SRI RAMAKRISHNA MISSION VIDYALAYA
COLLEGE OF ARTS AND SCIENCE
(Autonomous)
COIMBATORE – 641 020

DEPARTMENT OF MATHEMATICS

Under Choice Based Credit System (CBCS)
2016 – 2017 Onwards

B.Sc. MATHEMATICS

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme : B.Sc. Mathematics.
Course Title : Core 1: ALGEBRA **Course Code : 13UMA1C01**
Year : First Year **Semester : I**
Hours/Week : 5 **Credits : 4**

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 - 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 - 11

Unit –IV

THEORY OF EQUATIONS: Roots of an equation – Relations between the roots and co-efficient 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 - Roll's theorem – Multiple roots – Horner's method of approximation.

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

TEXT BOOK:

Algebra, Vol. I by Manickavachagam Pillay, T.Natarajan, K.S.GanapathyS.Viswanathan Pvt. Ltd (2007).

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme : B.Sc. Mathematics.
Course Title : Core 2: CALCULUS **Course Code : 13UMA1C02**
Year : First Year **Semester : I**
Hours/Week : 5 **Credits : 4**

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 - Evolutes and involutes –Radius of curvature when the curve is given in polar co-ordinates - Pedal equation of a curve.

PARTIAL DIFFERENTIATION: Total differential coefficient – Implicit functions – Homogeneous functions - Euler's theorem.

Chapter X: Sections 2.1 to 2.7, Chapter VIII: Sections 1.3 to 1.6

Unit-II

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

Chapter 1: Sections 8 to 14

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 BOOK:

1. **Calculus, Vol 1 – S.Narayanan and T.K.M. Pillai,** Viswanathan Publishers, 2007. **For Unit I**

2. **Calculus, Vol 2 – S.Narayanan and T.K.M. Pillai,** Viswanathan Publishers, 2007. **For Units II to V**

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme :B.Sc. Mathematics.
Course Title : Core 3: DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS **Course Cod : 13UMA2C03**
Year : First Year **Semester : II**
Hours/Week : 5 **Credits : 4**

Unit –I

DIFFERENTIAL EQUATIONS : Differential Equations of Non homogeneous equations - Bernoulli's equation. Differential Equations of the first order, but of the higher degree - Equations solvable for dy/dx – Equations solvable for y- Equations solvable for x- Clairaut's form.

Vol III: Chapter 1 section 2.1 to 2.5,5.1 to 6.1

Unit –II

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.

Vol III: Chapter 2 sections 2 to 4, 8 to 10

Unit – III

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.

VOL III : Chapter 3 sections 1 to 6

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.

Vol III: Chapter 4 ,Omit section 4, 5.5 and 7.0

Unit –V

LAPLACE TRANSFORMS: Laplace transforms – Definition – Transform of f(t), - expat, Cos at, Sin at and t^n when n is an integer – Laplace transforms to solve ordinary differential equations with constant co-efficient.

Vol III Chapter 5

TEXT BOOK:

Calculus Vol III by T.K.Manicavachagam Pillay , S.Narayanan,S.Viswanathan Printers, 2007.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme: B.Sc. Mathematics.
Course Title : Core 4: TRIGNOMETRY, VECTOR CALCULUS AND FOURIER SERIES **Course Code: 13UMA2C04**
Year : First Year **Semester : II**
Hours/Week : 5 **Credits: 4**

Unit -I

TRIGNOMETRY : Expansions of Cos nθ, Sin nθ, Cos θ, Sin θ, Hyperbolic functions – Separation of real and imaginary parts of Hyperbolic functions.
Chapter. III : Sec 1, 2, 5, Chapter. IV)

Unit -II

TRIGNOMETRY : Logarithms of Complex quantities – Summation of Trigonometric series.
Chapter. V: Sec 5, Chapter. VI

Unit III

VECTOR CALCULUS : Scalar and Vector point function – Differentiation of vectors – Directional derivative – gradient, divergence and curl.
Chapter 1 and Chapter 2

Unit -IV

VECTOR CALCULUS : Integration of vectors – line, surface and volume integrals – Integral theorems and their applications.
Chapter 3 and Chapter 4

Unit -V

FOURIER SERIES : Definition – finding Fourier coefficient for a given periodic function with period 2 π – odd and even functions, Change of Interval.
Chapter VI: Sec 1, 2, 3 and 6

TEXT BOOK :

1. **Trigonometry by S. Narayanan and Manickavachagam Pillai,** S. Viswanathan (Printers and Publishers) PVT Ltd . For Units I and II.
2. **Vector Calculus by N. Namasivayam,** S. Viswanathan (Printers and Publishers) PVT Ltd. For Units III and IV.
3. **Calculus Vol III byT.K.Manicavachagam Pillay, S.Narayanan**, S.Viswanathan Printers, 2007. For Unit V.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme :B.Sc. Mathematics.
Course Title : Core 5 : ANALYTICAL GEOMETRY OF 2D & 3D **Course Code : 13UMA3C05**
Year : Second Year **Semester : III**
Hours/Week : 5 **Credits : 4**

Unit-I:

ANALYTICAL GEOMETRY OF 2D : Polar equation of a Conic – Directrix – Chord – Tangent – Normal - simple problems.
Chapter IX: Sections 9 – 13.

Unit-II:

ANALYTICAL GEOMETRY 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 – 11 and Chapter II

Unit-III:

STRAIGHT LINE: Equation of the straight lines passing through two given points – Coplanarity of straight line-Shortest Distance (SD) and equation of SD between two lines-simple problems.
Chapter III: Sections 1, 2, 3, 4, 7, 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 – Central quadrics.
Chapter V: Sections 1, 2, 8

TEXT BOOK :

1. **Analytical Geometry – 2D by T.K. Manickavachagam Pillai & T. Natarajan,** S. Viswanathan (Printers & Publishers), PVT., LTD, 2007. For Unit I.

2. **Analytical Geometry – 3D by T.K. Manickavachagam Pillai & T. Natarajan ,** S. Viswanathan (Printers & Publishers), PVT., LTD, 2001. For Units II,III, IV & V.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme :B.Sc. Mathematics.
Course Title : Core 6: STATICS **Course Code : 13UMA3C06**
Year : Second Year **Semester : III**
Hours/Week : 5 **Credits : 4**

Unit -I

KINEMATICS : Mechanics, Units, Vector and Scalar quantities, A vector as a sum of three mutually perpendicular vectors, A vector as a sum of two non – perpendicular vectors.

FORCES : Force, types of forces, magnitude and direction of the resultant of forces acting on a particle (in particular resultant of two forces acting on a particle), equilibrium examples.

EQUILIBRIUM OF A PARTICLE: Equilibrium of a particle acted on a rough inclined plane, examples.

Chapter. I Sec. 1-5, Ch. 2&6

Unit –II

FORCES ON A RIGID BODY : Moment of a vector, General motion of rigid body, equivalent or equipotent systems of forces, resultant of parallel forces, couple, resultant of several coplanar forces.

Chapter 7, Sec 7.1 – 7.6

Unit –III

Moment of the resultant force, couples in a plane or in parallel planes, resultant of a couple and a force, three coplanar forces on a rigid body, equation of the line of action of the resultant, equilibrium of a rigid body under three coplanar forces examples.

Chapter 7 ,Sec 7.7 – 7.12

Unit –IV

A SPECIFIC REDUCTION OF A SYSTEM OF FORCES : Reduction of a system of forces to a force at a chosen point and a couple, central axis, problems involving frictional force, problems involving tilting of bodies, examples.

Chapter 8.

Unit -V

STABILITY OF EQUILIBRIUM AND HANGING STRINGS: Equilibrium of a uniform homogeneous string, sag, suspension bridge, examples.

Chapter 10 &11

TEXT BOOK:

Mechanics by P.Duraipandian and others,S.Chand& Co., 1990.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme	**:B.Sc. Mathematics.**		
Course Title	**: Allied 3: MATHEMATICAL STATISTICS I**	**Course Code**	**: 13UMA3AL3**
Year	**: Second Year**	**Semester**	**: III**
Hours/Week	**: 6**	**Credits**	**: 5**

Unit –I

Random Variables - Mathematical Expectations.

Chapter 2: Sections 2.1 to 2.32

Chapter 3: Sections 3.1 to 3.18

Unit –II

Variance -Moments -Moment Generating Function - Conditional Expectation.

Chapter 4: Sections 4.1 to 4.25

Chapter 5: Sections 5.1 to 5.17

Chapter 7: Sections 7.1 to 7.9

Unit –III

Correlation **(Omit Bivariate sample)** – Regression

Chapter 8: Sections 8.1 to 8.51

Chapter 9: Sections 9.1 to 9.24

Unit –IV

Binomial Distribution – Poisson Distribution- Geometric Distribution.

Chapter 12: Sections 12.1 to 12.25

Chapter 13: Sections 13.1 to 13.21

Chapter 15

Unit –V

Normal Distribution - Uniform Distribution - Exponential Distribution - Gamma Distribution – Beta distribution.

Chapters 16,17,18,19 and 20.

Text Book:

Mathematical Statistics by P.R. Vittal -Margham Publications, Chennai, 2004.
(Omit all Exercise Problems)

Reference Book:

Fundamental of Mathematical Statistics by S.C. Gupta and V.K. Kapoor, Sultan Chand & Sons, 2008.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme :B.Sc. Mathematics.
Course Title : Core 7: DYNAMICS **Course Code : 13UMA4C07**
Year : Second Year **Semester : IV**
Hours/Week : 5 **Credits : 4**

Unit –I

KINEMATICS : Velocity, resultant of $\bar{v}_1$ and $\bar{v}_2$ relative velocity acceleration, velocity and acceleration in a rectilinear motion, velocity and acceleration in a co-planar motion, angular velocity, rectilinear motion when the acceleration is constant, examples.

RECTILINEAR MOTION UNDER GRAVITY: Motion along a vertical line under gravity, line of quickest descent, motion along a smooth inclined plane, motion along a rough inclined plane, motion of connected particles, examples.

Chapter 1: Sec 1.6 to 1.15 Chapter 3: Sec 3.1 to 3.6

Unit -II

RECTILINEAR MOTION OF A PARTICLE UNDER VARYING FORCE : Simple harmonic motion, Orthogonal projection of a uniform circular motion, composition of two simple harmonic motions of same period, motion of a heavy particle attached to one end of a horizontal spiral spring, motion of heavy particle attached to one end of a vertical spiral spring, motion under gravity in a resisting medium, examples.

Chapter 5: Sec 5.1 to 5.7

Unit -III

IMPACT : Impulsive force, Impulse, conservation of linear momentum, elasticity, Impact of two smooth spheres, direct impact of two smooth spheres, Impact of smooth sphere on a fixed smooth plane, Oblique impact between two smooth spheres, examples.

Chapter 12: Sec 12.1 to 12.9

Unit –IV

MOTION OF A PROJECTILE UNDER GRAVITY: Motion of projectile, Nature of a projectory, Results pertaining to the motion of a projectile, maximum horizontal range and speed of a projectile, examples.

Chapter 13: Sec 13.1 to 13.4, 13.6 to 13.11

Unit -V

CIRCULAR AND CYCLODIAL MOTIONS: Conical pendulum, circular motion in a vertical plane under gravity, simple pendulum, cyclodial motion in a vertical plane, examples. **CENTRAL ORBITS :**Central force and central orbit, equation of a central orbit, law of force and speed for given orbit, determination of the orbit when the law of force is given.

Chapter 14: Sec 14.1 to 14.6 and **Chapter 15: Sec 15.1 to 15.5**

TEXT BOOK:

Mechanics by P.Duraipandian and others, S. Chand & Co., 1990.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.
For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme :B.Sc. Mathematics.
Course Title : Core 8: NUMERICAL ANALYSIS **Course Code : 13UMA4C08**
Year : Second Year **Semester : IV**
Hours/Week : 5 **Credits : 4**

Unit -I

THE SOLUTION OF NUMERICAL, ALGEBRAIC AND TRANSCENDENTAL EQUATIONS: Introduction – The Bisection method – Method of Successive Approximation or the Iteration method – The Method of False Position– Newton's Iteration method. **SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS:** Introduction – Gauss Elimination method – Computation of the inverse of a matrix using Gauss's Elimination method – Method of Triangularisation– Crout's method – Iterative methods – Comparison of Gauss Elimination and Gauss-Seidal Iteration methods – Relaxation methods – examples.

Chapter – III & IV

Unit -II

FINITE DIFFERENCES: First Differences – Higher Differences – Backward Differences – Central difference notation – Properties of the operator Δ - Differences of a polynomial – Factorial polynomials – Relation between the operators E and Δ - Relation between the operators (D) and Δ - other difference operators – Relationship between the operators – Examples.

Chapter – V

Unit –III

INTERPOLATION: Introduction – Linear Interpolation – Gregory Newton Forward Interpolation Formula – Gregory Newton Backward Interpolation Formula – Equidistant terms with one or more missing values. Central difference tables – Central Difference Interpolation Formulae – Gauss's Forward Interpolation Formula - Gauss's Backward Interpolation Formula – Stirling's Formula – Bessel's Formula – Lagrange's Interpolation Formula – Examples.

Chapter –VI &VII

Unit -IV NUMERICAL DIFFERENTIATION AND INTEGRATION: Newton's Forward Difference Formula to compute the Derivatives – Newton's Backward Difference Formula to compute the derivatives – Derivatives using Striling's formula – The Trapezoidel Rule – Truncation error in the Trapezoidal Formula – Romberg's method – Simpson's rule – Practical Applications of the Simpson's rule – Examples.

Chapter –IX

Unit –V

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS. Solutions by Taylor's series – Euler's method – Improved Euler's method – Modified Euler's method – Runge Kutta method – Second order Runge Kutta method – Higher order Runge Kutta method – Examples.

Chapter – X

TEXT BOOK:

Numerical Methods in Science and Engineeringby Dr M.K. Venkataraman, The National Publishing Company, Fifth Edition, 1999.

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For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme :B.Sc. Mathematics.
Course Title : Allied 4: MATHEMATICAL STATISTICS II **Course Code : 13UMA4AL4**
Year : Second Year **Semester : IV**
Hours/Week : 6 **Credits : 5**

Unit –I

Sampling Distribution – Chi Square, t, F - Distributions.
Chapter 22: Sections 22.1 to 22.40

Unit –II

Estimation **(Omit Cramer – Rao inequality and Rao-Blackwell Theorem).**
Chapter 23: Sections 23.1 to 23.56

Unit –III

Large Samples.
Chapter 24: Sections 24.1 to 24.44

Unit –IV

Small Samples – t- test**(Omit t-test for paired observation)** – Small Samples – F test.
Chapter 25: Sections25.1 to 25.39, Chapter 26: Sections 26.1 to 26.27

Unit-V

Small samples – Chi square Test – Design of experiments (**Omit Factorial Experiments)** – Test of Hypothesis.
Chapter 27: Sections 27.1 to 27.35, Chapter 28: Sections 28.1 to 28.17,
Chapter 29: Sections 29.1 to 29.6

Text Book:

Mathematical Statistics by Dr.P.R. Vittal - Margham Publications, Chennai, 2004.
(Omit all Exercise Problems)

Reference Book:

Fundamental of Mathematical Statistics by S.C. Gupta and V.K. Kapoor, Sultan Chand & Sons, 2008.

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For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme :B.Sc. Mathematics.
Course Title : Core 9 - MODERN ALGEBRA **Course Code : 13UMA5C09**
Year : Third Year **Semester : V**
Hours/Week : 5 **Credit : 5**

Unit -I

PRELIMINARY NOTIONS: Set theory-Mappings – The Integers. **GROUP THEORY**: Definition of a Group- Some Examples of Groups-Some Preliminary Lemmas.
Chapter 1: Sections 1.1 to 1.3 and Chapter 2 : Sections 2.1 to 2.3.

Unit –II

GROUP THEORY: Subgroups – A Counting Principle- Normal Subgroups and Quotient Groups.
Chapter 2 : Sections 2.4 to 2.6.

Unit –III

GROUP THEORY: Homomorphisms – Automorphisms – Cayley's Theorem- Permutation Groups.
Chapter 2 : Sections 2.7 to 2.10.

Unit –IV

RING THEORY:Definition and examples of rings- Some special classes of rings- Homomorphisms.
Chapter 3 : Sections 3.1 to 3.3.

Unit -V

RING THEORY: Ideals and Quotient Rings- More Ideals and Quotient Rings- The field of Quotients of an Integral Domain.
Chapter 3: Sections 3.4 to 3.6.

TEXT BOOK:

Topics in Algebra, by I.N. Herstein, Vani Educational Books a Division of Vikas Publishing House Pvt Ltd, New Delhi, 1984.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.
For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme :B.Sc. Mathematics.
Course Title : Core 10 : REAL ANALYSIS – I **Course Code : 13UMA5C10**
Year : Third Year **Semester : V**
Hours/Week : 5 **Credits : 5**

Unit – I

The Real and complex number systems: Introduction – The field and order axioms –The unique factorization theorem for integers – rational and irrational numbers – upper bounds and the completeness axiom – the Archimedean property of the real number system–the Cauchy–Schwarz inequality .**Some basic notions of set theory:** Ordered pairs –relations and functions –sequences – similar sets – finite and infinite sets – countable and uncountable sets– countable collections of countable sets.
Chapter 1: Sections 1.1 to 1.19 and **Chapter 2: Sections 2.1 – 2.15.**

Unit -II

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 – Weierstress theorem – the Cantor intersection theorem – 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 spaces – boundary of a set.
Chapter 3 : Sections 3.1 to 3.16.

Unit –III

Limits and continuity: introduction – convergent sequence in a metric spaces – Cauchy sequences – complete metric spaces – limit of a function – continuous functions – continuity of composite functions – examples of continuous functions – continuity and inverse images of open or closed sets – functions continuous on compact sets.
Chapter 4: Sections 4.1 to 4.5, 4.8, 4.9, 4.11, 4.12, 4.13.

Unit –IV

Topological mappings (homeomorphisms) – Bolzano's theorem – connectedness – components of a metric space – uniform continuity – uniform continuity and compact sets – fixed point theorem for contractions – discontinuities of real – valued functions – monotonic functions.
Chapter 4 : Sections 4.14 to 4.17, 4.19 – 4.23.

Unit –V

Derivatives : Introduction – definition of derivative – derivatives and continuity – algebra of derivatives – the chain rule – 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.
Chapter 5 : Sections 5.1 to 5.5, 5.9 – 5.14.

TEXT BOOK:

Mathematical Analysis by Tom M. Apostal, Addison Wesley, 1974.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE-641 020

For candidate admitted from academic year 2016-2017 onwards under new CBCS

Programme : B.Sc. Mathematics.

Course Title : core 11-COMPLEX ANALYSIS **Course Code : 16UMA5C11**

Year : Third Year **Semester : V**

Hours/Week: 5 **Credits : 4**

Unit- I

Analytic functions:

Complex functions - Limit of a function - Continuity of a function - Uniform Continuity - Differentiability and analyticity of a function – Necessary conditions for Differentiability - Sufficient conditions for Differentiability – C-R equations in polar coordinates

Chapter 4: Sections: 4.1-4.8

Unit- II

Elementary and Conformal mappings:

Bilinear transformation- Special bilinear transformation – Circles and inverse points – Transformations $w = z^2$, $w = z^{\frac{1}{2}}$, $w = e^z$, Conformal mapping

Chapter 7: Sections: 7.1-7.6 &7.8.

Unit- III

Complex Integration:

Simple rectifiable oriented curves – Integration of complex functions – Simple integrals using definition – Definite integrals – Interior and exterior of a closed curve – Simply-connected region – Cauchy's fundamental theorem using Goursat's lemma - Goursat's lemma (statement only) theorem 8.6 (statement only) – Integral along an arc joining two points, theorem 8.7 (statement only)- Cauchy's integral formula and formulas for derivatives , theorem 8.9, 8.10 (statements only), Morera's theorem.

Chapter 8: Sections: 8.1- 8.9.

Unit- IV

Complex Integration:

Zeros of a function – Related integral theorems, theorem 8.13-8.16 only.

Taylor's and Laurent's Series:

Taylor's series – Zeros of an analytic function – Laurent's series – Singular point or singularity – Isolated singularities – Removable singularity – Pole – Essential singularity.

Chapter 8: Sections: 8.10, 8.11.

Chapter 9: Sections: 9.1- 9.3, 9.5-9.9.

Unit-V

Residues:

Residue – Calculation of residues – Real definite integrals (types I, II, III only)

Chapter 10: Sections: 10.1-10.3.

Text Book:

Complex Analysis by P. Duraipandian, Laxmi Duraipandian and D. Muhilan, M. D. Gopalakrishnan, Emerald Publishers, 2001.

References:

1. **Complex Analysis by S. Narayanan and T. K. Manicavachagompillay,** S. Viswanathan (Printers and Publishers), PVT. LTD. 1997.
2. **Functions of a Complex Variable by J. N. Sharma.** Twenty Third Edition, KrishnaPrakasan Mandir PVT, Meerut, 1992-1993.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme :B.Sc. Mathematics.
Course Title : Core 12 – DISCRETE MATHEMATICS Course Code : 13UMA5C12
Year : Third Year Semester : V
Hours/Week : 4 Credits: 4

Unit – I

MATHEMATICAL LOGIC: Statements – Truth tables – Connectives – Normal forms.

Chapter 1: Sections 1.2.1 to 1.2.4, 1.2.6 to 1.2.11, 1.3.1 to 1.3.5.

Unit –II

MATHEMATICAL LOGIC: Predicate Calculus – Inference theory of Predicate Calculus.

Chapter 1: Sections 1.4.1 to 1.4.3, 1.5.1 to 1.5.5, 1.6.4, 1.6.5.

Unit –III

GRAMMAR AND AUTOMATA: Grammar and languages – Finite state acceptors and regular grammar.

Chapter 3: Sections 3.1, 3.3.2, Chapter 6: Sections 6.1, 6.2.

Unit –IV

LATTICE THEORY: Partial ordering – Posets – Hasse diagram – Lattices – Properties of Lattices – Boolean Algebra – Boolean Functions – Minimization.

Chapter 4: Sections 4.1.1, 4.1.2, 4.2 - 4.4

Unit –V

GRAPH THEORY: Introduction to Graphs – Matrix Representation of Graphs – Paths, Reachability, and Connectivity – Euler and Hamiltonian paths, Trees.

Chapter 5: Sections 5.1.1 to 5.1.4.

Text Book:

Discrete Mathematical Structures with Applications to Computer Science by J.P.Tremblay and R.Manohar, Tata McGraw Hill Book Edition, 1997.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.
For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme :B.Sc. Mathematics.
Course Title : Core 13: OPERATIONS RESEARCH – ICourse Code : 13UMA5C13
Year : Third Year **Semester : V**
Hours/Week : 5 **Credits : 4**

Unit -I

THE LINEAR PROGRAMMING PROBLEM: Introduction – Mathematical Formulation of the Problem – Graphical Solution Method – Some Exceptional Cases – General Linear Programming Problem – Standard Form of LPP – Some important definitions. **THE SIMPLEX METHOD:** Introduction – The Computational procedure – Use of Artificial variables – Two Phase Method – Big-M Method.
Chapter 2 and **Chapter 3.**

Unit-II

DUALITY IN LINEAR PROGRAMMING: Introduction – General Primal-Dual pair – Formulating a Dual Problem – Duality and Simplex Method – Economic Interpretation of Dual – Dual Simplex Method. **INTEGER PROGRAMMING:** Introduction – Gomory's all LPP Method – Construction of Gomory's Constraints – Gomory's Fractional Cut Method – Geometrical Interpretation of the Cutting Plane.
Chapter 4 and **Chapter 5.**

Unit-III

THE TRANSPORTATION PROBLEM: Introduction – General Structure of the Problem – Basic Feasibile Solution of a Transportation problem – The Transportation Tables – Loops in Transportation Tables – Solution of a Transportation problem – Finding Initial Basic Feasible Solution **-** Moving Towards Optimality – The Transportation Algorithm – Some exceptional cases.
Chapter 6.

Unit-IV

THE ASSIGNMENT PROBLEMS: The Assignment Problems – Mathematical Statement of the Problem – Method for Solving an Assignment Problem – Variations of the Assignment Problem – Travelling Salesman Problem.
Chapter 7.

Unit-V

SEQUENCING PROBLEMS: Introduction – Problem of Sequencing – Terminology,
Notations and Assumptions – Problems with n Jobs and two Machines – Problems with n Jobs and three Machines – Problems with n Jobs and m Machines – Problems with two Jobs and m Machines. **DYNAMIC PROGRAMMING:** Introduction – Characteristics of Dynamic Programming – The Recursive Equation Approach – The Computational Procedure – An Application in Production – Solution of an L.P.P. by Dynamic Programming.
Chapter 8 and **Chapter 9.**

TEXT BOOKS:**Introduction to Operations Research by Kanti Swarup, P.K. Gupta and Man Mohan,** Sultan Chand and Sons, Third Edition, 1997.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme	**:B.Sc. Mathematics.**		
Course Title	**: Core 14 - LINEAR ALGEBRA**	**Course Code**	**: 13UMA6C14**
Year	**: Third Year**	**Semester**	**: VI**
Hours/Week	**: 5**	**Credits**	**: 5**

Unit –I

MATRICES: Algebraic operations – Triangular, Diagonal, Scalar, Unit matrices – Transpose, adjoint and inverse of a square matrix – Symmetric and Skew Symmetric matrix.

Chapter 1: Sections 1.1 to 1.7.

Unit-II

Hermition and Skew Hermition Matrices-Orthogonal and Unitary Matrices:
Rank of a matrix - Eigen values and Eigen Vectors of linear operators – Solutions of Homogeneous linear equations, Solutions of non-homogeneous linear equations. Characteristic roots and Characteristic vectors of a square matrix

Chapter 1: Sections 1.8 -1.9, Chapter 2: Section 2.9, Chapter 3: Sections 3.6 to3.9.

Unit -III

VECTOR SPACES: Elementary basic concepts, linear Independence and bases

Chapter 4: Sections 4.1 to 4.2.

Unit –IV

Dual spaces – Inner product spaces

Chapter 4: Sections 4.3 and 4.4.

Unit –V

LINEAR TRANSFORMATIONS: Algebra of linear transformations – Characteristic roots – Matrices.

Chapter 6: Sections 6.1 to 6.3.

TEXT BOOKS

1. **A Text Book of Modern Algebra by R. Balakrishnan and N. Ramabhadran**, Vikas Publishing House Pvt Ltd, New Delhi, 1979.
   (For Units I and II)
2. **Topics in Algebra, by I.N. Herstein**, Vani Educational Books a Division of Vikas Publishing House Pvt Ltd, New Delhi, 1984.
   (For Units III, IV and V)

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme :B.Sc. Mathematics.
Course Title : Core 15 - REAL ANALYSIS II **Course Code : 13UMA6C15**
Year : Third Year **Semester : VI**
Hours/Week : 5 **Credits : 5**

Unit -I

FUNCTIONS OF BOUNDED VARIATION AND RECTIFIABLE CURVES : Introduction – properties of monotonic functions – Function 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 -II

THE RIEMANN – STIELTJES INTEGRAL : Introduction – Notation – The definitions of the Riemann-Stieltjes integral – Linear properties – Integration by parts – Change of Variable in a Riemann-Stieltjes integral – Reduction to a Riemannn integral – Step functions as integrators.

Chapter 7 : Sections 7.1 to 7.8.

Unit -III

Reduction of a Riemann-Stieltjes integral to a finite sum – Eulers summation formula – monotonically increasing integrations, upper and lower integrals – Additive and linearity properties of upper and lower integrals – Riemann condition.

Chapter 7: Sections 7.9 to 7.13.

Unit -IV

INFINITE SERIES AND INFINITE PRODUCTS: Limit superior and limit inferior of a real-valued sequence – Monotonic sequences of real numbers – infinite series – inserting and removing parentheses – Alternating series – Absolute and conditional convergence – Double series – Rearrangement theorem for double series – A sufficient condition for equality of iterated series.

Chapter 8 : Sections 8.3 to 8.8, 8.20 to 8.23.

Unit –V

SEQUENCE OF FUNCTIONS: Pointwise convergence of sequences of functions – Examples of sequences of real-valued functions – Definition of uniform convergence – Uniform convergence and continuity – The Cauchy condition for uniform convergence – uniform convergence of infinite series of functions – uniform convergence and Riemann-Stieltjes integration – Non uniformly convergent sequences that can be integrated term by term – uniform convergence and differentiation – sufficient conditions for uniform convergence of a series – uniform convergence and double sequences.

Chapter 9: Sections 9.1 to 9.6, 9.8 to 9.12.

TEXT BOOK:

Mathematical Analysis by Tom M. Apostal, Addison Wesley, 1974.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2016-2017 onwards
Under New CBCS

Programme : B.Sc. Mathematics.
Course Title : Core 16– SPECIAL FUNCTIONS **Course Code : 16UMA6C16**
Year : Third Year **Semester : VI**
Hours/Week : 4 **Credits : 4**

Unit -I

Spherical Harmonics: Spherical Harmonics, Kelvin's theorem, Legendre's equation from Laplace equations, Bessel's equation from Laplace equations.

Legendre's equation: Legendre's equation, Solution of Legendre's equation, Definition of $P_n(x)$ and $Q_n(x)$, To show that $P_n(x)$ is the coefficient of h^n in the expansion of $(1-2xh+h^2)^{-1/2}$, Laplace Definite integral for $P_n(x)$, Orthogonal properties of Legendre's Polynomials, Recurrence formulae

Chapter 1: Sec: 1.1 – 1.4 and
Chapter 2: Sec: 2.1 – 2.8
Examples : Pg.No:20-26

Unit -II

HyperGeometric functions: Hypergeometric functions, Gauss's hypergeometric equation, The hyper geometric series, Particular cases of hypergeometric series, Different forms of hypergeometric function, Solution of hypergeometric equation, Linear relations between the solution of hypergeometric equation, Symmetric property of hypergeometric function, Integral formula for the hypergeometric function, Kummer's Theorem, Gauss's Theorem, Vandermonde's Theorem, Differentiation of hypergeometric function

Chapter 4: Sec: 4.1 – 4.13
Examples : Pg.No:91-95

Unit -III

Bessel's equation: Bessel's equation, Solutions of Bessel's general differential equation , General solution of Bessel's equation, Integration of Bessel's equation in series for n=0 , Definition of Bessel's Equation for series for n=0, Definition of $J_n(x)$, Recurrence formula for $J_n(x)$.

Chapter 5: Sec: 5.1 – 5.6.
Examples : Pg.No:107-113

Unit -IV

Hermite polynomials: Hermite's Differential equation , Solution of Hermite's equation, Hermite polynomials, Generating functions, Other forms for the Hermite polynimals, To find the first few Hermite polynomials, Orthogonal properties of Hemite polynomials, Recurrence formulae for Hermite polynomials.

Chapter 6 : Sec 6.1-6.8

Examples : Pg.No:145-149

Unit -V

Chebyshev polynomials: Chebyshev's Differential equation,Chebyshev polynomial , To prove that $T_n(x)$ and $U_n(x)$ are independent solutions of Chebyshev's equation, Relations for $T_n(x)$ and $U_n(x)$, To find first few Chebyshev polynomials, Generating Functions , Orthogonal properties of Chebyshev polynomials, Recurrence for $T_n(x)$ and $U_n(x)$.

Chapter 8: Sec: 8.1 – 8.8.

Examples : Pg.No:180-182

TEXT BOOK:

Mathematical Methods (Part I) by J.N. Sharma, R.K. Gupta, Krishna Prakashan Mandir, Edition 1990-91.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme :B.Sc.Mathematics.
Course Title : Core 17: OPERATIONS RESEARCH II Course Code : 13UMA6C17
Year : Third Year Semester : VI
Hours/Week : 5 Credits : 4

Unit –I

GAME THEORY : Introduction – Two-person Zero-Sum Games – The MaxiMin - MiniMax Principle – Games Without Saddle Points– Mixed Strategies - Graphical Solution of *2* x *n* and *m* x *2* Games – Dominance Property – Reducing the Game Problem to an LPP – A short-cut method for *n* x *n* Games.

Chapter 10

Unit –II

QUEUEING THEORY: Introduction – Queueing Systems – Characteristics of the Queueing Systems – Operating Characteristics of a Queueing System – Poisson Process and Exponential Distribution – Definition of Transient and Steady States - Classification of Queues – Poisson Queues.

Chapter 11 (Omit Sec 11.9)

Unit –III

INVENTORY PROBLEMS: Introduction – Inventory Control – Costs Associated with Inventories – Economic Lot Size Problems – Problems of EOQ with Shortage Allowed – Purchase Inventory Problem with Price Breaks – Multi-item Deterministic Problem – Buffer Stock or Safety Stock – Re-Order Level

Chapter 12 (Omit Sec 12.10)

Unit –IV

REPLACEMENT PROBLEM : Introduction - Replacement of items that deteriorate with time - Replacement of Items that fail completely

Chapter 13

Unit –V

NETWORK SCHEDULING BY PERT/CPM : Introduction – Basic Concepts – Construction of the Network – Critical Path Analysis – Statistical Considerations in PERT – Cost Considerations in PERT/CPM

Chapter 14

TEXT BOOK:

I**ntroduction to Operations Research by Kanti Swarup, P.K. Gupta and Man Mohan** –Sultan Chand and Sons, Third Edition, 1997.

REFERENCE BOOK:

Resource Management Techniques by V. Sundaresan, K.S. Ganapathy Subramanian and **K. Ganesan,** A.R. Publications, Second Edition, 2004.

SRI RAMAKRISHNA MISSION VIDYALAYA COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS) COIMBATORE – 641 020.

For candidates admitted from academic year 2013-2014 onwards
Under New CBCS

Programme	**:B.Sc. Mathematics.**		
Course Title	**: Core 18: ASTRONOMY**	**Course Code**	**: 13UMA6C18**
Year	**: Third Year**	**Semester**	**: VI**
Hours/Week	**: 5**	**Credits**	**: 4**

Unit -I

Celestial sphere – Diurnal motion.
Chapter II: Sections 39-84.

Unit -II

The zones of earth - Dip of horizon – Twilight.
Chapter III: Sections 87, 89, 96-99, 106-108, 111, 112.

Unit -III

Refraction – Geocentric Parallax.
Chapter VI: Sections 117-127, 129, 130, Chapter V: Sections 135-139.

Unit -IV

Kepler's laws
Chapter VI: Sections 146-164.

Unit -V

The Moon and Eclipses.
Chapter XII: Sections 229-255, Chapter XIII: Sections 256-275.

Omit all exercise problems

TEXT BOOK:

Astronomy by S. Kumaravelu&N.SusheelaKumaravelu, Publisher S. KumaraveluNagerkoil, Edition 8, 1990.