOM PILLAY, T.NATARAJAN, and K.S.GANAPATHY, S.Viswanathan Pvt. Ltd, 2007.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|---------------|------|----------|
| 2018 -19 Onwards | CALCULUS | I | 18BMA14C |

OBJECTIVES:

1. To study the curvature of plane curves
2. To study integration and applying it to find the volume of solids.
3. To introduce Jacobian of transformations and study change of co-ordinates from one system to another.
4. To introduce Beta and Gamma functions and apply it to evaluate multiple integrals.

UNIT: I

CURVATURE OF PLANE CURVES: Curvature – Circle, radius and centre of curvature – Cartesian formula for the radius of curvature – The coordinates of the centre of curvature - Evolute and Involute –Radius of curvature when the curve is given in polar co-ordinates - Pedal equation of a curve.

(Chapter X – Sections: 2.1 to 2.7)

UNIT: II

INTEGRATION: Integration of irrational functions – Properties of definite integrals - Integration by parts – Reduction Formulae – Bernoulli’s Formula.

(Chapter 1 – Sections: 8 to 15.1)

UNIT: III

MULTIPLE INTEGRALS: Evaluation of the double integral – Change of order of integration – Double integral in polar co-ordinates – Triple integrals – Applications of Multiple integrals – Volumes of solids of revolution – Volumes of solids as double integrals – Volume as a triple integral.

(Chapter 5 - Sections: 1 to 6.3)

UNIT: IV

CHANGE OF VARIABLES: Jacobian – Two important results regarding Jacobians- Change of variables in the case of two variables – Change of variables in the case of three variables. Transformation from cartesian to polar co-ordinates – Transformation from cartesian to spherical polar co-ordinates.

(Chapter 6 – Sections: 1.1 to 2.4)

UNIT: V

IMPROPER INTEGRALS: Beta and Gamma functions – Recurrence formula for Gamma functions – Properties of Beta functions - Relation between Beta and Gamma functions – Applications of Gamma functions to multiple integrals.

(Chapter 7 - Sections: 2.1 to 6)

TEXT BOOKS:

1. **CALCULUS VOL - I - S.NARAYANAN and T.K.MANICAVACHAGOM PILLAY,** S Viswanathan Publishers, 2013. **(For Unit I)**

2. **CALCULUS, VOL – II - S.NARAYANAN and T.K.MANICAVACHAGOM PILLAY,** S Viswanathan Publishers, 2013. **(For Units II to V)**

| Year | Subject Title | Sem. | Sub Code |
|---------------------|--------------------|------|----------|
| 2018 -19 Onwards | NUMERICAL ANALYSIS | I | 18BMA15A |

OBJECTIVES:

1. To solve transcendental equations, Algebraic equations and simultaneous Linear equations.
2. To study the finite difference operators, forward, backward and central difference interpolation formulae.
3. To study the concept of Numerical differentiation and Numerical integration.

UNIT: I

SOLUTION OF TRANSCENDENTAL EQUATIONS AND ALGEBRAIC EQUATIONS: Bisection method – Iteration method – Newton Raphson method.

SOLUTION OF SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS: Gauss elimination and Gauss Jordan methods – Gauss Jacobi and Gauss Seidal methods.

(Chapter 3 - Sections: 2, 3, 5; Chapter 4 - Sections: 2, 6)

UNIT: II

FINITE DIFFERENCE OPERATORS: Operators Δ , ∇ , δ , μ and E - Properties of these operators and relation between them.

INTERPOLATION (FOR EQUAL INTERVALS): Newton's forward and Newton's backward interpolation formulae.

(Chapter 5 - Sections: 2 to 8, 10, 14, 15, 16, 18; Chapter 6 - Sections: 1, 3, 4)

UNIT: III

CENTRAL DIFFERENCE INTERPOLATION FORMULAE: Gauss's forward interpolation formula - Gauss's backward interpolation formula - Stirling's interpolation formula and Bessel's interpolation formula.

(Chapter 7 - Sections: 1 to 6)

UNIT: IV

INTERPOLATION (FOR UNEQUAL INTERVALS): Divided differences – Properties of Divided differences – Newton's divided difference formula – Lagrange's formula and inverse interpolation.

(Chapter 8 - Sections: 1 to 4, 9)

UNIT: V

NUMERICAL DIFFERENTIATION: Newton's forward difference formula and backward difference formula to compute the derivative – Derivative using Stirling's formula.

NUMERICAL INTEGRATION: Trapezoidal rule – Simpson's one third and three eighth rule.

(Chapter 9 - Sections: 1 to 4, 7, 8, 10)

TEXT BOOK:

1. NUMERICAL METHODS IN SCIENCE AND ENGINEERING - M. K. VENKATRAMAN, Second Edition (revised), The National Publishing Company, 1987.

REFERENCE BOOKS:

- 1. NUMERICAL METHODS - P. KANDASAMY, K. THILAGAVATHY and K. GUNAVATHY**, S. Chand and Company Limited, New Delhi, Revised Edition 2005.
- 2. INTRODUCTORY METHODS OF NUMERICAL ANALYSIS - S. S. SASTRY**, Third Edition, Prentice Hall India Private Limited, New Delhi, 2003.

| Year | Subject Title | Sem. | Sub Code |
|-----------------------------|---|-------------|-----------------|
| 2018 -19 Onwards | ENVIRONMENTAL STUDIES (For all UG courses) | I | 18ENV1GE |

UNIT: I

Environment – Introduction – Nature- Scope – Content – Need for study. Natural resources - Forest and energy resources - Use and over exploitation- deforestation. Energy resources - renewable and non renewable energy resources

UNIT: II

Ecosystem – concept – types- Forest, Grassland, Desert and Aquatic(Pond) - Structure and function of an ecosystem – Producers - consumers and decomposers – Food chain – food web- ecological pyramids - energy flow. Biodiversity and its conservation- *in situ* and *ex situ* conservation - Mega biodiversity centers and hotspots.

UNIT: III

Environmental pollution – definition – causes - effects and control measures of air, water, soil, thermal and nuclear pollutions - Waste management - Industrial and solid waste. Disaster management – earthquake, cyclone, flood and landslides.

UNIT: IV

Social Issues and the environment – Urbanization - Urban problems related to energy and watershed management. Environmental Ethics - Issues and possible solutions - Wasteland reclamation - Climate change - Global warming - Acid rain - Ozone layer depletion- Public awareness. Environmental laws - Environment Protection Act, Wildlife Protection Act, Forest Conservation Act.

UNIT: V

Human population and its impact on environment - Population growth - Resettlement and Rehabilitation of project affected persons - Case studies – Sardar Sarovar Project, Maharashtra and Bandipur National Park - Project Tiger, Karnataka, NTPC, India. Role of Indian and Global religions and Cultures in environmental conservation - Case study: sacred groves in Western Ghats (kavu) & Chinese culture. Human and Wildlife Conflicts.

TEXT BOOKS:

1. **TEXT BOOK OF ENVIRONMENTAL STUDIES**, BHARUCHA. E, 2003, UGC New Delhi & Bharathi Vidyapeeth Institute of Environmental Education and Research, Pune-361.
2. **ENVIRONMENTAL STUDIES (TAMIL VERSION)**, ARUMUGAM. M & KUMARESAN. V, 2016. Saras Publications, Nagercoil.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|--|------|----------|
| 2018 -19 Onwards | DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS | II | 18BMA23C |

OBJECTIVES:

1. To study the different ways of solving ordinary and partial differential equations.
2. To introduce Laplace Transforms and using it to solve the linear differential equations.

UNIT: I

ORDINARY DIFFERENTIAL EQUATIONS: Exact differential equations - Equations of the first order, but of higher degree.

(Chapter 1 - Sections: 3 to 7)

UNIT: II

ORDINARY DIFFERENTIAL EQUATIONS (CONT.) : Linear differential equations with constant coefficients – Special methods of finding particular integral – Linear equations with variable coefficients – Equations reducible to the linear homogeneous equations – Variation of parameters.

(Chapter 2 - Sections: 2 to 4, 8 to 10)

UNIT: III

ORDINARY DIFFERENTIAL EQUATIONS (CONT.) : Simultaneous equations of the first order and first degree – Methods for solving $dx/P=dy/Q=dz/R$ - Simultaneous linear differential equations with constant coefficients – Total Differential Equations.

(Chapter 3 – Sections: 1 to 7)

UNIT: IV

PARTIAL DIFFERENTIAL EQUATIONS: Derivation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Different integrals of partial differential equations - standard types of first order equations - Lagrange's equations.

(Chapter 4 – Sections: 1 to 6)

UNIT: V

LAPLACE TRANSFORMS: Definition - Laplace transforms of standard functions - some general theorems - Inverse Laplace transforms - Applications to first order and second order equations with constant coefficients and simultaneous linear differential equation.

(Chapter 5 - except Sections: 10 and 11)

TEXT BOOK:

CALCULUS VOL – III - S.NARAYANAN and T.K.MANICAVACHAGOM PILLAY,
S.Viswanathan Printers, 2013.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|-----------------------------------|------|----------|
| 2018 -19 Onwards | ANALYTICAL GEOMETRY OF 2D & 3D | II | 18BMA24C |

OBJECTIVES:

1. To study polar equations of a conic and study the characteristics of conics.
2. To introduce three dimensional Cartesian system and study the equations of planes, straight lines, spheres, cylinders and cone.

UNIT: I

ANALYTICAL GEOMETRY OF 2D: Polar equation of a conic – Directrix – Chord – Tangent – Normal.

(Chapter IX – Sections: 9 to 13)

UNIT: II

ANALYTICAL GEOMETRY OF 3D: Direction Cosines – Direction Ratios – Planes – Equation of the plane passing through the points – Angle between the planes – Equation of the plane through the line of intersection of two given planes.

(Chapter I - Sections: 7 to 11 and Chapter II)

UNIT: III

STRAIGHT LINE: Equation of the straight lines passing through two given points – The Plane and the straight line – Angle between the plane and the straight line – Co planarity of straight line - Shortest Distance (SD) and equation of SD between two lines.

(Chapter III – Sections: 1 to 8)

UNIT: IV

SPHERE: Standard equation of sphere - Results based on the properties of a sphere - Equation of circle on a sphere - Equation of tangent plane to a sphere.

(Chapter IV)

UNIT: V

CONE AND CYLINDER: Cone whose vertex is at the origin - Right circular cone - Equation of a cylinder - Right circular cylinder – Enveloping cylinder.

(Chapter V – Sections: 1, 2, 8)

TEXT BOOKS:

- 1. ANALYTICAL GEOMETRY – 2D - T.K. MANICKAVACHAGOM PILLAY & T. NATARAJAN, S. Viswanathan (Printers & Publishers) Pvt Ltd, 2007. (For Unit I)**
- 2. ANALYTICAL GEOMETRY – 3D - T.K. MANICKAVACHAGOM PILLAY& T. NATARAJAN , S. Viswanathan (Printers & Publishers) Pvt Ltd, 2007. (For Units II, III, IV & V)**

| Year | Subject Title | Sem. | Sub Code |
|---------------------|----------------------------------|------|----------|
| 2018 -19 Onwards | DISCRETE MATHEMATICAL STRUCTURES | II | 18BMA25A |

OBJECTIVES:

1. To study the fundamentals of Discrete Mathematical Structures.
2. To obtain knowledge about finite theoretical machines, and theoretical languages.

UNIT: I

MATHEMATICAL LOGIC: Connectives – Negation – Conjunction – Disjunction – Conditional and Biconditional – Well-formed Formulas – Tautologies – Equivalence of Formulas – Duality law – Tautological implication – Functionally Complete set of Connectives – Other Connectives – Normal forms – Disjunctive and Conjunctive normal forms – Principal Disjunctive and Principal Conjunctive normal forms.

(Chapter 1- Sections: 1.1 to 1.3)

UNIT: II

THEORY OF INFERENCE AND PREDICATE CALCULUS: Rules of Inference – Consistency of Premises and Indirect Method of Proof – The Predicate Calculus – Predicates, The Statement functions, Variables and Quantifiers – Free and Bound Variables, Inference Theory of the Predicate Calculus.

(Chapter 1 - Sections: 1.4 to 1.6)

UNIT: III

GRAPH THEORY: Basic definitions – degree of vertex-some special simple graphs - Matrix representation of graphs – Trees - Spanning trees - Minimum spanning trees - Rooted and Binary trees - Binary tree - Tree Traversal – Expression Trees – Problems

(Chapter 7)

UNIT: IV

LATTICES: Lattices as partially ordered sets – Definition and Examples – Some Properties of Lattices – Lattices as Algebraic Systems – Sub Lattices, Direct Product and Homomorphism – Some Special Lattices.

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(Chapter 4 - Section: 4.1)

UNIT: V

FORMAL LANGUAGES AND AUTOMATA: Phrase-Structure Grammar- Types of Phrase Structure Grammar – Backus – Naur Form - Finite state machine - input and output strings for FSM – Finite state Automata - Problems

(Chapter 8 – Page No: 448 to 490)

TEXT BOOKS:

- 1. DISCRETE MATHEMATICAL STRUCTURES WITH APPLICATIONS TO COMPUTER SCIENCE - J. P. TREMBLAY, R. MANOHAR,** Tata McGraw Hill Publishing Company Limited, New Delhi, 1997. (**For Units I,II,IV**)
- 2. DISCRETE MATHEMATICS WITH GRAPH THEORY AND COMBINATORICS - T.VEERARAJAN,** Tata McGraw Hill Publishing Company Limited, New Delhi, 2007. (**For Units III, V**)

| Year | Subject Title | Sem. | Sub Code |
|-----------------------------|---|-------------|-----------------|
| 2018 -19 Onwards | VALUE EDUCATION – GANDHIAN THOUGHTS (For all UG courses) | II | 18VAL2GE |

UNIT: I

Birth and Parentage - Childhood - At the High school - Stealing and Atonement - Glimpses of Religion - Gandhi's choice - Experiments in Dietetics - Acquaintance with Religions - The Great Exhibition.

UNIT: II

The first case - Preparing for South Africa - same experiences - on the way to Pretoria - Coolie - Natal Indian Congress - - Education of Children - Brahmacharya.

UNIT: III

Simple life - The Boer war - Sanitary Reform and Famine Relief - Lord Curzon's Darbar - A month with Gokhale - Experiments in Earth and water treatment - Indian opinion - Coolie Locations or Ghettoes - The Black plague.

UNIT: IV

The Magic spell of a Book - The Zulu Rebellion - The Birth of Satyagraha - More experiments in Dietetics - Kasturbai's Courage - Domestic Satyagraha- Fasting - Shanti Niketan - Woes of Third Class passengers.

UNIT: V

Kumbha mela - Lakshman Jhula - Founding of the Ashram - Abolition of Indentured Emigration - The Kheda Satyagraha - The Rowlatt Bills - Navajivan and young India - Congress Initiation - The Birth of Khadi.

TEXT BOOKS:

1. **THE STORY OF MY EXPERIMENTS WITH TRUTH - AN AUTOBIOGRAPHY,**
M.K.GANDHI , Apple publishing International(P) Ltd, Chennai.

2. மகாத்மா காந்தியின் சுயசரிதை - சத்தியசோதனை தமிழாக்கம் -
-ரா.வேங்கடராஜ்*லு, நவஜீவன் பரசுராலயம், அகமதாபாத

| Year | Subject Title | Sem. | Sub Code |
|---------------------|---|------|----------|
| 2018 -19 Onwards | TRIGONOMETRY, VECTOR ANALYSIS AND FOURIER SERIES | III | 18BMA33C |

OBJECTIVES:

On successful completion of the paper the students should have understood the concepts of expansion of trigonometric functions as series, hyperbolic functions, vector Differentiation, vector integration and fourier series expansion of functions.

UNIT: I

TRIGONOMETRY: Expansions of $\text{Cosn}\theta$, $\text{Sinn}\theta$, $\text{Cos}\theta$, $\text{Sin}\theta$, - Hyperbolic functions – Separation of real and imaginary parts of Hyperbolic functions.
(Chapter III – Sections: 1, 2, 5; Chapter IV)

UNIT: II

TRIGONOMETRY: Logarithm of Complex quantities – Summation of Trigonometric series.
(Chapter V – Section: 5; Chapter VI)

UNIT: III

VECTOR DIFFERENTIATION: Introduction – Gradient, Curl and Divergence – Divergence and Curl of a vector point function.
(Chapter I)

UNIT: IV

VECTOR INTEGRATION: Introduction – Line integral – Surface and Volume integrals – Gauss Divergence theorem – Stoke's theorem – Green's theorem – Problems based on these theorems.
(Chapter II)

UNIT: V

FOURIER SERIES: Definition – Finding Fourier coefficient for a given periodic function with period 2π – Odd and Even functions - Change of Interval.
(Chapter VI - Section: 1, 2, 3 and 6)

TEXT BOOKS:

1. **TRIGONOMETRY** - S. NARAYANAN and T.K MANICAVACHAGOM PILLAY, S. Viswanathan(Printers and Publishers) PVT Ltd. **(For Units I and II)**
2. **VECTOR ANALYSIS, ANALYTICAL SOLID GEOMETRY & SEQUENCES AND SERIES** - P R VITTAL, 2ND Edition, 1999, Margham Publications, Chennai. **(For Units III and IV)**
3. **CALCULUS VOL III** - T.K.MANICAVACHAGOM PILLAY, S.NARAYANAN, S.Viswanathan Printers, 2007. **(For Unit V)**

| Year | Subject Title | Sem. | Sub Code |
|---------------------|---------------------------|------|----------|
| 2018 -19 Onwards | OPTIMIZATION TECHNIQUES-I | III | 18BMA35S |

OBJECTIVES:

To provide Undergraduate students with a conceptual understanding of the role of management science using OR models. Students learn how to take decision for management problems.

UNIT: I

LINEAR PROGRAMMING PROBLEM: Mathematical formulation of the problem – Graphical solution – Some exceptional cases, Slack, Surplus variables – Simplex method.

(Chapter 2 - Sections: 2.1 to 2.4, Chapter 3 - Sections: 3.1 to 3.5, Chapter 4 - Section: 4.3)

UNIT: II

LINEAR PROGRAMMING PROBLEM: Use of artificial variables – Big M method – Two phase method.

DUALITY: General primal – dual pair – Formulating dual problem – Solving dual and finding the solution of the primal – Dual Simplex method.

(Chapter 4 - Section: 4.4, Chapter 5 - Sections: 5.1 to 5.4, 5.7, 5.9)

UNIT: III

TRANSPORTATION PROBLEM: General structure of the problem – Basic solutions – Loops in transportation tables – Transportation algorithm [MODI method].

ASSIGNMENT PROBLEM: Mathematical formulation of the problem – Hungarian assignment method.

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(Chapter 10 - Sections: 10.8 to 10.10, 10.12, 10.13; Chapter 11 - Sections: 11.1 to 11.3)

UNIT: IV

INVENTORY CONTROL: The inventory decisions – Costs associated with inventory – Factors affecting inventory control – Economic Order Quantity (EOQ) – Deterministic inventory problems with shortages and without shortages – EOQ problems with price breaks (No derivations of the formulas required).

(Chapter 19 - Sections: 19.1 to 19.12)

UNIT: V

QUEUING THEORY: Queuing system – Elements of Queuing system – Classification of Queuing models – Transient and steady states – $(M/M/1):(\infty/FIFO)$, $(M/M/1):(N/FIFO)$; models – Birth-Death process – $(M/M/C):(\infty/FIFO)$ models (No derivation of the formula's required).

(Chapter 21 - Sections: 21.1 to 21.3, 21.7 to 21.9)

TEXT BOOK:

OPERATIONS RESEARCH - KANTI SWARUP, P. K. GUPTA and MAN MOHAN, Fourteenth Edition, Sultan Chand and Sons, New Delhi, Reprint 2009.

REFERENCE BOOK:

OPERATIONS RESEARCH - HAMDY A. TAHA, Eighth Edition, Macmillan Publishing Company, 2007.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|------------------|------|----------|
| 2018 -19 Onwards | ABSTRACT ALGEBRA | IV | 18BMA43C |

OBJECTIVES:

To introduce concepts of the algebraic structures Groups and Rings along with the theorems on them.

UNIT: I

SET THEORY: Definition - Mappings – The Integers.

(Chapter 1 – Sections: 1.1 to 1.3)

UNIT: II

GROUP THEORY: Definition of a Group – Some examples of Groups – Some preliminary lemmas – Subgroups.

(Chapter 2 – Sections: 2.1 to 2.4)

UNIT: III

GROUP THEORY: A counting principle – Normal Subgroups and Quotient Groups – Homomorphism.

(Chapter 2 – Sections: 2.5 to 2.7)

UNIT: IV

RING THEORY: Definition and examples of Rings – Some special classes of Rings – Homomorphism – Ideals and Quotient Rings.

(Chapter 3 – Sections: 3.1 to 3.4)

UNIT: V

RING THEORY: More Ideals and Quotient Rings – The field of Quotients of an integral domain – Euclidean Rings – A particular Euclidean Ring.

(Chapter 3 – Sections: 3.5 to 3.8)

TEXT BOOK:

1. **TOPICS IN ALGEBRA** - N. HERSTEIN, Second Edition, Wiley Eastern Limited, 2010.

REFERENCE BOOKS:

1. **A FIRST COURSE IN ABSTRACT ALGEBRA** - JOHN B FARLEIGH, Narosa Publishing House, New Delhi.
2. **MODERN ALGEBRA** - ARUMUGAM S and ISAAC, A. T, Scitech Publication (India) Pvt. Ltd, Chennai – 600 017.
3. **MODERN ALGEBRA** - MANICAVACHAGOM PILLAY, Volume I, II, S. Viswanathan Publishers Pvt. Ltd.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|---------------------------|------|----------|
| 2018 -19 Onwards | OPTIMIZATION TECHNIQUE-II | IV | 18BMA46S |

OBJECTIVES:

To provide undergraduate students with a conceptual understanding of the role of management science using OR models. Students learn how to take decision for management problems.

UNIT: I

SEQUENCING: Problem of sequencing – Basic terms used in sequencing – Processing n jobs and two machines – Processing n jobs and three machines – Processing n jobs and m machines – Processing two jobs and m machines.

(Chapter 12 - Sections: 12.1 to 12.6)

UNIT: II

GAME THEORY: Introduction – Two person zero sum games – Basic terms – The Maximin – Minimax principle – Games without saddle points – Mixed strategies – Dominance property – Graphical solution of $2 \times n$ games and $m \times 2$ games.

(Chapter 17 - Sections: 17.1 to 17.7)

UNIT: III

INTEGER PROGRAMMING: Gomory's all I.P.P method – Construction of Gomory's constraints – Fractional cut method - All Integer LPP – Mixed Integer LPP.

(Chapter 7 – Sections: 7.1 to 7.6)

UNIT: IV

REPLACEMENT PROBLEM: Introduction – Replacement of equipment/asset that deteriorates gradually – Replacement of equipment that fails suddenly – Recruitment and promotion problem.

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(Chapter 18 - Sections: 18.1 to 18.4)

UNIT: V

NETWORK SCHEDULING BY PERT/CPM : Introduction – Network basic components – Logical sequencing – Rules of Network – Construction – Concurrent activities – Critical path analysis – Probability considerations in PERT – Distinction between PERT and CPM.

(Chapter 25 - Sections: 25.1 to 25.8)

TEXT BOOK:

OPERATIONS RESEARCH - KANTI SWARUP, P. K. GUPTA and MAN MOHAN, Fourteenth Edition, Sultan Chand and Sons, New Delhi, Reprint 2009.

REFERENCE BOOK:

OPERATIONS RESEARCH - HAMDY A. TAHA, Eighth Edition, Macmillan Publishing Company, 2007.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|----------------|------|----------|
| 2018 -19 Onwards | LINEAR ALGEBRA | V | 18BMA51C |

OBJECTIVES:

The core subject aims at introducing students to the fundamental concepts of Linear Algebra culminating in abstract vector spaces and linear transformations.

UNIT: I

MATRICES: Algebra of Matrices - Types of Matrices – The inverse of a Matrix - Characteristic equation and Cayley Hamilton theorem Statement and proof– Eigen values and Eigen vectors – Problems

(Chapter 7 - Sections: 7.1, 7.2, 7.3, 7.7, 7.8)

UNIT: II

VECTOR SPACES: Elementary basic concepts – Linear independence and bases.

(Chapter 4 - Sections: 4.1, 4.2)

UNIT: III

VECTOR SPACES: Dual spaces – Inner product spaces.

(Chapter 4 - Sections: 4.3, 4.4)

UNIT: IV

LINEAR TRANSFORMATION: Algebra of linear transformations – Characteristic roots.

(Chapter 6 - Sections: 6.1, 6.2)

UNIT: V

LINEAR TRANSFORMATION: Matrices - Canonical forms - Triangular forms.

(Chapter 6 - Sections: 6.3, 6.4)

TEXT BOOKS:

1. **MODERN ALGEBRA** – S.ARUMUGAM and A.T ISSAC, Eighth Edition, Sci Tech Publications (India) Private Limited, Reprint June 2016. **(For Unit I)**
2. **TOPICS IN ALGEBRA** - I. N. HERSTEIN, Second Edition, Vikas Publishers House Private Limited, Reprint 2016. **(For Units II, III, IV, V)**

REFERENCE BOOK:

1. **A TEXT BOOK IN MODERN ALGEBRA** - R. S. AGGARWAL, Second Edition, S Chand and Company Limited, New Delhi, 1979.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|------------------|------|----------|
| 2018 -19 Onwards | REAL ANALYSIS –I | V | 18BMA52C |

OBJECTIVES:

To provide a development of the subject which is dynamic, up to date and at the same time not too pedantic. It provides a transition from elementary calculus to advanced courses in real function theory and it introduces the reader to some of the abstract thinking that pervades modern analysis.

UNIT: I

THE REAL NUMBER SYSTEM: Introduction-The field axioms – The order axioms – Geometric representation of real numbers – Intervals – Integers – The unique factorization theorem for integers – Rational numbers – Irrational numbers – Upper bounds, maximum element, least upper bound (supremum) – The completeness axiom – Some properties of the supremum Properties of the integers deduced from the completeness axiom – The Archimedean property of the real number system – Rational numbers with finite decimal representation – Finite decimal approximations to real numbers – Infinite decimal representation of real numbers – Absolute values and the triangle inequality – The Cauchy-Schwarz inequality – Plus and minus infinity and the extended real number system R^* .

(Chapter 1- Sections: 1.1 to 1.20)

UNIT: II

SOME BASIC NOTIONS OF SET THEORY: Introduction - Notations – Ordered pairs – Cartesian product of two sets – Relations and functions – Further terminology concerning functions – One-to-one functions and inverses – Composite functions – Sequences – Similar (equinumerous) sets – Finite and Infinite sets – Countable and Uncountable sets – Uncountability of the real number system – Set algebra – Countable collection of countable sets.

(Chapter 2 - Sections: 2.1 to 2.15)

UNIT: III

ELEMENTS OF POINT SET TOPOLOGY: Introduction - Euclidean space R^n - Open balls and open sets in R^n - The structure of open sets in R^1 - Closed sets – Adherent points Accumulation points – Closed sets and Adherent points – The Bolzano-Weierstrass theorem – The Cantor's intersection theorem.

(Chapter 3 - Sections: 3.1 to 3.9)

UNIT: IV

ELEMENTS OF POINT SET TOPOLOGY (CONTINUED): The Lindelof covering theorem – The Heine-Borel covering theorem – Compactness in R^n - Metric spaces – Point set topology in metric spaces – Compact subsets of a metric space – Boundary of a set.

(Chapter 3 - Sections: 3.10 to 3.16)

UNIT: V

LIMITS AND CONTINUITY: Introduction - Convergent sequences in a metric space – Cauchy sequences – Complete metric spaces – Limit of a function – Limits of vector – valued functions – Continuous functions – Continuity of composite functions – Examples of continuous functions.

(Chapter 4 - Sections: 4.1 to 4.5, 4.7 to 4.9, 4.11)

TEXT BOOK:

MATHEMATICAL ANALYSIS - TOM M. APOSTOL, Second Edition, Narosa Publishing House, 2002.

REFERENCE BOOK:

PRINCIPLES OF MATHEMATICAL ANALYSIS - WALTER RUDIN, Mc Graw Hill, 1976.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|---------------|------|----------|
| 2018 -19 Onwards | STATICS | V | 18BMA53C |

OBJECTIVES:

To enable the students to know the concepts of force, resultant force of more than one force acting on a surface, friction and centre of gravity.

UNIT: I

PARALLEL FORCES AND MOMENT: Resultant of parallel forces – Moment of a force – Varignon’s theorem – Moment of a force about an axis.

COUPLES: Definition - Equilibrium of two couples – Equivalence of two couples – Resultant of coplanar couples.

(Chapter III - Sections: 1 to 4, 7 to 12, 14; Chapter IV - Sections: 1 to 3, 6 to 10)

UNIT: II

EQUILIBRIUM OF THREE FORCES ACTING ON A RIGID BODY: Rigid body subjected to any 3 forces - Three coplanar forces theorem – Conditions of equilibrium.

COPLANAR FORCES: Reduction of coplanar forces – Conditions for a system of forces to reduce to a single force or to a couple – Equation to the line of action of the resultant – Conditions of equilibrium of a system of coplanar forces.

(Chapter V- Sections: 1 to 3; Chapter VI - Sections: 1 to 5, 8 to 10)

UNIT: III

FRICTION: Introduction – Statical, Dynamical and Limiting friction – Laws of Friction – Co-efficient of Friction – Angle of Friction – Cone of Friction - Equilibrium of a body on a rough inclined plane under a force parallel to the plane and under any force.

(Chapter VII - Sections: 1 to 12)

UNIT: IV

CENTER OF GRAVITY: CG of a rod, Rectangular lamina, Uniform triangular lamina, Quadrilateral lamina – General formula for determination of CG.

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CG BY INTEGRATION: CG of uniform circular arc – Sector of a circle – Solid semi sphere – Hollow sphere – CG of a compound body.

(Chapter VIII - Sections: 3, 6, 8, 9, 11, 12, 18, 19)

UNIT: V

EQUILIBRIUM OF STRING: Equation of a common catenary – Tension at any point – Approximation to the shape of the catenary – Parabolic catenary - Suspension bridges – Simple problems.

(Chapter XI - Sections: 1 to 5, 7 to 9)

TEXT BOOK:

STATICS - Dr. M. K. VENKATARAMAN, 12th Edition, Agasthiar Publications, 2007.

REFERENCE BOOK:

MECHANICS - P.DURAIPANDIAN, LAXMI DURAIPANDIAN, MUTHAMIZH JAYAPRAGASAM, Sixth Edition, S Chand and Company Limited, 2006.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|---------------------------|------|----------|
| 2018 -19 Onwards | MATHEMATICAL STATISTICS-I | V | 18BMA54C |

OBJECTIVES:

1. To enable the students to understand the axioms of probability, multiplication theorem and Baye's theorem.
2. To understand the concepts of random variable and mathematical expectation.
3. To study various types of distributions, correlation and regression of multiple variables.

UNIT: I

THEORY OF PROBABILITY: Axioms of Probability – Generalized Addition theorem – Conditional Probability –Independent events – Multiplication theorem – Baye's theorem.

(Chapter III - Sections: 3.8 to 3.14; Chapter IV - Section: 4.2)

UNIT: II

RANDOM VARIABLES: The concept of random variable – The Distribution function – Discrete type and Continuous type – Two dimensional random variables – Marginal distribution – Conditional distributions – Independence of random variables.

MATHEMATICAL EXPECTATION: Mathematical Expectation – Moments of random variable – Skewness, Kurtosis, covariance, Properties of Expectation and Properties of Variance.

(Chapter V - Sections: 5.1 to 5.5, Chapter VI - Sections: 6.1 to 6.6)

UNIT: III

Moment generating function – Cumulants – Characteristic function- Chebyshev's inequality- Weak law of large numbers - Borel Cantelli lemma - Probability generating function

(Chapter VII - Sections: 7.1 to 7.3, 7.5, 7.7.1, 7.8 and 7.9)

UNIT: IV

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SOME PROBABILITY DISTRIBUTIONS: Bernoulli's scheme – Binomial, Poisson, Normal, Uniform, Beta and Gamma distribution.

(Chapter VIII - Sections: 8.1 to 8.5; Chapter IX - Sections: 9.1 to 9.3, 9.5 to 9.7)

UNIT: V

CORRELATION AND REGRESSION: Pearson's coefficient of correlation and regression – Partial and multiple correlation and regression of three variables only.

(Chapter X - Sections: 10.2, 10.4; Chapter XI - Sections: 11.1, 11.2.1 to 11.2.3, 11.4; Chapter XII - Sections: 12.4, 12.5, 12.7, 12.8)

TEXT BOOK:

FUNDAMENTALS OF MATHEMATICAL STATISTICS - V. K. KAPOOR and S. C. GUPTA, Eleventh Edition, Sultan Chand & Sons, New Delhi, 2002.

REFERENCE BOOK:

INTRODUCTION TO MATHEMATICAL STATISTICS - R. V. HOGG and T. V. CRAIG, Third Edition, Amerind Publishing Company Private Limited, New Delhi, 1970.

| Year | Subject Title | Sem. | Sub Code |
|------------------|---------------|------|----------|
| 2018 -19 onwards | C PROGRAMMING | V | 18BMA55S |

OBJECTIVES:

1. To expose a programming Language to students.
2. To write basic C programs with variables and Arithmetic operators.
3. To explain the process by which a C program is compiled.
4. To learn problem solving technique.

UNIT: I

CONSTANTS, VARIABLES AND DATA TYPES: Introduction – Character set – C Tokens – Keywords and Identifiers – Constants – Variables – Data types – Declaration of variables – Declaration of storage class – Assigning values to variables – Defining symbolic constants.

OPERATORS AND EXPRESSIONS: Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Special operators – Arithmetic expressions – Evaluation of expressions – Precedence of arithmetic operators – Type conversion in expressions – Operator precedence and associativity.

(Chapter 2 - Sections: 2.1 to 2.11; Chapter 3 - Sections: 3.1 to 3.12, 3.14 to 3.15)

UNIT: II

MANAGING INPUT AND OUTPUT OPERATIONS: Reading a character – Writing a character – Formatted input – Formatted output.

DECISION MAKING AND BRANCHING: Decision making with IF statement – Simple IF statement – The IF...ELSE statement – Nesting of IF...ELSE statements – The ELSE - IF Ladder – The Switch statement – The ?: operator – The GO TO statement.

(Chapter 4 - Sections: 4.1 to 4.5; Chapter 5 - Sections: 5.1 to 5.9)

UNIT: III

DECISION MAKING AND LOOPING: The WHILE statement – The Do statement – The FOR statement – Jumps in LOOPS.

ARRAYS: One dimensional array – Declaration of One dimensional array – Initialization of one dimensional arrays – Two dimensional arrays – Initializing Two-dimensional arrays – Multi-dimensional arrays.

(Chapter 6 - Sections: 6.1 to 6.5; Chapter 7 - Sections: 7.1 to 7.7)

UNIT: IV

USER-DEFINED FUNCTIONS: Need for user-defined functions – A multifunction program – Elements of user-defined functions – Definition of functions – Return values and their types – Function calls – Function declaration – Category of functions – No arguments and no return values – Arguments but no return values – Arguments with return values – No arguments but returns a value – Functions that return multiple values – Nesting of functions – Recursion – Passing arrays to functions.

(Chapter 9 - Sections: 9.1 to 9.17)

UNIT: V

STRUCTURES: Defining a structure – Declaring structure variables – Accessing structure members – Structure Initialization – Copying and comparing structure variables – Operations on individual members – Arrays of structures – Arrays within structures – Structures within structures.

(Chapter 10 - Sections: 10.1 to 10.10)

TEXT BOOK:

PROGRAMMING IN ANSI C - E. BALAGURUSAMY, Fourth Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

REFERENCE BOOK:

THE SPIRIT OF C, AN INTRODUCTION TO MODERN PROGRAMMING - HENRY MULLISH and HERBERT L. Cooper, Jaico Publishing House, 1999.

| Year | Subject Title | Sem. | Sub Code |
|-----------------------------|-----------------------------|-------------|-----------------|
| 2018 -19 Onwards | ARITHMETIC FOR ALL-I | V | 18BMA5EL |

OBJECTIVES:

1. To enable the students to learn about the basic concepts in Mathematics
2. To train the students in problem solving as preparatory for competitive examinations.

UNIT: I

Numbers – H.C.F and L.C.M of Numbers – Decimal Fractions.

(Sections: 1 to 3)

UNIT: II

Simplification, Square Roots and Cube Roots – Average

(Sections: 4 to 6)

UNIT: III

Problems on Numbers – Problems on Ages, Surds and Indices

(Sections: 7 to 9)

UNIT: IV

Percentage – Profit and Loss – Ratio and Proportion

(Sections: 10 to 12)

UNIT: V

Partnership – Chain Rule – Time and work.

(Sections: 13 to 15)

TEXT BOOK:

QUANTITATIVE APTITUDE (FOR COMPETITIVE EXAMINATIONS) -
Dr. R. S. AGGARWAL, Reprint 2014, S. Chand and Company Pvt Limited, Ram Nagar,
New Delhi -110055.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|-------------------|------|----------|
| 2018 -19 Onwards | REAL ANALYSIS -II | VI | 18BMA61C |

OBJECTIVES:

To provide a development of the subject which is dynamic, up to date and at the same time not too pedantic. It provides a transition from elementary calculus to advanced courses in real function theory and it introduces the reader to some of the abstract thinking that pervades modern analysis.

UNIT: I

THE CONCEPT OF CONTINUITY: Continuity and inverse images of open or closed sets – Functions continuous on compact sets – Topological mappings (homeomorphisms) – Bolzano's theorem – Connectedness – Components of a metric space.

(Chapter 4 - Sections: 4.12 to 4.17)

UNIT: II

UNIFORM CONTINUITY: Uniform continuity - Uniform continuity and compact sets – Fixed-point theorem for contractions – Discontinuities of real-valued functions – Monotonic functions.

DERIVATIVES: Introduction - Definition of derivative – Derivatives and continuity – Algebra of derivatives – The chain rule – One-sided derivatives and infinite derivatives – Functions with non zero derivative – Zero derivatives and local extrema.

(Chapter 4 - Sections: 4. 19 to 4.23; Chapter 5 - Sections: 5.1 to 5.8)

UNIT: III

DERIVATIVES (CONTINUED): Rolle's Theorem – The Mean-value theorem for derivatives – Intermediate-value theorem for derivatives – Taylor's formula with remainder – Derivatives of vector-valued functions – Partial derivatives.

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(Chapter 5 - Sections: 5.9 to 5.14)

UNIT: IV

FUNCTIONS OF BOUNDED VARIATION: Introduction - Properties of monotonic functions – Functions of bounded variation – Total variation – Additive property of total variation – Total variation on $[a, x]$ as a function of x - Functions of bounded variation expressed as the difference of increasing functions – Continuous functions of bounded variation.

(Chapter 6 - Sections: 6.1 to 6.8)

UNIT: V

THE RIEMANN–STIELTJES INTEGRAL: Introduction - Notation – The definition of Riemann-Stieltjes integral – Linear properties – Integration by parts – Change of variables in a Riemann-Stieltjes Integral – Reduction to a Riemann Integral.

(Chapter 7 - Sections: 7.1 to 7.7)

TEXT BOOK:

MATHEMATICAL ANALYSIS - TOM M. APOSTOL, Second Edition, Narosa Publishing House, 2002.

REFERENCE BOOK:

PRINCIPLES OF MATHEMATICAL ANALYSIS - WALTER RULDIN, McGraw Hill, 1976.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|---------------|------|----------|
| 2018 -19 Onwards | DYNAMICS | VI | 18BMA62C |

OBJECTIVES:

1. To give the students a thorough knowledge of the various concepts of real life applications.
2. The students are expected to have a sound knowledge of moving bodies.

UNIT: I

PROJECTILES: Definitions – Two fundamental principles - Path of a projectile – Characteristic of the motion of the Projectile - Horizontal projection of a particle from a point at a certain height – Maximum horizontal range.

(Chapter VI - Sections: 6.1 to 6.7)

UNIT: II

COLLISION OF ELASTIC BODIES: Introduction – Definitions - Fundamental laws of impact – Impact of a smooth sphere on a fixed smooth plane – Direct impact of two smooth spheres – Loss of kinetic energy – Oblique impact of two smooth spheres – Loss of kinetic energy.

(Chapter VIII - Sections: 8.1 to 8.8)

UNIT: III

SIMPLE HARMONIC MOTION: Introduction - SHM in a straight line – Simple problems – Composition of two SHM of the same period and in the same straight line – Composition of two simple harmonic motions of the same period in two perpendicular directions – Simple pendulum – Equivalent simple pendulum – The Seconds pendulum – Loss or gain in the number of oscillations made by a pendulum.

(Chapter X - Sections: 10.1, 10.2, 10.6, 10.7, 10.12, 10.14, 10.15, 10.16)

UNIT: IV

CENTRAL FORCES: Introduction – Velocity and Acceleration in Polar Coordinates – Equations of Motion in Polar Coordinates – Note on the Equiangular Spiral – Motion under a central force - Differential equation of central orbit – Pedal equation to the central orbit – Two fold problems in the central orbit.

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(Chapter XI - Sections: 11.1 to 11.6, 11.8, 11.11)

UNIT: V

MOMENT OF INERTIA: Definition – The Theorem on parallel axes – The Theorem of Perpendicular axes – M.I. of uniform rod – Rectangular lamina – Uniform Circular ring – Uniform Circular disc – Uniform Elliptic lamina – Solid sphere – Hollow sphere – Right circular cone - Hollow cone – Triangular lamina.

(Chapter XII - Sections: 12.1 to 12.4)

TEXT BOOK:

DYNAMICS - Dr. M.K.VENKATARAMAN, Sixteenth Edition, Agasthiar Publications, 2014.

REFERENCE BOOK:

MECHANICS - P. DURAI PANDIAN, LAXMI DURAI PANDIAN, MUTHAMIZH JAYAPRAGASAM, Sixth Edition, S Chand and Company Limited, 2006.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|------------------|------|----------|
| 2018 -19 Onwards | COMPLEX ANALYSIS | VI | 18BMA63C |

OBJECTIVES:

On successful completion of the paper the students should have understood the concepts of analytic functions and complex integration.

UNIT: I

ANALYTIC FUNCTIONS: Complex function – Limit of a function – Continuity of a function – Uniform continuity – Differentiability and analyticity of a function – Necessary condition for differentiability – Sufficient condition for differentiability – C. R. Equation in polar co-ordinates - Harmonic Function.

(Chapter 4 – Sections: 4.1 to 4.8; Chapter 6 - 6.12)

UNIT: II

BILINEAR TRANSFORMATIONS: Transformation $W = z^2$, $W = e^z$, $W = \sin z$, $W = \cos z$.

(Chapter 7 – 7.1 to 7.4, 7.6 to 7.8)

UNIT: III

COMPLEX INTEGRATION: Simple rectifiable positively oriented curves – Simple integrals using definition – Definite integrals – Interior and exterior of a closed curve – Simply connected region – Cauchy-Goursat's theorem. Integrals along an arc joining two points –Problems.

(Chapter 8 - Sections 8.1 to 8.8)

UNIT: IV

Cauchy's integral formula – Cauchy's formula for derivative – Cauchy's formula for higher derivatives – Morera's theorem – Problems.

TAYLORS AND LAURENT'S SERIES: Taylor's series – Zeros of an analytic function – Laurent's series.

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(Chapter 8 - Section 8.9; Chapter 9 – Sections: 9.1 to 9.3)

UNIT: V

Singular points and types of singularities - Residues – Calculus of residues – Problems.

(Chapter 9 – Sections: 9.5 to 9.13; Chapter 10 – Sections: 10.1, 10.2)

TEXT BOOK:

COMPLEX ANALYSIS - P. DURAI PANDIAN and LAXMI DURAI PANDIAN,
D. MUHILAN, Second Edition, Emerald Publisher, 1984.

REFERENCE BOOK:

THE ELEMENTS OF COMPLEX ANALYSIS - B. CHOUDHARY, Wiley Eastern
Limited.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|----------------------------|------|----------|
| 2018 -19 Onwards | MATHEMATICAL STATISTICS-II | VI | 18BMA64C |

OBJECTIVES:

1. To enable the students to understand the various applications of χ^2 , t, F distributions.
2. To understand the concepts of method of estimation.
3. To construct \bar{X} & R chart, p-chart, np-chart, c-chart in statistical quality control.

UNIT: I

TESTING OF HYPOTHESIS AND SAMPLING DISTRIBUTION I: Parameter and Statistic - Test of significance – Null Hypothesis – Type I and Type II errors – Critical region – Exact test based on normal, Derivation of χ^2 Distribution – M.G.F of χ^2 Distribution – Applications of χ^2 Distribution.

(Chapter 14 - Sections: 14.3, 14.4, 14.5, 14.7, 14.8.1 to 14.8.4; Chapter 15 - Sections: 15.1 to 15.3; 15.6 - 15.6.1 to 15.6.4)

UNIT: II

EXACT SAMPLING DISTRIBUTIONS II: Student's 't' Distribution – Fishers 't' Distribution – Applications of 't' Distribution - χ^2 and F -Distribution with regard to mean, proportions – Variance and standard deviation – F-Distribution – Applications of F-Distribution – F- test for equality of two population variances

(Chapter 16 - Sections: 16.1; 16.2 - 16.2.1 to 16.2.5, 16.3.1 to 16.3.4, 16.5, 16.6.1)

UNIT: III

THEORY OF ESTIMATION: Characteristics of estimators – Cramer-Rao inequality Unbiasedness – Consistency – Efficient Estimators – Sufficiency.

(Chapter 17 - Sections: 17.1 to 17.3)

UNIT: IV

METHODS OF ESTIMATION: Methods of estimation – Method of moments and method of Maximum Likelihood Estimation – Properties of Maximum Likelihood Estimators – Method of Minimum Variance - Confidence Interval and Confidence Limits.

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(Chapter 17- Sections: 17.6.1 to 17.6.3, 17.7)

UNIT: V

STATISTICAL QUALITY CONTROL: Meaning, Causes of variation – Assignable causes – Non Assignable causes – Process control and product control – Control chart for variables – Construction of \bar{X} & R chart – Control chart of attributes – p- chart – np-chart – c-chart.

(Chapter 1 - Sections: 1.1 to 1.9)

TEXT BOOKS:

1. **FUNDAMENTALS OF MATHEMATICAL STATISTICS** - S. C. GUPTA and V. K. KAPOOR, Eleventh Edition, Sultan Chand and Sons, New Delhi, 2002. **(For Units I, II, III and IV)**
2. **FUNDAMENTALS OF APPLIED STATISTICS** - V.K.KAPOOR and S.C.GUPTA, Third Edition, Sultan Chand and Sons, New Delhi, 2012.**(For Unit V)**

REFERENCE BOOK:

1. **INTRODUCTION TO MATHEMATICAL STATISTICS** - R V.HOGG and T.V. CRAIG, Third Edition, Amerind Publishing Company Private Limited, New Delhi, 1970.

| Year | Subject Title | Sem. | Sub Code |
|-----------------------------|----------------------|-------------|-----------------|
| 2018 -19 Onwards | LATEX | VI | 18BMA65S |

OBJECTIVES:

On completion of Latex the students skill in typing reports, articles and also books will be enhanced. Mathematical documents can be easily done in Latex.

UNIT: I

TEXT, SYMBOLS AND COMMANDS: Command names and arguments – Environments – Declarations – Lengths – Special characters.

(Chapter 2 - Sections: 2.1 to 2.5)

UNIT: II

Fine-tuning text – Word division.

DOCUMENT LAYOUT AND ORGANIZATION: Document class – Page style – Parts of the document – Table of contents.

(Chapter 2 - Sections: 2.7 to 2.8; Chapter 3 - Sections: 3.1 to 3.4)

UNIT: III

DISPLAYED TEXT: Changing font – Centering and indenting – Lists – Theorem-like declarations – Tables – Printing literal text – Foot notes and marginal notes – Comments within text.

(Chapter 4 - Sections: 4.1 to 4.3, 4.5, 4.8.1, 4.8.2, 4.9 to 4.11)

UNIT: IV

MATHEMATICAL FORMULAS: Mathematical environments – Main elements of math mode – Mathematical symbols.

(Chapter 5 - Sections: 5.1 to 5.3)

UNIT: V

Additional elements – Fine-tuning mathematics.

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(Chapter 5 - Sections: 5.4, 5.5)

TEXT BOOK:

A GUIDE TO LATEX - HELMUT KOPKA and PATRICK W. DALY, Fourth Edition,
Addison-Wesley.

REFERENCE BOOK:

GETTING STARTED WITH LATEX - DAVID R. WILKINS, Second Edition.

| Year | Subject Title | Sem. | Sub Code |
|-----------------------------|------------------------------|-------------|-----------------|
| 2018 -19 Onwards | ARITHMETIC FOR ALL-II | VI | 18BMA6EL |

OBJECTIVES:

1. To enable the students to learn about the basic concepts in Mathematics
2. To train the students in problem solving as preparatory for competitive examinations.

UNIT: I

Pipes and cistern – Time and distance – Problems on trains

(Sections: 16 to 18)

UNIT: II

Boats and Streams – Allegation or mixture – Simple Interest.

(Sections: 19 to 21)

UNIT: III

Compound Interest – Logarithms – Area.

(Sections: 22 to 24)

UNIT: IV

Volume and Surface areas – Races and games of skill – Calendar.

(Sections: 25 to 27)

UNIT: V

Clocks – Stocks and shares – True Discount.

(Sections: 28, 29 and 32)

TEXT BOOK:

QUANTITATIVE APTITUDE (FOR COMPETITIVE EXAMINATIONS) -
Dr. R. S. AGGARWAL, Reprint 2014, S Chand and Company Pvt Limited, Ram Nagar,
New Delhi -110055.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|--|------|-----------------------|
| 2018 -19 Onwards | ALLIED- I: MATHEMATICS –I (FOR PHYSICS AND CHEMISTRY) | I | 18BPH14A/ 18BCH14A |

OBJECTIVES:

1. To study the Characteristic equation and Eigenvectors of a matrix.
2. To understand the concepts and methods for finding the roots of the equations.
3. To study the nature of curvature and Trigonometric functions.

UNIT: I

MATRICES: Characteristic Equation of a matrix – Characteristic vectors of a matrix - Cayley Hamilton's theorem

(Chapter 5)

UNIT: II

THEORY OF EQUATIONS: Relations between the roots and coefficients of equation – Imaginary and Irrational roots – Symmetric functions of the roots of an equation in terms of its coefficient – Reciprocal equation – Transformation of equation – Multiplication of roots by m.

(Chapter 6 - Sections: 1 to 8)

UNIT: III

THEORY OF EQUATIONS (CONTINUED): Diminishing the roots of an equation – Descarte's Rule of signs – Horner's method – Newton's method.

(Chapter 6 - Sections: 9 to 14)

UNIT: IV

POLAR CO-ORDINATES, CURVATURE AND RADIUS OF CURVATURE: Angle of intersection of two curves – Pedal equation – Cartesian Formula for Radius of Curvature – Parametric formula – Radius of curvature in polar co-ordinates – Radius of curvature for pedal curve.

(Chapter 10 and Chapter 11)

UNIT: V

TRIGONOMETRY: Expansions – Roots of Equations – Hyperbolic functions.

(Chapter 14)

TEXT BOOKS:

1. **ALLIED MATHEMATICS** - Dr. P. R. VITTAL, Margham Publications, Chennai, 1998.

REFERENCE BOOK:

1. **ALGEBRA VOLUME I** - T. K. MANICAVACHAGOM PILLAY and OTHERS, S. Viswanathan Printers and Publisher Private Limited, 2008.
2. **ALGEBRA VOLUME II** - T. K. MANICAVACHAGOM PILLAY and OTHERS, S. Viswanathan Printers and Publisher Private Limited, 2008.
3. **CALCULUS VOLUME I** - T. K. MANICAVACHAGOM PILLAY and OTHERS, S. Viswanathan Printers and Publisher Private Limited, 2008.
4. **TRIGONOMETRY** - T.K.MANICAVACHAGOM PILLAY and OTHERS, S. Viswanathan Printers and Publisher Private Limited, Tenth Edition, 2007.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|---|------|----------|
| 2018 -19 Onwards | ALLIED –I: MATHEMATICS FOR STATISTICS-I | I | 18BST14A |

OBJECTIVES:

To understand the concept of solving the higher degree polynomial equations, solving the non-linear equations and finding the Eigen values and Eigen vectors using matrices.

To understand the methods of solving the differential calculus, integral calculus and solving the ordinary differential equations.

UNIT I: THEORY OF EQUATIONS

In an equation with real coefficients imaginary roots occur in pairs – In an equation with rational coefficients irrational roots occur in pairs – Relations between the roots and coefficients of equations – Reciprocal equation.

(Chapter 6- Sections: 9, 10, 11, 16)

UNIT II : MATRICES

System of non-homogeneous linear equations – Eigen values and Eigen vectors – Cayley – Hamilton theorem (proof not needed) Problem based on this theorem.

(Chapter 2 : Section 16)

UNIT III : DIFFERENTIAL CALCULUS

Standard forms – General theorems on differential coefficients– Product rule, Quotient rule, Differential coefficient of $\tan x, \cot x, \sec x, \operatorname{cosec} x$, function of function rule, Inverse function, differential of hyperbolic and Inverse hyperbolic function – Logarithmic differentiation.

(Chapter 2 : Sections 2-4)

UNIT IV : INTEGRAL CALCULUS

Methods of Integration- Integrals of functions containing linear functions of x , Integrals of functions involving $a^2 \pm x^2$ - integrals of the functions of the form $\int f(x)^n x^{n-1} dx$ - Integrals of

the functions of the form $\int \{f(x)\}^n f'(x) dx$, integrals of the form $\int F\{f(x)\}f'(x) dx$ - Integrals of rational algebraic functions (Type I, Type –II) –Special Cases.
(Chapter: I, Sections 5 -7.5)

UNIT V: ORDINARY DIFFERENTIAL EQUATION

Differential Equations of First order and Higher degree – Equations solvable for p - Equations solvable for y - Equations solvable for x – Clairaut’s Equation, Linear Homogeneous Equation and variation of parameter

(Chapter 1 – Sections:1,5,6.1 and 10)

TEXTBOOKS

1. **ALGEBRA VOLUME I** - T. K. MANICAVACHAGOM PILLAY and OTHERS,
S. Viswanathan Printers and Publisher Private Limited, 2013 (For UNIT-I).
2. **ALGEBRA VOLUME II** - T. K. MANICAVACHAGOM PILLAY and OTHERS,
S. Viswanathan Printers and Publisher Private Limited, 2011(For UNIT-II).
3. **CALCULUS VOLUME I** - T. K. MANICAVACHAGOM PILLAY and OTHERS,
S. Viswanathan Printers and Publisher Private Limited, 2009 (For UNIT III)
4. **CALCULUS VOLUME II** - T. K. MANICAVACHAGOM PILLAY and OTHERS,
S. Viswanathan Printers and Publisher Private Limited, 2007 (For UNIT-IV).
5. **CALCULUS VOLUME III** - T. K. MANICAVACHAGOM PILLAY and OTHERS,
S. Viswanathan Printers and Publisher Private Limited, 2011 (For UNIT-V).

REFERENCE BOOK:

ANCILLARY MATHEMATICS - P. R. VITTAL, Margam Publication, Chennai, 1998.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|--|------|-----------------------|
| 2018 -19 Onwards | ALLIED -II: MATHEMATICS -II (FOR PHYSICS AND CHEMISTRY) | II | 18BPH24A/ 18BCH24A |

OBJECTIVES:

1. To understand the concept of Integral calculus.
2. To study Ordinary and Partial Differential equations.
3. To understand the use of Laplace transform and Fourier series.

UNIT: I

INTEGRAL CALCULUS: Definite Integral - Double integral – Double integral in polar coordinates – Triple Integral.

Beta, Gamma Functions – Properties.

(Chapter 20 – Sections: 20.1 to 20.4; Chapter 30)

UNIT: II

ORDINARY DIFFERENTIAL EQUATION: Differential Equations of First order and Higher degree – Equations solvable for p - Equations solvable for y - Equations solvable for x – Clairaut's Equation.

Linear Homogeneous Equation and variation of parameter

(Chapter 22 – Sections: 22.1 to 22.2; Chapter 24)

UNIT: III

PARTIAL DIFFERENTIAL EQUATION: Formation of PDE – Non Linear Differential Equations of first order – Standard Types – Lagrange's Linear Partial Differential Equations.

(Chapter 26)

UNIT: IV

LAPLACE TRANSFORMS: Laplace transform of elementary functions – Properties – Inverse Laplace Transform – Solving Differential Equations using Laplace Transform.

(Chapter 27)

UNIT: V

FOURIER SERIES: Fourier coefficients – Fourier series for odd and even functions – Half Range Fourier series.

(Chapter 21)

TEXT BOOKS:

1. **ALLIED MATHEMATICS** - Dr. P. R. VITTAL, Margham Publications, Chennai, 1998.

REFERENCE BOOKS:

1. **CALCULUS VOLUME II** - T. K. MANICAVACHAGOM PILLAY and OTHERS, S. Viswanathan Printers and Publisher Private Limited, 2008.
2. **CALCULUS VOLUME III** - T. K. MANICAVACHAGOM PILLAY and OTHERS, S. Viswanathan Printers and Publisher Private Limited, 2008.
3. **DIFFERENTIAL EQUATIONS** - S. NARAYANAN AND OTHERS, Ninth Edition, S. Viswanathan Printers and Publishers, 2007.
4. **ENGINEERING MATHEMATICS VOLUME III** - A. SINGARAVELU, Fifth Edition, Meenakshi Agencies, Chennai, 2005.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|---|------|----------|
| 2018 -19 Onwards | ALLIED -II:MATHEMATICS FOR STATISTICS –II | II | 18BST25A |

OBJECTIVES:

To understand the concept Sets and functions, Sequence and series of real numbers and limits and metric spaces of Real and Analysis.

UNIT I : SETS AND FUNCTIONS

Sets and elements – Operation on sets – Functions – Real valued functions – Equivalence, Countability – Real numbers – Least upper bounds
(Chapter 1 : Sections 1.1 – 1.7)

UNIT II : SEQUENCE OF REAL NUMBER

Definition of Sequence and Subsequence – Limit of a Sequence – Convergent Sequence – Divergent sequence – Bounded Sequence – Monotone Sequence – Operation on Convergent Sequence – Operation on Divergent sequence
(Chapter 2 : Sections 2.1-2.8)

UNIT III : SERIES OF REAL NUMBERS

Convergence and Divergence – Series with non-negative terms – Alternating Series – Conditional Convergence and Absolute Convergence – Test for absolute convergence

(Chapter 3 : Sections 3.1 – 3.4, 3.6)

UNIT IV: SERIES OF REAL NUMBERS (Continuation)

Test for Absolute Convergence – Series whose terms form a non-increasing Sequence – Summation by Parts – (C,1) Summability of Series.

(Chapter 3 : Section 3.6 – 3.9)

UNIT V : LIMITS AND METRIC SPACES

Limits of a function on the real line – Metric spaces – Limits in Metric space (Chapter 4 : Sections 4.1 – 4.3)

TEXTBOOKS

METHODS OF REAL ANALYSIS - Richard R. Goldberg, Oxford & IBH Publishing Co. PVT. LTD., NewDelhi, 1963.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|--|------|----------|
| 2018 -19 Onwards | DISCRETE MATHEMATICS FOR COMPUTER SCIENCE | II | 18BCS24A |

OBJECTIVES:

1. To understand the concepts of basic Discrete structures.
2. To get knowledge about applying the properties of Discrete Mathematical Structures.

UNIT: I

MATHEMATICAL LOGIC: Propositions and Logical Operators – Truth table – Tautology – Contradiction – Equivalence and Implication – Normal forms (DNF, CNF, PDNF and PCNF).

(Chapter I - Sections: 1.1 to 1.3)

UNIT: II

INFERENCE THEORY: Inference theory for statement calculus – Predicates – Quantifiers – Variables – Free and bound variables – Inference theory for predicate calculus.

(Chapter I - Sections: 1.4 to 1.6)

UNIT: III

BASIC SET THEORY: Basic definitions – Venn diagrams and set operations – Laws of set theory – Principle of inclusion and exclusion – Relations – Properties of relations – Matrices of relations – Functions – Injective, surjective and bijective functions.

(Chapter II - Sections: 2.1, 2.3 and 2.4)

UNIT: IV

FORMAL LANGUAGES AND AUTOMATA: Grammers and Languages– Finite state machine – Finite state Acceptors and Regular grammars.

(Chapter III - Section: 3.3; Chapter IV – Section: 4.6; Chapter VI - Section: 6.1)

UNIT: V

GRAPH THEORY: Basic terminology – Types of graphs – Paths, cycle and connectivity – Representation of graphs in computer memory – Trees – Properties of trees – Binary trees – Traversing binary trees – Computer representation of general trees.

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(Chapter V - Sections: 5.1, 5.2)

TEXT BOOK:

DISCRETE MATHEMATICAL STRUCTURES WITH APPLICATIONS TO COMPUTER SCIENCE - J. P. TREMBLAY and R. MANOHAR, Mc Graw Hill International Edition, 1997.

REFERENCE BOOK:

DISCRETE MATHEMATICS - Dr. M.K.VENKATARAMAN, Dr.N.SRIDHARAN and N.CHANDARSEKARAN, The National Publishing Company, Chennai, 2002.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|---|------|----------|
| 2018 -19 Onwards | OPERATIONS RESEARCH FOR COMPUTER SCIENCE | III | 18BCS34A |

OBJECTIVES:

1. To solve the Linear Programming Problem.
2. To study the concepts of the Transportation problems.
3. To understand the concepts of inventory control and Network scheduling by PERT/CPM.

UNIT: I

LINEAR PROGRAMMING PROBLEM: Formulation of L.P.P – Graphical solutions of L.P.P – Canonical and standard forms of L.P.P – Simplex method – Big M Method - Duality in L.P.P – Formulation of dual- Duality and Simplex Method.

(Chapter 2 - Sections: 2.1 to 2.4; Chapter 3 - Sections: 3.1 to 3.5; Chapter 4 - Sections: 4.1to 4.4; Chapter 5 - Sections: 5.1 to 5.4, 5.7)

UNIT: II

GAME THEORY: Two person zero sum game – The Maximin-Minimax principle – Problems. Solution of 2×2 rectangular games – Domination property - $(2 \times n)$ and $(m \times 2)$ graphical method- Dominance property – Problems.

(Chapter 17 - Sections: 17.1 to 17.7)

UNIT: III

THE TRANSPORTATION PROBLEMS: Basic feasible solution by L.C.M – NWC – VAM – Optimum solutions (MODI Method) – Unbalanced transportation problems. The Assignment problems – Assignment algorithm – Optimum solutions (Hungarian Method) – Unbalanced assignment problems.

(Chapter 10 - Sections: 10.1 to 10.13; Chapter 11 - Sections: 11.1 to 11.4)

UNIT: IV

INVENTORY CONTROL: Types of inventories – Inventory costs – EOQ problem with no shortages – Production problem with no shortages – EOQ with shortages – Production problem with shortages – EOQ with price breaks.

(Chapter 19 - Sections: 19.1 to 19.12)

UNIT: V

NETWORK SCHEDULING BY PERT/CPM : Introduction – Network basic components – Logical sequencing – Rules of Network – Construction – Concurrent activities – Critical path analysis – Probability considerations in PERT – Distinction between PERT and CPM.

(Chapter 25 - Sections: 25.1 to 25.8)

TEXT BOOKS:

1. **OPERATIONS RESEARCH** - KANTISWARUP, P. K. GUPTA, MAN MOHAN, Fourteenth Revised Edition, S. Chand & Sons Educational Publications, New Delhi, Reprint 2009.
2. **PROBLEMS IN OPERATIONS RESEARCH** - P. K. GUPTA, MAN MOHAN, Eleventh Edition, S. Chand and Sons Educational Publications, Reprint 2007.

REFERENCE BOOKS:

1. **OPERATIONS RESEARCH – An Introduction** - HAMDY A. TAHA, Pearson Education, Reprint 2009.
2. **PROBLEMS IN OPERATIONS RESEARCH** - P. K. GUPTA AND D. S. HIRA, Third Edition, S. Chand and Company Limited, Reprint 2000.
3. **OPERATIONS RESEARCH THEORY AND APPLICATIONS** - J. K. SHARMA, Second Edition, Macmillan India Limited, Reprint 2002.

| Year | Subject Title | Sem. | Sub Code |
|---------------------|---|------|----------|
| 2018 -19 Onwards | MATHEMATICAL FOUNDATION FOR INFORMATION TECHNOLOGY | I | 18BIT14A |

OBJECTIVES:

1. To get basic ideas of some basic Discrete Mathematical Structures.
2. To enhance the knowledge of applying the properties of Discrete Mathematical Structures to Computer Science.

UNIT: I

MATRICES: Introduction – Matrix Operations – Inverse of a square matrix – Elementary operations and Rank of a matrix – Simultaneous equations – Inverse by partitioning – eigenvalues and eigenvectors.

(Chapter VI – Sections: 6.1 to 6.7)

UNIT: II

SET THEORY: Introduction – Sets – Notation and descriptions of sets – Sub sets- Venn -Euler Diagram -Operations on sets - Properties of set operations - Verification of the basic laws of algebra by Venn diagram.

(Chapter I - Sections 1.1 to 1.8)

UNIT: III

MATHEMATICAL LOGIC: Statements and notations- Connectives - Normal forms - Theory of inference for statement calculus.

(Chapter I - Sections 1.1 to 1.4)

UNIT: IV

RELATIONS : Cartesian product of two sets – Relations - Representation of Relation - Operations on relations - Equivalence Relations - Closures and Warshall’s Algorithm.

(Chapter II – Sections: 2.1 to 2.6)

UNIT: V

GRAPH THEORY: Basic Concepts - Matrix representations of graphs – Trees - Spanning trees
(Chapter XI – Sections: 11.1 to 11.4)

TEXT BOOKS:

**1. DISCRETE MATHEMATICAL STRUCTURES WITH APPLICATIONS TO
COMPUTER SCIENCE - J.P.TREMBLAY and R.MANO HAR, McGraw Hill International
Edition. (For Unit III)**

**2. DISCRETE MATHEMATICS - Dr. M.K.VENKATRAMAN, Dr. N.SRIDHARAN,
N.CHANDRASEKARAN - NPC, Chennai. (For Units I, II, IV and V)**

REFERENCE BOOKS:

1. ENGINEERING MATHEMATICS VOL II – Dr. M.K. VENKATRAMAN - NPC

**2. DISCRETE MATHEMATICS - J. K. SHARMA, Second Edition, Macmillan India
Ltd., 2005.**

| Year | Subject Title | Sem. | Sub Code |
|---------------------|----------------------|------|----------|
| 2018 -19 Onwards | BUSINESS MATHEMATICS | III | 18BCO34A |

OBJECTIVES:

To teach the mathematical concepts and principals of Multivariate Calculus, Numerical Methods and Operations Research for their future studies and easy understanding of their subjects.

UNIT: I

MATRICES AND DETERMINANTS: Definition – Different types of matrices with examples – Matrix operations – Solving system of linear equations – Inverse of a matrix – Rank of matrix – Determinants and its properties – Cramer’s rule – Problems.

(Chapter 4 - Sections: 1 to 12)

UNIT: II

Variables, constants and functions – Limits of Algebraic functions – Simple Differentiation of Algebraic functions – Meaning of derivatives – Evaluation of first and second order derivatives – Maxima and Minima – Application to Business problems.

(Chapter 5 and Chapter 6)

UNIT: III

Elementary integral calculus – Determining Indefinite and Definite integrals of simple functions – Integration by parts.

(Chapter 8)

UNIT: IV

OPERATIONS RESEARCH: Mathematical formulation of the linear programming problem – Graphical solution – Simplex method – Simple problems using slack variable.

(Chapter 2 - Sections: 2.1 to 2.4; Chapter 3 - Sections: 3.1 to 3.3; Chapter 4 - Section: 4.3)

UNIT: V

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OPERATIONS RESEARCH: Transportation problem – Assignment problem and special cases in assignment problem – Simple problems.

(Chapter 10 - Sections: 10.8 to 10.9; Chapter 11 - Sections: 11.1 to 11.4)

TEXT BOOKS:

1. **BUSINESS MATHEMATICS AND STATISTICS** - P. A. NAVANITHAM, Jai Publishers, Trichy, 2008. **(For Unit I, II,III)**
2. **OPERATIONS RESEARCH** - V. KANTI SWARUP, P. K. GUPTA and MAN MOHAN, Fourteenth Edition, Sultan Chand and Sons, New Delhi, Reprint 2009. **(For Units IV and V)**

REFERENCE BOOKS:

1. **PROBLEMS IN OPERATIONS RESEARCH** - P. K. GUPTA and MANMOHAN, Sultan Chand and Sons, New Delhi, Reprint 2007.

| Year | Subject Title | Sem. | Sub Code |
|-----------------------------|---------------------------------|-------------|-----------------|
| 2018 -19 Onwards | MATHEMATICS FOR BUSINESS | II | 18BIB25A |

OBJECTIVES:

1. To study the concepts involved in various types of interests and discounts.
2. To understand the concepts of Matrix, Differential and Integral calculus.
3. To formulate and solve the Linear Programming Problem.

UNIT: I

Set theory – Arithmetic and Geometric series – Simple and Compound interest – Effective rate of interest – Sinking fund – Annuities – Present value – Discounting of Bills – True Discount – Banker’s Gain.

(Chapter 1 and Chapter 2)

UNIT: II

MATRICES AND DETERMINANTS: Definition – Different types of matrices with examples – Matrix operations – Solving system of linear equations – Inverse of a matrix – Rank of matrix – Determinants and its properties – Cramer’s rule – Problems.

(Chapter 4 - Sections: 1 to 12)

UNIT: III

Variables, constants and functions – Limits of Algebraic functions – Simple Differentiation of Algebraic functions – Meaning of derivatives – Evaluation of first and second order derivatives – Maxima and Minima – Application to Business problems.

(Chapter 5 and Chapter 6)

UNIT: IV

Elementary integral calculus – Determining Indefinite and Definite integrals of simple functions – Integration by parts.

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(Chapter 8)

UNIT: V

Linear Programming Problem – Formations – Solution by Graphical method solution by Simple method.

(Chapter 9)

TEXT BOOK:

BUSINESS MATHEMATICS AND STATISTICS - P.A.NAVANITHAM, Jai Publishers, Trichy, 2008.

REFERENCE BOOKS:

INTRODUCTION TO BUSINESS MATHEMATICS – SUNDARESAN and JAYASELEEN, S Chand Co Ltd, Newdelhi.