Department : Mathematics		
Course : B.Sc.	Effective From the Year :2017	
Subject code : 17UMS101 Title : CLASSICAL ALGEBRA		
Hrs/ Week	5	Credits : 4
Objectives	This paper provides the learners a wide spectrum of basic mathematical concepts. This paper enables the learners to (i) develop skills in solving algebraic equation (ii) Expand their knowledge in matrices.	
Units	Contents	Hrs
Unit-I	Binomial theorem for rational index (Statement only) - Application of Binomial theorem to summation of series - Exponential theorem (Statement only) - Summation of series - The logarithmic series - Summation. Text Book 1, Chapter 3 Sections : 5 and 10 and Chapter 4 Sections: 2, 3, 5 and 8.	14 hours
Unit-II	Theory of equations - Roots of an equation (Simple problems and Results only) - Relation between roots and coefficients - Symmetric functions of the roots of an equation. Text Book 1, Chapter 6 Sections: 10, 11 and 12.	13 hours
Unit-III	Newton's theorem on sum of the powers of the roots (Statements and problems only) - Transformation of equations - Reciprocal equations. Text Book 1, Chapter 6 Sections: 14, 15 and 16.	13 hours
Unit-IV	To increase or decrease the roots of a given equation by a given quantity - Removal of terms - *Descartes rule of signs (Self study)*. Text Book 1, Chapter 6 Sections: 17, 18, 19 and 24.	12 hours
Unit-V	Matrices - Special types of Matrices - Characteristic roots, Characteristic vectors - Diagonalization of a matrix. Text Book 2, Chapter 1 Sections: 1 and 4.	13 hours
Text Books	1. Manicavachagom pillay T. K, Natarajan T. and Ganapathy K. S, *Algebra Volume I*, First edition S. Viswanathan Pvt. Ltd, 2010. 2. Kandasamy P. and Thilagavathi K, *Mathematics for B. Sc. Branch - I, Volume II*, First Edition, 2004.	
Reference Books	1. Thakur B. R, Sinha H. C, Agarwal B. L. and Johri V. B, *A text book of Algebra*, Ram Prasad & sons, 1970. 2. Ray M. and Sharma H. S, *A text book of Higher Algebra*, S. Chand & Company, 1988.	

Department : Mathematics		
Course : B. Sc.	Effective From the Year : 2017	
Subject code : 17UMS102 Title : CALCULUS		
Hrs/ Week	6	Credits :5
Objectives	This paper enables the learners to (i) understand the concepts of multiple integrals, Beta and Gamma functions (ii) learn about various types of differential equations and methods to solve them (iii) Gain basic knowledge of Laplace transforms.	
Units	Contents	Hrs
Unit-I	Linear differential equations with constant coefficients - *Differential equation of higher order (Self study)* - Special methods of finding particular integral - Linear equations with variable coefficients. Text Book 1, Chapter 2 Sections: 1 to 4 and Chapter 8 Sections: 8.1, 8.2.	15 hours
Unit-II	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 (*Type IV - Self study*) - Lagrange's equation. Text Book 1, Chapter 4 Sections: 1 to 6.	16 hours
Unit-III	Multiple integrals - Definition of double integral - Evaluation of double integral - Double integral in polar co-ordinates - Triple integrals. Text Book 2, Chapter 5 Sections: 1 to 4.	15 hours
Unit-IV	Change of variables - Jacobian - Transformation from Cartesian to polar co-ordinates - Transformation from Cartesian to spherical polar co-ordinates - Beta and Gamma functions - Applications of Gamma functions to multiple integrals. Text Book 2, Chapter 6 Sections: 1.1, 1.2, 2.1 to 2.4. Chapter 7 Sections: 2.1 to 6.	16 hours
Unit-V	Laplace Transforms - Definition - Transform of f(t), e^{at}, cos at, sin at and t^n when n is an integer - Laplace transforms to solve ordinary differential equation with constant coefficients - Inverse Laplace transforms. Text Book 1, Chapter 5 Sections: 1, 2, 4,5,6,7 and 8.	16 hours
Text Books	1. Narayanan S. and Manicavachagom Pillay T. K, *Calculus Volume - II*, S. Viswanathan Pvt. Ltd, 2007. 2. Narayanan S. and Manicavachagom Pillay T. K, *Calculus Volume - III*, S. Viswanathan Pvt. Ltd, 2007.	
Reference Books	1. Dass H. K, *Advanced Engineering Mathematics (Sixteenth Edition)*, S. Chand and Company Ltd, New Delhi, 2006. 2. Kandasamy P. and Thilagavathi K, *Allied Mathematics (Paper - II)*, S. Chand and Company Ltd, New Delhi, 2004.	

	3. Kandasamy P. and Thilagavathi K, *Mathematics (Volume - III),* S. Chand and Company Ltd, New Delhi, 2009.

Department	Mathematics	
Course : B. Sc.	Effective From the Year : 2017	
Subject code : 17UMS1A1 Title : MATHEMATICAL STATISTICS - I		
Hrs/ Week	6	Credits : 5
Objectives	On successful completion of the course the students should have understood the concepts of random variable, discrete, continuous probability functions, expectations, covariance, Moment generating functions, Cumulants, Characteristic functions and some discrete and continuous distributions and should have developed skills to apply them to various real life situations.	
Units	Contents	Hrs
Unit-I	Mathematical Expectation - Properties - Addition and Multiplication Theorem - Simple problems. Definition of Covariance - Chebychev's inequality - Simple problems. Chapter 6 Sections: 6.1 - 6.6 and 7.5.	16 hours
Unit-II	Moment Generating Function (MGF) – Definition - Properties - Cumulants - Relation between Cumulant and central moment - *Characteristic Function (Self study)* - Definition - Properties - Simple problems. Chapter 7 Sections: 7.1.1 - 7.3.1.	15 hours
Unit-III	MGF of Binomial distribution - Finding mean and variance - Additive property - Recurrence relation - MGF of Poisson distribution - Finding mean and variance - Additive property - Recurrence relation - Simple problems. Chapter 8 Sections : 8.4 - 8.4.2, 8.4.6, 8.4.7 8.5 - 8.5.2, 8.5.4, 8.5.5, 8.5.8.	16 hours
Unit-IV	Normal distribution: Properties - Uses - MGF of Normal distribution about its origin and about arithmetic mean - Recurrence relation - *Additive property (Self study)* - Rectangular distribution - Definition - MGF - Finding mean and variance - Simple problems. Chapter 9 Sections: 9.1 - 9.2.2, 9.2.5, 9.2.7, 9.2.8, 9.3 - 9.3.4.	15 hours
Unit-V	Gamma Distribution: MGF of Gamma distribution and finding the central moments - Additive property of Gamma varieties. Beta distributions of first and second kind: Definition - Finding mean and variance. Exponential distribution: Definition - MGF- Finding mean and variance. Chapter 9 Sections : 9.5 - 9.5.3, 9.6 - 9.6.1, 9.7 - 9.7.1, 9.8 - 9.8.1.	16 hours
Text Book	Gupta S. C. and Kapoor V. K, *Fundamentals of Mathematical Statistics,* S. Chand & Sons, 2009.	
Reference Books	1. Vital P. R, *Mathematical Statistics*, Margham publications, 2004. 2. Hogg R.V. and Craigh A. G, *Introduction to Mathematical Statistics,* Pearson Education publications, 2004.	

Department	Mathematics	
Course	B. Sc.	Effective From the Year : 2017
Subject code : 17UCY1A1 Title : ANCILLARY MATHEMATICS FOR CHEMISTRY-I		
Hrs/ Week	8	Credits : 4
Objectives	The aim of this paper is to train the students to improve the basic knowledge of mathematics relevant to their major subjects. This syllabus enables students to (i) explore matrix theory (ii) expand their knowledge in solving Algebraic equations and (iii) develop their knowledge in Fourier series, Beta and Gamma functions.	
Units	Contents	Hrs
Unit-I	Symmetric and Skew - Symmetric matrices - Hermitian and Skew - Hermitian matrices - Orthogonal and unitary matrices - Characteristic Equation of a matrix - Cayley-Hamilton's theorem (without proof) - Simple Problems. Chapter 5 Sections: 5.8 - 5.23 and 5.50 - 5.67. (Pg. No. : 5.8 to 5.23 and 5.50 to 5.67)	22 hours
Unit-II	Fundamental theorem in the theory of Equations - Relation between the roots and co-efficient of an Equation - Imaginary and Irrational roots. Chapter 6 Sections: 6.1 - 6.17 and 6.19 - 6.25. (Pg. No. : 6.1 to 6.17 and 6.19 to 6.25)	22 hours
Unit-III	Reciprocal Equation - Diminishing the roots of an Equation - Removal of term - Simple Problems. Chapter 6 Sections: 6.30 - 6.36 and 6.49 - 6.55. (Pg. No. : 6.30 to 6.36 and 6.49 to 6.55)	21 hours
Unit-IV	Summation of Binomial Series - Exponential series - Simple Problems. Chapter 2 Sections: 2.4 - 2.10, Chapter 3 Sections: 3.1 - 3.9. (Pg. No. : 2.4 to 2.10 and 3.1 to 3.9)	19 hours
Unit-V	Beta, Gamma Functions - Simple Problems. Chapter 30 Sections: 30.1 - 30.23. (Pg. No. : 30.1 to 30.23)	20 hours
Text Book	Dr. Vittal P. R, *Allied Mathematics*, Fourth Edition, Margham Publications, Chennai, 2010.	
Reference Books	Frank Ayres, *Shaum's outline of theory and problem of matrices*.	

Department	Mathematics	
Course : B. Sc.		Effective From the Year : 2017
Subject code : 17UPS1A1 Title : ANCILLARY MATHEMATICS FOR PHYSICS – I		
Hrs/ Week	8	Credits : 4
Objectives	The aim of this paper is to train the students to improve the basic knowledge of mathematics relevant to their major subjects. This syllabus enables students to (i) explore matrix theory (ii) expand their knowledge in solving Algebraic equations and develop their knowledge in Fourier series, Beta and Gamma functions.	

Units	Contents	Hrs
Unit-I	Symmetric and Skew-Symmetric matrices - Hermitian and Skew - Hermitian matrices - Orthogonal and unitary matrices - Characteristic Equation of a matrix - Cayley-Hamilton's theorem (without proof) - Simple Problems. Chapter 5 Sections: 5.8 - 5.23 and 5.50 - 5.67. (Pg. No : 5.8 to 5.23 and 5.50 to 5.67)	23 hours
Unit-II	Fundamental theorem in the theory of Equations - Relation between the roots and co-efficient of an Equation - Imaginary and Irrational roots. Chapter 6 Sections: 6.1 - 6.17 and 6.19 - 6.25. (Pg. No. : 6.1 to 6.17 and 6.19 to 6.25)	22 hours
Unit-III	Reciprocal Equation - Diminishing the roots of an Equation - Removal of term - Simple Problems. Chapter 6 Sections: 6.30 - 6.36 and 6.49 - 6.55. (Pg. No. : 6.30 to 6.36 and 6.49 to 6.55)	21 hours
Unit-IV	Logarithmic series - Binomial series - Simple Problems. Chapter 4 Sections: 4.1 - 4.11 Chapter 2 Sections: 2.4 - 2.10 (Pg. No. : 4.1 to 4.11 and 2.4 to 2.10)	19 hours
Unit-V	Beta, Gamma Functions - Simple Problems. Chapter 30 Sections: 30.1 - 30.23. (Pg. No. : 30.1 to 30.23)	19 hours
Text Book	Dr. Vittal P. R, *Allied Mathematics*, Fourth Edition, Margham Publications, Chennai, 2010.	
Reference Books	Frank Ayres*, Shaum's outline of theory and problem of matrices*.	

Department	Mathematics	
Course : B. Sc.		Effective From the Year : 2017
Subject code : 17UMS203 Title : TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES		
Hrs/ Week	5	Credits : 4
Objectives	This paper enables the students to (i) provide basic knowledge of trigonometry and vector calculus (ii) learn about applications of multiple integrals.	
Units	Contents	Hrs
Unit-I	Expansions of cosnθ, sinnθ and tannθ - Examples on formation of equations - Expansions of $\cos^n\theta$ and $\sin^n\theta$ - Expansions of sinθ and cosθ in a series of ascending powers of θ. Text Book 1, Chapter 3 Sections : 1 to 5.	14 hours
Unit-II	Hyperbolic functions - Inverse hyperbolic functions - Separation of real and imaginary parts of sin(α+iβ), cos(α+iβ), tan(α+iβ), sinh(α+iβ), cosh(α+iβ), tanh(α+iβ) and $\tan^{-1}(\alpha+i\beta)$. Text Book 1, Chapter 4 Sections : 1 to 2.	13 hours
Unit-III	Fourier Series: Definition - Finding Fourier co-efficient for given periodic functions with period 2π - Even and odd functions - Half range series. Text Book 2, Chapter 6 Sections : 1 to 5.2.	13 hours
Unit-IV	Vector differentiation: Scalar and vector point functions - Level surface - Gradient of a scalar point function - Directional of a scalar point function - Theorems (only statement) - *Equations of tangent plane and normal line to a level surface (Self study)* - Divergence and curl of a vector point function - Solenoidal vector - Irrotational vector - Vector identities. Text Book 3, Chapter 1.	12 hours
Unit-V	Vector integration: Line integral - Theorems on line integrals (only statement) - Surface and Volume integrals - Gauss Divergence theorem - Stoke's theorem - Green's theorem in plane. Text Book 3, Chapter 2.	13 hours
Text Books	1. Narayanan S. and Manicavachagom pillay T. K, *Trigonometry*, Viswanathan S, Pvt. Ltd, 2012. 2. S. Narayanan, Manicavachagom Pillay T. K, S. Viswanathan, *Calculus Volume III*, (Printers & Publishers), Pvt. Ltd, 2010. 3. P. R. Vittal, V. Malini, *Vector Analysis*, Margham publication.	
Reference Books	1. Mittal S. C, Pragathi prakasan, *Trigonometry*, 1969. 2. Gupta R, *Vector Calculus*, Firewall media.	

Department	Mathematics	
Course : B. Sc.	Effective From the Year : 2017	
Subject code : 17UMS204 Title : ANALYTICAL GEOMETRY 2D AND 3D		
Hrs/ Week	5	Credits : 4
Objectives	This paper enables the student to gain fundamental ideas about co-ordinate geometry and gives clear knowledge about regular geometrical aspects and their properties in two dimensional and three dimensional analytical geometry.	
Units	Contents	Hrs
Unit-I	Polar Co-ordinates: Polar Co-ordinates - Relation between polar and rectangular Cartesian co-ordinates - Equation of a circle - Equation of a conic. Text book 1, Chapter 9 Sections : 9.1 to 9.4 and 9.6.	13 hours
Unit-II	Straight Lines: Co-planarity of two lines - Shortest distances between two skew lines - Feet of the common perpendicular. Text book 2, Chapter 4 Sections : 4.2 and 4.6	13 hours
Unit-III	Sphere: Equation of a sphere - Results based on properties of a sphere - Tangent plane to a sphere - Equations of a circle - *Equation of smallest sphere through the circle (Self study).* Text book 2, Chapter 5 Sections : 5.1, 5.3, 5.4, 5.6, 5.7.	13 hours
Unit-IV	Cone: Equation of a cone - Cone whose vertex is at the origin - Quadratic cone with vertex at the origin - *General quadratic cone (Self study)* - Intersection of a cone by a plane. Text book 2, Chapter 6 Sections : 6.1 to 6.5.	14 hours
Unit-V	Cone: Right circular cone - Enveloping cone. Cylinder: Equation of a cylinder-Right circular cylinder. Text book 2, Chapter 6 Sections: 6.6, 6.7, 6.11.	12 hours
Text Book	Duraipandian P, Laxmi Duraipandian, Muhilan D, *Analytical Geometry 2 dimensional*, Emerald publishers, 2000. Duraipandian P, Laxmi Duraipandian, Muhilan D, *Analytical Geometry 3 dimensional*, Emerald publishers, 2000.	
Reference Books	1. Manicavachagom Pillai T. K, Natarajan T, *A text book of Analytical Geometry part-I two dimensions*, S. Viswanathan printers & publishers Pvt. Ltd, 2010. 2. Manicavachagom Pillai T. K, Natarajan T, *A text book of Analytical Geometry part-I three dimensions*, S. Viswanathan printers & publishers, Pvt. Ltd, 2010.	

Department	Mathematics	
Course : B. Sc.	Effective From the Year : 2017	
Subject code : 17UMS2A2 Title : MATHEMATICAL STATISTICS – II		
Hrs/ Week	6	Credits : 5
Objectives	On successful completion of the course the students should have understood the concepts of Two Dimensional Random Variable, Moments of Bi-variate Probability Distributions, Linear Regressions and developed skills to apply Sampling procedures to different situations.	
Units	Contents	Hrs
Unit-I	Two Dimensional Random Variables: Joint Probability Mass Function - Two Dimensional Distribution function - Marginal Distribution functions - Joint Density function - Marginal Density Function - The conditional Distribution Function and Conditional Probability Density function. Moments of Bivariate Probability Distributions - Conditional Expectation and Conditional Variance - Simple problems. Chapter 5 Sections: 5.5, 5.5.1, 5.5.2, 5.5.3, 5.5.4, 5.5.5. Chapter 6 Sections: 6.8, 6.9.	15 hours
Unit-II	Karl Pearson's co-efficient of Correlation: Limits for Correlation Coefficient - Calculation of the Correlation Coefficient for a Bivariate Frequency Distribution. Rank Correlation: Spearmen's Rank Correlation Coefficient - problems only (no derivations). Linear Regression: Regression Coefficients - Properties of Regression Coefficients- *Angle between two Lines of Regression (Self study)* - Simple Problems. Chapter 10 Sections: 10.4, 10.4.1, 10.5, 10.7, 10.7.1. Chapter 11 Sections: 11.2, 11.2.1, 11.2.2, 11.2.3.	16 hours
Unit-III	Parameter and Statistic: Sampling Distribution of a Statistic - Standard Error. Tests of Significance: Null and alternative Hypothesis - Errors in sampling - Critical Region and Level of Significance - One-tailed and Two-tailed tests - Critical Values or Significant Values. Procedure for Testing of Hypothesis. Tests of Significance for Large Samples. Sampling of Attributes: Test of significance for 1. Single Proportion, 2. Difference of Proportions - Simple Problems. *Sampling of Variables: Test of significance for* *1. Single Mean,* *2. Difference of Means (Self study)*- Simple Problems. Chapter 14 Sections: 14.3, 14.3.1, 14.3.2, 14.4.1, 14.4.2, 14.4.3, 14.4.4, 14.4.5, 14.5, 14.6, 14.7, 14.7.1, 14.7.2, 14.8, 14.8.3, 14.8.4.	16 hours
Unit-IV	Applications of χ^2 Distribution: Inferences about a Population Variance - Goodness of Fit Test - Test of Independence of Attributes - 2x2 Contingency Table only - Simple Problems. Chapter 15 Sections: 15.6, 15.6.2, 15.6.3.	15 hours

Unit-V	Applications of t-Distribution: t-test for Single Mean - t-test for Difference of Means - t-test for Testing the Significance of an Observed Sample Correlation Coefficient. Applications of F-Distribution: F-test for Equality of Two Population Variances - Simple Problems. Chapter 16 Sections: 16.3, 16.3.1, 16.3.2, 16.3.4, 16.6, 16.6.1.	16 hours

Text Book	Gupta S. C and Kapoor V. K, *Fundamentals of Mathematical Statistics*, S. Chand & Sons, 2009.
Reference Books	1. Vital P. R, *Mathematical Statistics*, Margham publications, 2004. 2. Hogg R. V and Craigh A. G, *Introduction to Mathematical Statistics*, Pearson Education publications, 2004.

Department	Mathematics	
Course : B. Sc.	Effective From the Year : 2017	
Subject code : 17UCY2A2 Title : ANCILLARY MATHEMATICS FOR CHEMISTRY-II		
Hrs/ Week	8	Credits : 4
Objectives	On completion of the course the learners are expected to (i) have a good understanding, application ability of Hyperbolic functions and Laplace functions (ii) have a very good understanding of vector calculus.	
Units	Contents	Hrs
Unit-I	Hyperbolic functions: Relations between circular and hyperbolic functions - Addition formula for hyperbolic functions - Problems. Chapter 14 Sections : 14.31-14.37&14.40-14.55 (Pg. No. : 14.31 to14.37 and 14.40 to 14.55)	21 hours
Unit-II	Laplace Transforms: Definition - Laplace transform of elementary function - Linear Property - Shifting Property - Change of scale property - Laplace transform of derivatives - Laplace transform of integrals - Multiplication by t - problems. Chapter 27 Sections : 27.1 - 27.19 (Pg. No. : 27.1 to 27.19)	22 hours
Unit-III	Vector Differentiation: Gradient, Curl and Divergence - Problems. Chapter 28 Sections : 28.7 - 28.51, 28.23, 28.26 - 28.33 and 28.36 - 28.43 (Pg.No. : 28.7 to 28.51, 28.23, 28.26 to 28.33 and 28.36 to 28.43)	21 hours
Unit-IV	Line Integral - Surface Integral - Volume Integral - Problems. Chapter 29 Sections : 29.59 - 29.72 and 29.75 - 29.87 (Pg.No. : 29.59 to 29.72 and 29.75 to 29. 87)	20 hours
Unit-V	Green's theorem (without proof) - Simple Problems. Chapter 29 Sections : 29.129 - 29.140 (Pg.No. : 29.129 to 29.140)	20 hours
Text Book	Vittal P. R, *Allied Mathematics*, Fourth Edition, Margham Publications, Chennai, 2010.	
Reference Books	1. Murray R. Spiegel, *Shaum's outline of theory and problem of vector analysis*. 2. Murray R. Spiegel, *Shaum's outline of theory and problem of Laplace Transform.*	

Department	Mathematics	
Course: B. Sc.	Effective From theYear :2017	
Subject code : 17UPS2A2 Title : ANCILLARY MATHEMATICS FOR PHYSICS-II		
Hrs/ Week	8	Credits : 4
Objectives	On completion of the course the learners are expected to (i) have a good understanding, application ability of Hyperbolic functions and Laplace functions (ii) have a very good understanding of vector calculus.	
Units	Contents	Hrs
Unit-I	Hyperbolic functions: Relations between circular and hyperbolic functions - Addition formula for hyperbolic functions - Problems. Chapter 14 Sections : 14.1 - 14.37 and 14.40 - 14.57. (Pg. No. : 14.1 to 14.37 and 14.40 to 14.57)	21 hours
Unit-II	Laplace Transforms: Definition - Laplace transform of elementary function - Linear Property - Shifting Property - Change of scale property - Laplace transform of derivatives - Laplace transform of integrals - Multiplication by t - Problems. Chapter 27 Sections : 27.1 - 27.19 (Pg. No. : 27.1 to 27.19).	22 hours
Unit-III	Vector Differentiation: Gradient, Curl and Divergence - Simple Problems. Chapter 28 Sections : 28.8 - 28.51. (Pg. No. : 28.8 to 28.51).	21 hours
Unit-IV	Line Integral - Surface Integral - Volume Integral - Simple Problems. Chapter 29 Sections : 29.59 - 29.72 and 29.75 - 29.87. (Pg. No. : 29.59 to 29.72 and 29.75 to 29.87).	20 hours
Unit-V	Logarithm of complex number - Simple Problems. Chapter 14 Sections : 14.61 - 14.72. (Pg. No. : 14.61 to 14.72).	20 hours
Text Book	Vittal P. R, *Allied Mathematics*, Fourth Edition, Margham Publications, Chennai, 2010.	
Reference Books	1. Murray R. Spiegel, *Shaum's outline of theory and problem of vector analysis* 2. Murray R. Spiegel, *Shaum's outline of theory and problem of Laplace transform*	

Department	Mathematics	
Course	B. Sc.	Effective From the Year : 2017
Subject code : 17UMS305 Title : DYNAMICS		
Hrs/ Week	5	Credits : 4
Objectives	To enable the students to apply laws, principles and postulates governing the dynamics in physical reality. At the end of this course, the students will be able to comprehend the notion of impulsive and coplanar forces and will have a sound knowledge in rigid body motion and able to realize the reason for dynamic changes in the body.	
Units	Contents	Hrs
Unit-I	Projectiles - Simple problems. Chapter 6 Sections : 6.1 to 6.15.	13 hours
Unit-II	Simple Harmonic Motion - Simple problems. Chapter 10 Sections : 10.1 to 10.7.	12 hours
Unit-III	Motion under the action of central forces - *Differential Equations of central orbits (Self study)* - Simple problems. Chapter 11 Sections : 11.1 to 11.13.	14 hours
Unit-IV	Impulsive forces - Simple problems. Chapter 7 Sections : 7.1 to 7.6.	13 hours
Unit-V	Collision of elastic bodies -. *Compression and Restitution (Self study)* - Simple problems. Chapter VIII Sections : 8.1 to 8.8.	13 hours
Text Book	Venkataraman M. K, *Dynamics,* Thirteenth Edition, Agasthiar publications, 2009.	
Reference Books	1. Dharmapadam A. V, *Dynamics,* S. Viswanathan Printers and Publishers Pvt. Ltd, Chennai, 1998. 2. Viswanath Naik K and Kasi M. S, *Dynamics*, Emerald Publishers, 1992.	

Department	Mathematics	
Course	B. Sc.	Effective From the Year : 2017
Subject code : 17UMS306 Title : NUMERICAL TECHNIQUES		
Hrs/ Week	4	Credits : 3
Objectives	To enable the students to learn and use numerical techniques to get numerical solutions to equations like transcendental and non linear differential equations when ordinary analytical methods fail.	
Units	Contents	Hrs

Unit-I	The solution of Numerical Algebraic and Transcendental Equations: Introduction - The Bisection method - The iteration method - The method of false position (Regula Falsi Method) - Newton Raphson method. Chapter 3 Sections : 1 to 5.	11 hours
Unit-II	Interpolation: Introduction - Linear interpolation - Gregory Newton Forward and Backward interpolation Formula - Equidistant terms with one or more missing values. Chapter 6 Sections : 1 to 5.	10 hours
Unit-III	Numerical Differentiation: Introduction - Newton's forward difference formula to compute the derivatives - Newton's backward difference formula to compute the derivatives - Derivatives using Stirling's formula - *Remarks on numerical differentiation (Self study)* - *Maxima and minima of a tabulated function (Self study).* Chapter 9 Sections : 1 to 6.	11 hours
Unit-IV	Numerical Integration: The Trapezoidal rule - Romberg's method - Simpson's one third rule - Practical applications of Simpson's rule. Chapter 9 Sections : 8 to10 and 12.	10 hours
Unit-V	Numerical Solution of Ordinary Differential Equations: Euler's method - Improved Euler's method - Modified Euler method - Runge Kutta method - Second order Runge Kutta Method - *Higher order Runge Kutta methods (Self study).* Chapter 11 Sections : 10 to 15.	10 hours
Text Book	Venkataraman M. K, *Numerical Methods in Science and Engineering*, The National Publishing Company, Madras, 2006.	
Reference Book	Kandasamy P, Thilagavathy K and Gunavathi K, *Numerical Methods*, S. Chand company Ltd, 2012.	

Department	Mathematics	
Course	B. Sc.	Effective From the Year : 2017
Subject code : 17UMS3N1 Title : NME QUANTITATIVE APTITUDE - I		
Hrs/ Week	1	Credits : 2
Units	Contents	Hrs
Unit-I	Operation on numbers: Introduction - Face value - Place value - Various types of numbers - Simple problems. Chapter 1 Sections: 1 to 6.	3 hours

Unit-II	HCF and LCM of numbers: Factors and multiples - HCF and GCD - Factorization method - Division method - Simple problems. Chapter 2 Sections: 1 and 2.	3hours
Unit-III	Ratio and Proportion: Ratio - Proportion - Simple problems. Chapter 12 Sections: 1 and 2.	3 hours
Unit-IV	Profit and loss: Introduction - Cost price - Selling price - Profit and loss - Simple Problems. Chapter 11 fully.	2 hours
Unit-V	Odd man out and Series: Directions for odd man out and series. Chapter 35 fully.	2 hours
Text Book	Aggarwal R. S, *Quantitative Aptitude*, S. Chand & Company Ltd, Ram Nagar, New Delhi, 2013.	

Department	Mathematics	
Course	B. Sc.	Effective From the Year : 2017
Subject code : 17UMS3N2 Title : NME ASTRONOMY- I		
Hrs/ Week	1	Credits : 2
Units	Contents	Hrs
Unit-I	The Solar System: Introduction - The Sun - Mercury - Venus - Mars - Asteriods - Jupiter - Saturn - Uranus - Neptune.	3 hours

	Chapter 16 Sections : 316 - 326.	
Unit-II	The Solar System: Comets - Meteors - Zodiacal light. Chapter 16 Sections : 327 - 329.	3hours
Unit-III	Double And Multiple Stars: Introduction - Variables stars - Eclipsing Variables capheid variables - Long period variables - Irregular variables - Novae - Star clusters Nebulae - Constellations - Zodiacal Constellations. Chapter 17 Sections : 339 - 345.	3 hours
Unit-IV	The Milky Way: Introduction - Seasonal changes in the night sky - The winter Constellations - The spring Consellations. Chapter 17 Sections : 346 - 347.	2 hours
Unit-V	Constellations: Introduction - The summer Constellations - The autumn Constellations. Chapter 17 Section : 347.	2 hours
Text Book	Kumaravelu S and Susheela Kumaravelu, *Astronomy for degree classes*, 7th edition 1986.	

Department	Mathematics	
Course	B. Sc.	Effective From the Year : 2017
Subject code : 17UMS407 Title : STATICS		
Hrs/ Week	4	Credits : 4
Objectives	The prime objective of this paper is to introduce the concepts about the forces, resultant force of more than one forces acting on a surface, friction and center of gravity and simple related problems. At the end of the course, learner will be well trained in handling these concepts.	

Units	Contents	Hrs
Unit-I	Forces acting at a point - Simple problems. Chapter 2 Sections : 1 - 15.	11 hours
Unit-II	Parallel forces and *Moments (Self study)* - Simple problems. Chapter 3 Sections : 1 - 13.	11 hours
Unit-III	Couples - Simple problems Chapter 4 Sections : 1-10.	10 hours
Unit-IV	Equilibrium of three forces acting on a rigid body - *Coplanar forces (Self study)* - Simple Problems. Chapter 5 Sections : 1 - 6. Chapter 6 Sections : 1 - 13.	10 hours
Unit-V	Friction and Centre of gravity – Simple problems. Chapter 7 Sections : 1-13. Chapter 8 Sections : 1-18.	10 hours
Text Book	Venkataraman M. K, *Statics*, Sixth Edition, Agasthiar publications, 2007.	
Reference Books	1. Dharmapadam A. V, *Statics,* Chennai, S. Viswanathan printers and Publishers Pvt. Ltd, 1993. 2. Duraipandian P and Laxmi Duraipandian, *Mechanics*, Ram Nagar, New Delhi, S. Chand & Co. Pvt. Ltd, 1985.	

Department	Mathematics	
Course	B. Sc.	Effective From the Year : 2017
Subject code : 17UMS408 Title : OPERATIONS RESEARCH - I		
Hrs/ Week	5	Credits : 4
Objectives	The prime objective of this paper is to introduce certain OR techniques such as LPP, Transportation problems, Assignment problems, Sequencing and Replacing models to help the students to develop logical reasoning for applying mathematical tools to managerial and other life oriented problems.	

Units	Contents	Hrs
Unit-I	Linear Programming Problem: Introduction - Mathematical Formulation of the Problem - Graphical Solution Method - General Linear Programming Problem - Canonical and Standard Forms of L.P.P. Chapter 2 Sections : 2.1 - 2.4 Chapter 3 Sections : 3.1 - 3.5.	14 hours
Unit-II	Linear Programming Problem: Simplex Method Introduction - The Computational Procedure - Use of Artificial Variables - Big M-method - Degeneracy in Linear Programming - Applications of Simplex Method. Chapter 4 Sections : 4.1, 4.3 – 4.5, 4.8.	13 hours
Unit-III	Transportation Problem: LP formulation of the Transportation Problem - Existence of Solution in TP - The Transportation Table - Loops in Transportation Tables - Finding an initial basic feasible solution - North West corner rule - *Vogel's approximation Method (Self study)* -Test for Optimality - Determining the Net evaluations (The uv method) - Transportation algorithm (MODI Method) - Some exceptional cases - Unbalanced Transportation Problem. Chapter 10 Sections : 10.2, 10.3, 10.5, 10.6, 10.9, 10.10, 10.13, 10.15.	13 hours
Unit-IV	Assignment & Replacement Problem: Mathematical Formulation of the Assignment Problem - Solution of Assignment Problem - Hungarian Assignment method - Replacement of equipment / Assert that deteriorates gradually - Case (i) Value of money does not change with time Case (ii) Value of money changes with time - Selection of best equipment amongst two - Simple problems. Chapter 11 Sections: 11.1- 11.3, Chapter 18 Sections: 18.1 - 18.2.	13 hours
Unit-V	Queueing Theory: Queueing System - Elements of a Queueing System - Operating characteristics of a Queueing system - Poisson Queueing System Model I : (M/M/ 1): (∞/FIFO) Model III : (M/M/ 1): (N/FIFO) Model V : (M/M/ C): (∞/FIFO) *Model VI : (M/M/ C): (N/FIFO)(Self study)* Simple Problems. Chapter 21 Sections : 21.1 - 21.4, 21.9.	12 hours

Text Book	Kanti Swarup, Gupta P. K and Man Mohan, *Operations Research*, Sultan Chand & Sons, New Delhi, 2014.

Reference Books	1. Taha H. A, *Operation Research - An introduction,* Prentice Hall of India Pvt Ltd, New Delhi, 2006. 2. Phillips T, Ravindran A and Solberg J, *Operations Research: Principles and Practice,* John Willey & Sons, 1976.

(MATHEMATICAL DERIVATIONS IN ALL UNITS MAY BE OMITTED).

Department	Mathematics	
Course	B. Sc.	Effective From the Year :2017
Subject code : 17UMS4N3 Title : NME QUANTITATIVE APTITUDE - II		
Hrs/ Week	1	Credits : 2
Units	Contents	Hrs

Unit-I	Percentage: Introduction - Important facts and family - Concept of percentage - Simple problems. Chapter 10.	3 hours
Unit-II	Simplification: Introduction - BODMAS rule - Modulus of a real number - Simple problems. Chapter 4.	3 hours
Unit-III	Problems on ages: Problems on ages - Simple problems. Chapter 8.	3 hours
Unit-IV	Time and work: Time and work - Simple problems. Chapter 15.	2 hours
Unit-V	Problems on trains: Problems on trains with solved examples. Chapter 18.	2 hours
Text Book	Aggarwal R. S, *Quantitative Aptitude*, S. Chand & Company Ltd, Ram Nagar, New Delhi, 2013.	

Department	Mathematics	
Course	B. Sc.	Effective From the Year :2017
Subject code : 17UMS4N4 Title : NME ASTRONOMY - II		
Hrs/ Week	1	Credits : 2
Units	Contents	Hrs

Unit-I	The Moon: Introduction - Sidereal month - Synodic month Elongation - Conjucation - Opposition - Quadratures Daily motion of the moon - Age of moon - Phase of moon. Chapter 12 Sections : 228 - 238	3 hours
Unit-II	The Moon: Moon exhibits the same side to the earth -Lunar Librations - Summer and winter full moons path of the moon with respect to the sun - Perturbations of lunar orbit. Chapter 12 Sections : 241 - 245	3 hours
Unit-III	Double And Multiple Stars: Introduction -Variables stars - Eclipsing Variables capheid variables - Long period variables - Irregular variables - Novae - Star clusters Nebulae - Constellations - Zodiacal Constellations. Chapter 13 Sections : 254 -257 and 264	3 hours
Unit-IV	The Milky Way: Introduction - Seasonal changes in the night sky - The winter constellations - The spring consellations. Chapter 14 Sections : 283,284 and 286 - 288	2 hours
Unit-V	Constellations: Introduction - The summer constellations - The autumn constellations. Chapter 15 Sections : 303,304,305,306 and 310	2 hours
Text Book	Kumaravelu S and Susheela Kumaravelu, *Astronomy for degree classes*, 7th edition 1986.	

Department	Mathematics	
Course	B. Sc.	Effective From the Year :2017
Subject code : 17UMS510 Title : REAL ANALYSIS - I		
Hrs/ Week	6	Credits : 4
Objectives	One of the higher mathematical divisions, mathematical analysis provides the students a transition from elementary calculus to advanced courses in modern	

	analysis. The course includes real and complex number systems, set theory, elements of point set topology, metric spaces and continuous functions. On completion of the course the learners are expected to have obtained a strong foundation for further study in analysis.	
Units	Contents	Hrs
Unit-I	The Real and Complex number Systems: Introduction - The field axioms - The order axioms - Intervals - Integers - The unique factorization theorem for integers - Rational numbers - Irrational numbers - Upper bounds, maximum element, least upper bound - The completeness axiom - Some properties of the supremum - Properties of the integers deduced from the completeness axiom - The Archimedean property - Absolute values and the triangle inequality - The Cauchy Schwatz inequality - Plus and minus infinity and the extended real number system R*. Chapter 1 Sections : 1.1 - 1.20 (Except 1.15 - 1.17).	15 hours
Unit-II	Some Basic Notations of Set Theory: Notations - Ordered pairs - Cartesian product of two sets - Relations and functions - One to one functions and inverses - Composite functions - Sequences - Similar sets - Finite and infinite sets - Countable and uncountable sets - Uncountability of the real number system - Set algebra - Countable collections of countable sets. Chapter 2 Sections : 2.1 - 2.15 (Except 2.6).	16 hours
Unit-III	Elements of Point Set Topology: 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 intersection theorem - Lindelof covering theorem - The Heine Borel covering theorem - Compactness in R^n . Chapter 3 Sections : 3.1 - 3.12.	16 hours
Unit-IV	Metric spaces - Point set topology in metric spaces - Compact subsets of a metric space - Boundary of a set. Limits and Continuity: Convergent sequences in a metric space - Cauchy sequences - Complete metric spaces - Limit of a function - Limits of vector valued functions. Chapter 3 Sections : 3.13 - 3.16, Chapter 4 Sections : 4.1 - 4.5, 4.7.	16 hours
Unit-V	Continuous function - Continuity of composite functions - Continuity and inverse images of open or closed sets - Connectedness - Uniform continuity - Uniform continuity and compact sets - Discontinuities of real valued functions - Monotonic functions. Chapter 4 Sections : 4.8, 4.9, 4.12, 4.16, 4.19, 4.20, 4.22, 4.23.	15 hours

Text Book	Tom M. Apostal, *Mathematical Analysis*, Addison Wesley, Second Edition 2002.
Reference Books	1. Walter Rudin, *Principles of Mathematical Analysis*, Third Edition, McGraw Hill Inter Editions, 1976. 2. Ralp P. Boas, *A primer of Real function*, The mathematical Association of America, 1960.

Department	Mathematics	
Course	B.Sc.	Effective From the Year : 2017
Subject code : 17UMS511 Title : OPERATIONS RESEARCH -II		
Hrs/ Week	5	Credits : 4
Objectives	The prime objective of this paper is to introduce certain OR techniques such as Game theory, sequencing and networking models to help the students to	

	develop logical reasoning for applying mathematical tools to managerial and other life oriented problems	
Units	Contents	Hrs
Unit-I	Games and strategies: Two person zero sum games - Some basic terms - The Maximin - Minimax principle - Games without Saddle points - Mixed strategies - Graphical Solution of 2xn and mx2 games Chapter 17 Sections : 17.1 - 17.6.	13 hours
Unit-II	Sequencing problems: Problem of Sequencing - Basic terms used in Sequencing - Processing n jobs through 2 machines *Processing n jobs through k-machines (Self study)* Processing 2 jobs through k-machines. Chapter 12 Sections : 12.1 - 12.6	13 hours
Unit-III	Inventory control: Types of inventories - Reasons for carrying inventories - The inventory decisions - Cost associated with inventories - Factors affecting inventory control - The concept of EOQ - Deterministic inventory problems with no shortages Case (i) The fundamental Problem of EOQ Case (ii) Problem of EOQ with finite replenishment (Production). Chapter 19 Sections :19.1 - 19.4, 19.6, 19.7, 19.9, 19.10.	14 hours
Unit-IV	Inventory control: Deterministic inventory Problems with shortages Case (i) Problem of EOQ with instantaneous Production and variable order cycle Case (ii) Problem of EOQ with instantaneous Production and Fixed order cycle. Case (iii) Problem of EOQ with finite replenishment (Production). Problem of EOQ with price breaks Case (i) Problem of EOQ with one price break Case (ii) Problem of EOQ with more than one price break. Chapter 19 Sections : 19.11, 19.12.	13 hours
Unit-V	Network scheduling by PERT/CPM: Network: Basic compounds - Logical Sequencing - Rules of *Network constructions - Critical Path Method (CPM) (Self study)* - Probability considerations in PERT - Distinction between PERT & CPM - Simple Problems. Chapter 25 Sections : 25.1 - 25.4, 25.6 - 25.8.	12 hours

Text Book	Kanti Swarup, Gupta P.K. & Man Mohan, *Operations Research* (2014), Sultan Chand & Sons, New Delhi.
Reference Books	1. Taha H. A, *Operation Research - An introduction,* Prentice Hall of India Pvt Ltd, New Delhi, 2006. 2. Philips T, Ravindran A and Solberg J, *Operations Research: Principles and Practice*, John Willey & Sons, 1976.

(MATHEMATICAL DERIVATIONS IN ALL UNITS MAY BE OMITTED)

Department	Mathematics	
Course	B. Sc.	Effective From the Year : 2017
Subject code : 17UMS512 Title : THEORY OF NUMBERS		
Hrs/ Week	5	Credits : 4
Objectives	This course exposes the elementary basic theory of numbers and several famous functions, related theorems and some unsolved problems about	

	primes to the students in order to enable them to deeper their understanding of the subject.	
Units	Contents	Hrs
Unit-I	Basic Representation: Principles of Mathematical induction - The Basis Representation Theorem. The Fundamental Theorem of Arithmetic: Euclid's Division Lemma - Divisibility - The linear Diophantine Equation - The Fundamental Theorem of Arithmetic. Chapter 1 and 2.	12 hours
Unit-II	Combinational and Computational Number Theory: Permutations and Combinations - Fermat's Little Theorem (Statement only) - Wilson's Theorem (Statement only). Fundamentals of Congruences: *Basic properties of Congruences (Self study)* - Residue systems. Chapter 3 Sections : 3.1 - 3.3, Chapter 4 Sections : 4.1, 4.2.	12 hours
Unit-III	Solving Congruences: Linear congruences - the theorems of Fermat and Wilson Revisited - The Chinese Remainder theorem - *Polynomial congruences (Self study).* Chapter 5.	13 hours
Unit-IV	Arithmetic Functions: Combinational study of $\Phi(n)$ - Formulae for $d(n)$ and $\sigma(n)$ - Multiplicative arithmetic functions - The Mobius Inversion Formula. Chapter 6.	14 hours
Unit-V	Primitive Roots: Properties of Reduced Residue Systems - Primitive Roots module p. Prime Numbers: Elementary properties of $\pi(x)$ - Tchebychev's theorem - Some unsolved problems about primes. Chapter 7 and 8.	14 hours
Text Book	George E. Andrews, *Number Theory*, HPS (India), 1992.	
Reference Books	1. David M. Burten, *Elementary Number Theory*, McGraw- Hill, 1997. 2. Kumaravelu et al., *Elements of Number Theory*, Nagerkovil, SKV, 2002. 3. Telang, *Number theory*, Tata McGraw-Hill publishing Company Ltd, 1984.	

Department	Mathematics	
Course	B. Sc.	Effective From the Year :2017
Subject code : 17UMS513 Title : PROGRAMMING IN 'C'		
Hrs/ Week	4	Credits : 3
Objectives	C is a general- purpose structured programming language that is powerful, efficient and compact. The programming language C finds a wide variety of	

	applications in the development of software. This course provides the students with all the fundamental concepts of the C language with some practical experience. Also helps the students to develop their programming skills and to build large programs.	
Units	Contents	Hrs
Unit-I	History of C - Importance of C - Character set - Keywords - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining symbolic constants - Arithmetic, Relational, Logical, Assignment, increment, Decrement and conditional operators-Arithmetic expressions - Evaluation of expressions - *Precedence of arithmetic operators (Self study)* - Type conversions in expressions - Operator precedence - Mathematical functions - Reading a character - Writing a character - Formatted input and output. Chapter 1 Sections : 1.1-1.9 Chapter 2 Sections : 2.1-2.12 Chapter 3 Sections : 3.1-3.16 Chapter 4 Sections : 4.1-4.5.	11 hours
Unit-II	Simple if statement - If … else statement - Nesting of if … else statements - else if ladder - switch statement - go to statement - while statement - do while statement - for statement - Jumps in loops - Simple programs. Chapter 5 and 6 Sections : 5.1-5.9 and 6.1-6.5.	11 hours
Unit-III	One dimensional arrays - Two dimensional arrays - Declaring and initializing string variables - Reading strings from terminal - Writing strings to screen Arithmetic operations on characters - Putting strings together comparison of two strings - String handling functions - *Table of strings (Self study)* - Simple programs. Chapter 7 and 8 Sections : 7.1 - 7.6 and 8.1 - 8.9.	10 hours
Unit-IV	Need for user defined functions - The form of C functions - Return values and their types - Calling a function - No arguments and no return values - Arguments but no return values - Arguments with return values - Handling of non integer functions - Functions returning nothing Nesting of C functions - Recursion - Functions with arrays - Simple programs. Chapter 9 Sections : 9.1 - 9.16.	10 hours
Unit-V	Understanding pointers - Accessing the address of a variable - Declaring and initializing pointers - Accessing a variable through its pointer - Pointer expressions – Pointer increments and scale factor - Pointers and arrays - Pointers and characters strings - Pointers as function arguments - Pointers to functions - Simple programs. Chapter 11 Sections : 11.1-11.16.	10 hours
Text Book	Balagurusamy E, *Programming in ANSI C*, Third Edition, Tata McGraw Hill Publishing Company Ltd, 2004.	
Reference	1. Kernighan B. W and Ritchie D. M, *The C programming language*,	

Books	Prentice Hall, 1997. 2. Kochan S. G, *Programming in C,* Hyden, 1983. 3. Venugopal, K. R and Prasad S. R, *Programming with C,* Tata McGraw Hill Publishing company ltd, 1997.

Subject code : 17UMS514 Title : PROGRAMMING LAB IN 'C'		
Hrs/ Week	2	Credits : 2

List of programs:

1. Program to convert the given temperature in Fahrenheit to Celsius.
2. Program to convert days into months and days.
3. Program to find the solution of quadratic equation.
4. Program for finding Fibonacci sequence.
5. Program to sort a list and find its median.
6. Program to sort a list in ascending / descending order.
7. Program to calculate mean and standard deviation of a given series of numbers.
8. Program for finding the addition of two matrices.
9. Program for finding the multiplication of two matrices.
10. Program to find trace of a square matrix.
11. Program to sort a list of strings in alphabetical order.
12. Program to compute nCr value.
13. Program to check whether the number is prime or not.
14. Program to check whether the year is leap year or not.
15. Program to illustrate the use of pointers in one dimensional array.

Department	Mathematics	
Course	B. Sc.	Effective From the Year : 2017

Subject code : 17UMS5S1 Title : MATHEMATICS IN FINANCE-I		
Hrs/ Week	1	Credits : 2
Units	Contents	Hrs
Unit I	Financial statement analysis: Introduction - Ratio analysis - Meaning and Rationals - Basis of comparison. Chapter 4 Sections : 4.1, 4.2.	3 hours
Unit II	Types of ratios - Liquidity ratio - Net working capital - Current ratios - Acid test/Quick ratios. Chapter 4 Sections : 4.3, 4.4.	3 hours
Unit III	Turnover ratio – Defensive - Interval ratio - Leverage/Capital structure ratio – Debt - Equity Ratios - Debt to total capital ratio. Chapter 4 Sections : 4.5.	3 hours
Unit IV	Coverage ratios - Profitability ratios - profitability ratios related to sales - Profit margin - Expenses ratio. Chapter 4 Sections : 4.6, 4.7.	2 hours
Unit V	Profitability ratios related to investments: Return on investment - Importance of ratio analysis. Chapter 4 Section : 4.9.	2 hours
Text Book	Khan M.Y and Jain P. K, *Financial Management*, Tata McGraw Hill Publishing Company Ltd, New Delhi, 1990.	
Reference Books	1. Aswath Damodaran, *Corporate Finance, Theory and Practice*, John Wiley and Sons, Inc, 2007. 2. Prasanna Chandra, *Managing Investment*, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 1998.	

Department	Mathematics	
Course	B. Sc.	Effective From the Year : 2017

Subject code : 17UMS5C2 Title : ACTUARIAL MATHEMATICS-I		
Hrs/ Week	1	Credits : 2
Units	Contents	Hrs
Unit I	Basics of Probability and Interest: Probability. Chapter 1 Section : 1.1	3 hours
Unit II	Theory of Interest: Variable Interest Rates, Continuous-time Payment Streams. Chapter 1 Sections : 1.2 - 1.4	3 hours
Unit III	Interest and Force of Mortality: More on Theory of Interest, Annuities and Actuarial Notation, Loan Amortization and Mortgage Refinancing, Illustration on Mortgage Refinancing. Chapter 2 Section : 2.1(2.1.1 - 2.1.3)	3 hours
Unit IV	Interest and Force of Mortality: Computational Illustration in Splus, Coupon and Zero Coupon Bonds. Chapter 2 Section : 2.1 (2.1.4 & 2.1.5)	2 hours
Unit V	Interest and Force of Mortality: Force of Mortality and Analytical Models, Comparison of Forces of Mortality. Chapter 2 Section : 2.2	2 hours
Text Book	Eric V. Slud, *Actuarial Mathematics and Life-Table Statistics*, Department of Mathematics, University of Maryland, College Park, 2001.	
Reference Books	1. Charles L. Trowbridge, *Fundamental Concepts of Actuarial Mathematical Science*, Actuarial Education and Research Fund, Revised Edition, 1989. 2. Jerry Alan Veeh, *Lecture Notes on Actuarial Mathematics, (e-notes)*, 2006.	

Department	Mathematics	
Course	B. Sc.	Effective From the Year : 2017
Subject code : 17UMS615 Title : LINEAR ALGEBRA		
Hrs/ Week	6	Credits : 4

Objectives	To enable the students to study (i) how to solve system of linear algebraic equations. (ii) a new algebraic structure, vector space and its properties. (iii) linear transformations on vector spaces and their relation between matrices.	
Units	Contents	Hrs
Unit-I	Linear equations: Fields - Systems of linear equations - Matrices and elementary row operations - Row reduced echelon matrices *Matrix multiplication (Self study)* - Invertible matrices. Chapter 1 Sections : 1.1 - 1.6.	16 hours
Unit-II	Vector Spaces: Vector spaces - Subspaces - Bases and dimension Coordinates - *Summary of row equivalence (Self study).* Chapter 2 Sections : 2.1 - 2.5.	16 hours
Unit-III	Linear transformation: Linear transformations - The algebra of linear Transformations - Isomorphism. Chapter 3 Sections : 3.1 - 3.3.	16 hours
Unit-IV	Representation of transformations by matrices - Linear functionals. Chapter 3 Sections : 3.4, 3.5.	15 hours
Unit-V	The double dual - The transpose of a linear transformation. Chapter 3 Sections : 3.6, 3.7.	15 hours
Text Books	Kenneth Hoffman and Ray Kunze, *Linear Algebra,* Second Edition, PHI Learning Pvt. Ltd, New Delhi, 2013.	
Reference Books	1. Herstein I. N, *Topics in algebra*, Vikas Publishing House Pvt. Ltd, 1981. 2. Kumaresan S, *Linear Algebra*, Prentice Hall of India, 2001.	

Department	Mathematics	
Course : B. Sc.		Effective From the Year : 2017
Subject code : 17UMS616 Title : REAL ANALYSIS - II		
Hrs/ Week	6	Credits : 4

Objectives	To enable the learners (i) to get introduction to some of the advanced topics in Real Analysis. (ii) to understand and to have a chance to study in depth advanced topics like functions of bounded variations and Riemann- Stieltjes integrals.	
Units	Contents	Unit
Unit-I	Derivatives: Introduction - Definition of derivative - Derivatives and continuity - Algebra of Derivatives - The chain rule - One sided Derivatives and infinite derivatives - Functions with nonzero derivative - Zero derivatives and local extrema - Rolle's theorem - The Mean Value Theorem for derivatives - Intermediate value theorem for derivatives - Taylor's formula with remainder. Chapter 5 Sections : 5.1 to 5.12.	15 hours
Unit-II	Functions of Bounded Variations: Introduction - Properties of monotonic functions - Functions of bounded variations - Total variations - 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.	16 hours
Unit-III	The Riemann-Stieltjes Integral: Introduction - Notation - The definition of Riemann-Stieltjes Integral - Linear properties - Integration by parts - Change of variable in Riemann-Stieltjes integral - Reduction to a Riemann integral - Step functions as integrators - Reduction of a Riemann-Stieltjes integral to a finite sum - Euler's summation formula. Chapter7 Sections : 7.1 to 7.10.	16 hours
Unit-IV	Monotonically increasing integrators - Upper and lower integrals - Additive and linearity properties of upper and lower integrals - Riemann's condition - Comparison theorems - Integrators of bounded variation - Sufficient conditions for existence of Riemann-Stieltjes integrals - Necessary conditions for existence of Riemann-Stieltjes integrals. Chapter7 Sections : 7.11 to 7.17.	16 hours
Unit-V	Mean Value Theorems for Riemann-Stieltjes Integrals - The integral as a function of the interval - Second fundamental theorem of integral calculus - Change of variable in a Riemann integral - Second Mean-Value Theorem for Riemann integrals. Chapter7 Sections : 7.18 to 7.22.	15 hours

Text Book	Tom M. Apostal, *Mathematical Analysis*, Narosa Publishing House, Second Edition 1990.
Reference Books	1. Goldberg R. R, *Methods of Real Analysis*, Oxford and IBH Publishing Co., 1973. 2. Soma Sundaram D, Choudhary B, *A first course in Mathematical Analysis*, Narosa Publishing House, 1996. 3. Walter Rudin, *Principles of Mathematical Analysis*, McGraw Hill Inc, Third Edition, 1976.

Department	Mathematics	
Course : B.Sc.	Effective From the Year :2017	
Subject code : 17UMS617 Title : COMPLEX ANALYSIS		
Hrs/ Week	5	Credits : 4
Objectives	To enable the learners to (i) get a chance to explore the concept of analytic functions, the theory of Power Series, Exponential functions and Trigonometric functions (ii) study fundamental theorems, Cauchy's integral formula, local properties of analytic functions and related results. (iii) develop a solid base for further study.	
Units	Contents	Hrs
Unit-I	Introduction to the concept of analytic function: Limits and Continuity - Analytic functions - Polynomials - Rational Functions. Chapter 1Sections : 1.1 - 1.4.	16 hours
Unit-II	Elementary theory of power series : Sequences - Series - Uniform Convergence - Power Series - Abel's Limit Theorem. Chapter 2 Sections : 2.1 - 2.5.	16 hours
Unit-III	The Exponential, Trigonometric Functions and Conformality : The Exponential -The Trigonometric Functions - Arcs and Closed Curves - Analytic Functions in Regions - Conformal Mapping - Length and Area. Chapter 2 Sections : 3.1, 3.2, Chapter 3 Sections : 2.1 - 2.4.	16 hours
Unit-IV	Fundamental Theorems : Line Integrals – Line Integrals as Function of Arcs – Cauchy's Theorem in a Rectangle - Cauchy's Theorem in a Disc – The Index of a Point with respect to a Closed Curve - Cauchy's Integral Formula. Chapter 4 Sections : 1.1, 1.3, 1.4, and 1.5. Chapter 4 Sections : 2.1, 2.2.	15 hours
Unit-V	Local Properties of Analytic functions : Removable Singularities, Taylor's Theorem – Zeros and Poles - The Local Mapping – The Maximum Principle. Chapter 4 Sections : 3.1, 3.2, 3.3, and 3.4.	15 hours
Text Book	Lars V. Ahlfors (2013), Complex Analysis, MCGRAW HILL international Edition (Indian Edition).	
Reference Books	1. Ponnusamy S (2009), *Foundations of Complex Analysis* Narosa publishing house,Second Editon. 2. Goyal & Gupta (2012), *Functions of a Complex Variable* – Pragati's Edition.	

Department	Mathematics

Course : B. Sc.		Effective From the Year :2017
Subject code : 17UMS618 Title : DISCRETE MATHEMATICS		
Hrs/ Week	5	Credits : 5
Objectives	Discrete Mathematics is the theoretical foundation for much of today's advanced technology. In this paper a set of topics that are of genuine use in computer science and elsewhere are identified and combined together in a logically coherent fashion, to enable the students to get a good training in these topics which will inevitably lead the students in the direction of clear thinking, sound reasoning and a proper attitude towards the applications of Mathematics in computer science and other related fields.	
Units	Contents	Hrs
Unit-I	Recurrence Relations and Generating functions: Recurrence - An introduction - Polynomials and their Evaluations - Recurrence Relations - Solution of Finite order Homogeneous (linear) Relations - Solution of Non-homogeneous relations - Generating Functions - Some common recurrence relations. Text Book 1, Chapter 5 Sections : 1 to 7.	14 hours
Unit-II	Logic: Introduction - TF-statements – Connectives - Atomic and Compound Statements - Well Formed (Statement) Formulae -The Truth table of a Formula - Tautology - Tautological Implications and Equivalence of Formulae - Replacement Process - Functionally Complete Sets of Connectives and Duality Law - Normal Forms - Principal Normal Forms. Text Book 1, Chapter 9 Sections : 1 to 12.	13 hours
Unit-III	Lattices and Boolean Algebra: Lattices - Some properties of Lattices - New lattices - Modular and distributive lattices - Boolean Algebras Text Book 1, Chapter 10 Sections : 1 to 5.	13 hours
Unit-IV	Graph Theory: Introduction - Basic Terminology - Paths, Cycles and Connectivity - Subgraphs - Types of Graphs - Isomorpic Graphs - Homeomorphic Graphs - *Eulerian and Hamiltonian Graphs (Self study).* Text Book 2, Chapter 9 Sections : 9.1 to 9.7 and 9.9.	12 hours
Unit-V	Language , Grammar and Automata: Introduction - Language - The Set Theory of Strings - Languages - Regular Expressions and Regular Languages - Grammar - Finite-State Machine - Finite State Automata. Text Book 2, Chapter 15 Sections : 15.1 to 15.7.	13 hours

Text Books	1. Venkataraman M. K, Sridharan N and Chandrasekaran N, *Discrete Mathematics*, The National Publishing Company, 2000. 2. Sharma J. K, *Discrete Mathematics*, Macmillan Publishers India Ltd, 2011.
Reference Books	1. Ralph P.Grimaldi, *Discrete and Combinatoral Mathematics - An applied introduction*, Third Edition, Addison Wesley Publishing Company, 1994. 2. Tremblay J. P and Manohar R, *Discrete Mathematical Structures with Applications to Computer Science*, Tata McGraw Hill, 2001.

Department	Mathematics	
Course : B.Sc.		Effective From the Year : 2017
Subject code : 17UMS619 Title : OBJECT ORIENTED PROGRAMMING WITH C++		
Hrs/ Week	4	Credits : 3
Objectives	C++ is an extension of C language which is widely used all over the world. It is a powerful modern language that combines the power, elegance and flexibility of C and the features of object oriented programming. C++ offers significant software engineering benefits over C. This course content enables the students to know all needed about C++ and object oriented programming and also to meet the global requirements in software industries.	
Units	Contents	Hrs
Unit-I	Beginning with C++ - *Tokens (Self study)* - Expressions and Control structures. Chapter 2 Sections : 2.1-2.6 Chapter 3 Sections : 3.1-3.25.	11 hours
Unit-II	Functions in C++ - Constructors and Destructors. Chapter 4 Sections : 4.1- 4.12 Chapter 6 Sections : 6.1-6.11.	10 hours
Unit-III	Classes and objects. Chapter 5 Sections : 5.1-5.19.	11 hours
Unit-IV	Operator overloading and Type conversions, Pointers, Virtual Functions and Polymorphism. Chapter 7 Sections : 7.1-7.9 Chapter 8 Sections : 8.1-8.11	10 hours
Unit-V	Inheritance: Extending classes. Chapter 9 Sections : 9.1-9.7	10 hours
Text Book	Balagurusamy, E. (2009) *Object Oriented Programming with C++*, Tata Mc Graw Hill Publishing Company, New Delhi	
Reference Books	1. Robert Lafore. (1992), *Object Oriented Programming in turbo C++*, Waite group. 2. Bjarne Stroustroup, *(1991), The C++ Programming language,* Addison – Wesley. 3. Herbert Schildt Osborne. *(1994), Teach Yourself C++*, Mc Graw Hill.	

Department	Mathematics	
Course : B.Sc.		Effective From the Year : 2017
Subject code : 17UMS620 Title : PROGRAMMING LAB IN OOP WITH C++		
Hrs/ Week	2	Credits : 2

List of programs:

1. Program to find the Mean and variance
2. Program to find the largest of two numbers using nesting of member functions
3. Program to illustrate the use of array of objects
4. Program to illustrate the use of objects as arguments
5. Program to swap private data of classes using friend function
6. Program to illustrate overloaded constructors
7. Program to illustrate matrix multiplication
8. Program to illustrate the use of 'new' in constructors
9. Program to illustrate overloading + operators
10. Program to explain single inheritance
11. Program to illustrate multilevel inheritance
12. Program to explain hybrid inheritance
13. Program to illustrate the use of initialization lists in the base and derived constructors
14. Program to illustrate the use of pointers to objects
15. Program to illustrate runtime polymorphism

Department	Mathematics	
Course : B.Sc.		Effective From the Year :2017
Subject code : 17UMS6S2 Title : MATHEMATICS IN FINANCE-II		
Hrs/ Week	1	Credits : 2
Units	Contents	Hrs

Unit I	Capital budgeting principle and techniques: Nature of capital budgeting-Importance-Difficulties-Rationale-Kinds.	3 hours
Unit II	Data requirement: Identifying relevant cash flows: Accounting profit and cash flows-Incremental cash flow- Effect of taxes-Conventional & non-conventional cash flows	3 hours
Unit III	Cash flow estimates-Determination of relevant cash flows-Single proposal-Replacement situations-Mutually exclusive situations	3 hours
Unit IV	Evaluations techniques: Unsophisticated or traditional-Average rate of return method-Payback method	2 hours
Unit V	Sophisticated or time –adjusted- net present value method-internal rate of return method.	2 hours
Text Book	Khan M.Y and Jain P.K (1990), *Financial Management* Tata McGraw- Hill Publishing Company Ltd, New Delhi.	
Reference Books	1. Aswath Damodaran (2007), *Corporate Finance*, Theory and Practice, John Wiley and Sons, Inc. 2. Prasanna Chandra (1998), *Managing Investment*,Tata McGraw- Hill Publishing Company Ltd, New Delhi.	

Department	Mathematics	
Course :	B.Sc.	Effective From the Year :2017
Subject code :	17UMS6C2	
Title :	ACTUARIAL MATHEMATICS -II	
Hrs/ Week	1	Credits : 2
Unit	Contents	Hrs
Unit I	Probability and Life tables: Interpreting Force of Mortality, Interpolation Between Integer Ages. Sections- 3.1, 3.2	3 hours
Unit II	Binomial variables and Law of Large Numbers, Exact Probabilities, Bounds and Approximations. Sections- 3.3, 3.3.1	3 hours

Unit III Unit IV Unit V	Simulation of Life Table Data, Expectation for Discrete Random Variables. Section- 3.4, 3.4.1 Rules for Manipulating Expectations. Section- 3.4.2 Some Special Integrals. Section- 3.5	3 hours 2 hours 2 hours
Text Book	Actuarial Mathematics and Life-Table Statistics- Eric V. Slud, Department of Mathematics, University of Maryland, College Park, 2001.	
Reference Books	1. Fundamental Concepts of Actuarial Mathematical Science, Charles L.Trowbridge, Actuarial Education and Research Fund, Revised Edition, 1989. 2. Lecture Notes on Actuarial Mathematics, Jerry Alan Veeh, (E-notes), 2006.	