B.Sc. Mathematics Programme Scheme
For candidates admitted from 2012-13 onwards

Semester	Course Code	Course Title	L + T/ P Hours per week	Duration of Exam Hrs ESE	Max. Marks CA	ESE	Total	Credit Points
I	10UTL01	Part I - Tamil Paper - I	6	3	25	75	100	3
	09UEN01	Part II - English for Enrichment - I	5	3	25	75	100	3
	10UMSC01	Part III -Classical Algebra	5	3	25	75	100	4
	10UMSC02	Calculus	6	3	25	75	100	5
	10UMSA01	Mathematical Statistics I	6	3	25	75	100	5
	09HEC01	Part IV - Human Excellence	1	3	-	50	-	-
	08EVS01	Environmental Studies	1	-	-	-	-	-
II	10UTL02	Part I - Tamil Paper - II	6	3	25	75	100	3
	09UEN02	Part II - English for Enrichment - II	5	3	25	75	100	3
	10UMSC03	Part III - Analytical Geometry and Vector Calculus	5	3	25	75	100	4
	10UMSC04	Numerical Methods	5	3	25	75	100	4
	10UMSA02	Mathematical Statistics II	6	3	25	75	100	5
	09HEC02	Part IV - Human Excellence	1	3	-	50	100	1
	09HECP01	Human Excellence Practical - I						1
	08EVS01	Environmental Studies	1	3	-	50	50	2
	08SBP01	SB – Human Rights	1	3	-	50	50	2
III	10UTL03	Part I - Tamil Paper – III	5	3	25	75	100	3
	08UEN03	Part II - English for Excellence - I	6	3	25	75	100	3
	10UMSC05	Part III - Statics	4	3	25	75	100	4
	10UMSC06	Modern Algebra I	3	3	25	75	100	4
	10UMSA03	Physics for Mathematics and Chemistry - I	8	3	25	75	100	4
	09HEC03	Part IV – Human Excellence (NME)	1	-	-	50	-	-
	10UMSS01	SB- Operations Research -I	3	3	-	50	50	2
IV	10UTL04	Part I - Tamil Paper - IV	5	3	25	75	100	3
	08UEN04	Part II - English for Excellence - II	6	3	25	75	100	3
	10UMSC07	Part III - Dynamics	4	3	25	75	100	4
	10UMSC08	Modern Algebra II	3	3	25	75	100	4
	10UMSA04	Physics for Mathematics and Chemistry - II	8	3	25	75	100	4
	10UMSA05	Physics lab for Mathematics and Chemistry	-	3	40	60	100	2
	09HEC04	Part IV - Human Excellence (NME)	1	3	-	50	100	1
	09HECP02	Human Excellence Practical - II						1
	10UMSS02	SB- Operations Research -II	3	3	-	50	50	2
		Part V - Extension Activities	-	-	-	-	50	1
V	10UMSC09	Part III – Linear Algebra	6	3	25	75	100	4
	10UMSC10	Part III - Real Analysis – I	6	3	25	75	100	4
	10UMSC11	Part III - Complex Analysis - I	5	3	25	75	100	4
	10UMSC12	Part III - Discrete Mathematics / Elective	3	3	25	75	100	3
	10UMSC13	Part III - Programming in C / Elective	4	3	25	75	100/2=50	3
	10UMSC14	Part III - Programming Lab in C	2	3	40	60	100/2=50	3
	09HEC05	Part IV - Human Excellence (NME)	1	-	-	50	-	-
	08GKL01	SB - General Awareness (SS)	-	3	-	50	50	2
	10UMSS03	SB - Operations Research - III	3	3	-	50	50	2
VI	10UMSC15	Part III - Real Analysis - II	6	3	25	75	100	4
	10UMSC16	Part III - Complex Analysis - II	6	3	25	75	100	4
	10UMSC17	Part III - Theory of Numbers / Elective	5	3	25	75	100	4
	10UMSC18	Part III - Graph Theory / Elective	3	3	25	75	100	3
	10UMSC19	Part III - OOP With C++/ Elective	4	3	25	75	100/2=50	3
	10UMSC20	Part III - Programming Lab in OOP With C++	2	3	40	60	100/2=50	3
	09HEC06	Part IV - Human Excellence (NME)	1	3	-	50	100	2
	10UMSS04	SB - Operations Research - IV	3	3	-	50	50	2

Total: 3800 140

SB- Skill Based, SS - Self Study, L-Lecture, T-Tutorial and P-Practical. NME – Non Major Elective

General Question Pattern

Papers

Max Marks: 100	Internal : 25	External 75	
Section	Pattern	Mark	Total
Part A	Multiple choice (10 Questions)	$10 * 1$	10
Part B	Either (or) choice (5 Questions)	$5 * 5$	25
Part C	Either (or) choice (5 Questions)	$5* 8$	40
		Total :	75

Question Pattern for EVS & Skill Based (Elective)

Max Marks: 100		External : 50	
Section	Pattern	Mark	Total
Part A	Short answer/multiple choice (10 Questions)	$10 * 1$	10
Part B	Open choice (5 out of 8 Questions)	$5 * 8$	40
		Total :	50

List of Electives

1. Astronomy
2. Special Functions
3. Mathematical Modeling
4. Programming in C
5. Fuzzy Set Theory
6. Graph Theory
7. Mathematics in Finance
8. OOP with C++

FIRST SEMESTER

10UMSC01 CLASSICAL ALGEBRA 4 Credits

Contact hours per week: 5 Total hours : 75

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.

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. (13-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. (13-hours)

UNIT – III Newton's theorem on sum of the powers of the roots (Statements and problems only) – Transformation of equations – Reciprocal equations. (12-hours)

UNIT – IV To increase or decrease the roots of a given equation by a given quantity – Removal of terms – Descartes rule of signs. (12-hours)

UNIT – V Matrices – Special types of Matrices- Characteristic roots, Characteristic vectors- Diagonalization of a matrix. (12-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: 1. Algebra Volume I by T. K. Manicavachagam pillay, T. Natarajan and K. S. Ganapathy, S. Viswanathan Pvt. Ltd. First edition 1956, Reprint 1999.
2. Mathematics for B. Sc. Branch – I, Volume II by P. Kandasamy and K. Thilagavathi, First Edition 2004 for Unit V.

CONTENTS:

For Unit – I Chapter 3: Sections 5 and 10
Chapter 4: Sections 2, 3, 5 and 8.
For Unit – II Chapter 6: Sections 10, 11 and 12
For Unit – III Chapter 6: Sections 14, 15 and 16
For Unit – IV Chapter 6: Sections 17, 18, 19 and 24
For Unit – V Chapter 1: Sections 1 and 4.

REFERENCE BOOKS:

1. A text book of Algebra, B.R. Thakur, H.C. Sinha, B.L. Agarwal, V. B. Johri, Ram Prasad & sons, 1970.
2. A text book of Higher Algebra, M. Ray, H. S. Sharma, S. Chand & Company, 1988.

FIRST SEMESTER

10UMSC02 **CALCULUS** **4 Credits**

Contact hours per week: 6 **Total Hours:90**

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.

UNIT – I Linear differential equations with constant coefficients – Special methods of finding particular integral – Linear equations with variable coefficients. (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 – Lagrange's equation. (15-hours)

UNIT – III Multiple integrals–Definition of double integral – Evaluation of double integral – Double integral in polar co-ordinates – Triple integrals. (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.. (15-hours)

UNIT – V Laplace Transforms - Definition – Transform of f(t), e^{at}, cosat, sinat and t^n when n is an integer – Laplace transforms to solve ordinary differential equation with constant coefficients – Inverse Laplace transforms. (15-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOKS : 1. Calculus Volume – II by S. Narayanan and T. K. Manicavachagom Pillay, S. Viswanathan Pvt. Ltd. 2007 [For Units III & IV]

2. Unit V, Calculus Volume – III by S. Narayanan and T. K. Manicavachagom Pillay, S. Viswanathan Pvt. Ltd. 2007. [For Units I, II & V]

CONTENTS:

For Unit – I Chapter 2, Sections: 1 to 4 and 8

For Unit – II Chapter 4, Sections: 1, 2, 3, 5 and 6

For Unit – III Chapter 5, Sections: 2.1, 2.2, 3.1 and 4

For Unit – IV Chapter 6, Sections: 1.1, 2.1, 2.2, 2.3 and 2.4
Chapter 7, Sections: 2.1, 2.2, 2.3 and 2.6

For Unit – V Chapter 5, Sections 1 to 8.

FIRST SEMESTER

10UMSA01 MATHEMATICAL STATISTICS – I 5 Credits

Contact hours per week: 6 Total hours : 90

Objective: 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.

UNIT – I [Review of Discrete and Continuous Random Variable, Probability mass and density function (No questions in this portion)] Mathematical Expectation - Properties - Addition and Multiplication Theorem-Simple problems. Definition of Covariance-Chebychev's inequality-Statement with Proof Simple problems. (15-hours)

UNIT – II Moment Generating Function (MGF)- Definition- Properties (with proof) Cumulants - relation between Cumulant and central moment. Characteristic Function definition - properties with proof. (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. (15-hours)

UNIT - IV Normal distribution: Properties - uses -MGF of Normal distribution about its origin and about arithmetic mean - recurrence relation - additive property. Rectangular distribution- Definition - MGF - finding mean and variance - Simple problems. (15-hours)

UNIT – V Gamma Distribution: MGF of Gamma distribution and finding the central moments - Additive property of Gamma variates. Beta distributions of first and second kind: definition - finding mean and variance Exponential distribution: -definition -MGF-finding mean and variance (15-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Fundamentals of Mathematical Statistics, by S.C.Gupta and V.K. Kapoor, S. Chand & Sons (2006).

REFERENCE BOOKS: 1. Mathematical Statistics, by P.R. Vital, Margham publications (2004).

3. Introduction to Mathematical Statistics, R.V. Hogg and A.G. Craigh, Pearson Education publications (2004).

ANCILLARY MATHEMATICS FOR PHYSICS AND CHEMISTRY-I

11UPS 02/ 11 UCY 02 **5 Credits**
Contact hours per week: 8 **Total hours: 90**

Objective: One aim of this paper is to train the students and to import basic knowledge of mathematics relevant to their major subjects. This syllabus enables students to

(i) Explore matrix theory
(ii) Expand their in solving Algebric equations and learn
(iii) Develop their knowledge in Fourier series, Beta and Gamma functions.

UNIT – I: Symmetric and Skew-Symmetric matrices- Hermitian and Skew - Hermitian matrices-Orthogonal and unitary matrices- Characteristic Equation of a matrix- The Characteristic vectors of a matrix- Cayley- Hamilton's theorem(without proof)-Simple Problems.

UNIT – II: Fundamental theorem in the theory of Equations – Relation between the roots and co-efficients of an Equation - Imaginary and Irrational roots – Reciprocal Equation – Diminishing the roots of an Equation – Removal of term – Simple Problems.

UNIT – III: Exponential Series – Logarithmic Series – Binomial Series – Simple Problems.

UNIT – IV: Fourier Series – Simple Problems.

UNIT – V: Beta, Gamma Functions – Simple Problems.
(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Allied Mathematics by Dr. P. R . Vittal, Margham Publications, Chennai – 17, 4 th ed, Reprint 2010.

CONTENTS:

For UNIT – I: Chapter: 5
For UNIT – II: Chapter: 6
For UNIT – III: Chapter: 2, 3, 4
For UNIT – IV: Chapter: 21
For UNIT – V: Chapter: 30.

SECOND SEMESTER

10UMSC03 ANALYTICAL GEOMETRY AND VECTOR CALCULUS 4 Credits

Contact hours per week: 6 **Total hours: 90**

Objectives: This paper enables the students to

(i) learn about the properties of circle, sphere and cone
(ii) provide basic knowledge of vector calculus
(iii) learn about applications of integration.

UNIT – I Polar co-ordinates – Relations between Polar and rectangular cartesian co-ordinates – Polar equations of Straight line, Circle, Chord of a circle, Conic and Chord of a Conic – Simple problems. (15-hours)

UNIT – II Equation of a sphere – Standard equation of a sphere - Results based on properties of a sphere – Tangent Plane to Sphere – Equations of a Circle – Equation of a Cone – Cone with vertex is at the origin. (15-hours)

UNIT – III Differentiation of vectors and Scalar point functions (Results only) – Gradient – Divergence and Curl – Formulae involving operator ∇ - operators involving ∇ twice - Simple problems. (15-hours)

UNIT – IV Line integrals – Surface integrals – Volume integrals – Simple problems. (15-hours)

UNIT – V Gauss divergence theorem – Green's theorem (In space)– Stokes theorem – Green's theorem (In plane)– Applications. (15-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOKS : 1. Analytical geometry – 2 dimensional by P. Duraipandian, Laxmi Duraipandian and D. Muhilan, First Edition 1968, Reprint 1997. (for Unit I)

2. Analytical geometry – 3 dimensional by P. Duraipandian, Laxmi Duraipandian and D. Muhilan, First Edition 1975, Reprint 2000. (for Unit II)

3. Vector Calculus by S. Narayanan and T. K. Manichavachagam Pillay, S. Viswanathan Pvt. Ltd. 1997.(for Unit III to Unit V)

CONTENTS :

For Unit – I Chapter 9, Sections : 9.1 to 9.7.
For Unit – II Chapter 5, Sections : 5.1 to 5.4
Chapter 6, Sections : 6.1 to 6.3
For Unit – III Chapter 1
For Unit – IV Chapter 3, Sections : 2 to 5
For Unit – V Chapter 3, Sections : 6 to 10.

SECOND SEMESTER

10UMSC04 NUMERICAL METHODS 4 Credits

Contact hours per week: 5 Total hours: 75

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.

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. (13-hours)

UNIT - II: Interpolation: Introduction - Linear interpolation - Gregory Newton Forward and Backward interpolation Formula - Equidistant terms with one or more missing values. (13-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 – maxima and minima of a tabulated function. (12-hours)

UNIT - IV: Numerical Integration : The Trapezoidal rule – Romberg's method - Simpson's one third - Practical applications of Simpson's rule. (12-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. (12-hours).

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Numerical Methods in Science and Engineering by M.K. Venkataraman, The National Publishing Company, Madras (2006).

CONTENTS:

Unit – I - Chapter 3, sections 1 to 5.
Unit – II - Chapter 6, sections 1 to 5.
Unit – III - Chapter 9, sections 1 to 6.
Unit – IV - Chapter 9, sections 7, 8, 9, 10 and 12.
Unit – V - Chapter 11, sections 10 to 16.
(Only problems)

SECOND SEMESTER

10UMSA02 MATHEMATICAL STATISTICS – II 5 Credits

Contact hours per week: 6 Total hours:90

Objective: On successful completion of the course the students should have understood the concepts of Two Dimensional Random Variable, Moments of Bivariate Probability Distributions, Linear Regressions and developed skills to apply Sampling procedures to different situations.

UNIT-I Two-Dimensional Random Variables: Two-Dimensional or 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. (15-hours)

UNIT-II Karl Pearson's coefficient 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 - Simple Problems. (20-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 (Simple Problems)

1. Single Proportion
2. Difference of Proportions

Sampling of Variables: Test of significance for (Simple Problems)

1. Single Mean
2. Difference of Means (20-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. (10-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. (10-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Fundamentals of Mathematical Statistics, by S.C. Gupta and V.K. Kapoor, S. Chand & Sons, 2009.

Unit I - Chapter V : Sections 5.5, 5.5.1, 5.5.2, 5.5.3, 5.5.4, 5.5.5
Chapter VI: Sections 6.8, 6.9

Unit II - Chapter X : Sections 10.4, 10.4.1, 10.5, 10.7, 10.7.1
Chapter XI : Sections 11.2, 11.2.1, 11.2.2, 11.2.3

Unit III - Chapter XIV : 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.
Unit IV - Chapter XV : Sections 15.6, 15.6.2, 15.6.3
Unit V - Chapter XVI : Sections 16.3, 16.3.1, 16.3.2, 16.3.4, 16.6, 16.6.1.

REFERENCE BOOKS:

1. Mathematical Statistics, by P.R. Vital, Margham publications (2004).
2. Introduction to Mathematical Statistics, R.V. Hogg and A.G.Craigh, Pearson Education publications (2004).

ANCILLARY MATHEMATICS FOR PHYSICS AND CHEMISTRY-II

11UPS07 / 11 UCY05 **5 Credits**
Contact hours per week: 8 **Total hours: 90**

Objective: On completion of the course the learness are expected to

(i) have a good understanding, application ability of Hyperbolic functions and Laplace functions

(ii) have a very good understanding of vector calculas

UNIT – I: Hyperbolic functions – Inverse Hyperbolic functions – Problems.

UNIT – II: Laplace Transforms – Inverse Laplace Transforms – Problems.

UNIT – III: Vector Differentiation: Gradient, Curl and Divergence – Problems.

UNIT – IV: Line Integral – Surface Integral – Volume Integral – Problems.

UNIT – V: Green's theorem (without proof) – Stoke's theorem (without proof) – Gauss's divergence theorem (without proof) – Problems.

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Allied Mathematics by Dr. P. R . Vittal, Margham Publications, Chennai – 17, 4 th ed, Reprint 2010.

CONTENTS:

For UNIT – I: Chapter:14
For UNIT – II: Chapter:27
For UNIT – III: Chapter:28
For UNIT – IV: Chapter:29
For UNIT – V: Chapter:29.

THIRD SEMESTER

10UMSC05 **STATICS** **4 Credits**

Contact hours per week: 4 **Total hours: 60**

Objective: 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.

UNIT I **:** Forces acting at a point – Simple problems. (12- hours)

UNIT II **:** Parallel forces and Moments – Simple problems. (10-hours)

Unit III **:** Couples - Simple problems. (12-hours)

UNIT IV **:** Equilibrium of three forces acting on a rigid body, coplanar forces– Simple Problems. (6-hours)

UNIT V **:** Friction and Centre of gravity – Simple problems. (10-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Statics, M. K. Venkatraman, Agasthiar publications, 6th Edition, 1990.

CONTENTS:

UNIT I - Chapter II: Sections 1 to 13
UNIT II - Chapter III: Sections 1 to 13
UNIT III - Chapter IV: Sections 1 to 10
UNIT IV - Chapter V: Sections 1 to 6 and
Chapter VI: Sections 1 to 9
UNIT V - Chapter VII: Sections 1 to 8 and Sections 10 and 11 and
Chapter VIII: Sections 1 to 6 and 18

REFERENCE BOOKS: 1. Statics, A. V. Dharmapadam, S. Viswanathan printers and publishers Pvt. Ltd., Chennai, 1993.
2. Mechanics, P. Duraipandian & Laxmi Duraipandian, S. Chand & Co. Pvt. Ltd, Ram Nagar, New Delhi, 1985.

THIRD SEMESTER

10UMSC06 MODERN ALGEBRA – I 4 Credits

Contact hours per week: 3 Total hours: 45

Objective: The major objective of this course is to provide the students an introduction to set theory, integers, relations, functions and algebraic structure like Groups. The course provides an adequate foundation for further study abstract algebra and its applications in various branch of mathematics.

UNIT: I Set theory: Relations and binary relations; Equivalence class. (7-hours)

UNIT: II Mappings – The integers. (7-hours)

UNIT: III Definition of a Group – Some Examples of Groups – Some Preliminary Lemmas. (7-hours)

UNIT: IV Subgroups: Right coset; Lagrange theorem. (7-hours)

UNIT: V A Counting Principle, Normal Subgroups and Quotient groups. (7-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Topics in Algebra, I.N.Herstein, John Wiley & Sons, 2nd edition.

CONTENTS:

For unit I: Section 1.1
For unit II: Sections 1.2 and 1.3
For unit III: Sections 2.1, 2.2 and 2.3
For unit IV: Section 2.4
For unit V: Sections 2.5 and 2.6

REFERENCE BOOKS:

1. Algebra, Thomas W.Hungerford, Springer international Edition, Reprint 2005.
2. A Text Book of Modern Algebra, R.Balakrishnan, N.Ramabhadran, Vikas Publishing House Pvt Ltd, 1985 Edition.

THIRD SEMESTER

10UMSS01 OPERATIONS RESEARCH -I 2 Credits

Contact hours per week: 3 Total hours:45

Objective: The objective of this paper is to introduce the Linear Programming techniques which will help the students to develop logical reasoning for applying mathematical tools and managerial skills to life oriented problems.

UNIT I: Linear Programming Problem: Introduction, Mathematical Formulation of The roblem, Illustrations on Mathematical formulation of LPPs, Graphical Solution Method. – Simple problems. (7-hours)

UNIT II: Linear Programming Problem: General Linear Programming Problem, Canonical and Standard Forms of L.P.P. – Simple problems. Linear Programming Problem -Simplex Method: The Computational Procedure. - Simple problems. (7-hours)

UNIT III: Linear Programming Problem -Simplex Method: Use of Artificial variables- Big-M method, Degeneracy in Linear Programming, Applications of Simplex method. – Simple problems. (7-hours)

UNIT IV: Duality in Linear Programming: Introduction, General Primal-Dual pair, formulating a dual problem, Primal-Dual pair in Matrix form. – Simple problems. (7-hours)

UNIT V: **Duality in Linear Programming:** Duality and Simplex method, Dual simplex method – Simple problems. (7-hours)

(Mathematical Derivations in ALL Units may be omitted)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Operations Research (13th Edition), Kantiswarup, P.K. Gupta & Man Mohan, Sultan Chand & Sons, New Delhi, 2007.

CONTENTS:

For Unit I: Chapter 2: Sections 2.1 - 2.4 and Chapter 3: Section 3.2.
For Unit II: Chapter 3: Sections 3.4 -3.5 and Chapter 4: Section 4.3.
For Unit III: Chapter 4: Sections 4.4, 4.5 and 4.8
For Unit IV: Chapter 5: Sections 5.1 - 5.4.
For Unit V: Chapter 5: Sections 5.7 and 5.9.

REFERENCE BOOKS:

1. Operations Research-An introduction – H.A.Taha, Prentice Hall of India (P) Limited, New Delhi, 2006.
2. D.Philips, A.Ravindran Solberg, Operations Research: Principles and Practice, JOHN WILEY & SONS, 1976.

FOURTH SEMESTER

10UMSC 07 **DYNAMICS** **4 Credits**

Contact hours per week: 4 **Total Hours : 60**

Objectives: To enable the students to apply laws, principles and postulates governing the dynamics in physical reality. At the end of this course, the student 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.

UNIT I : Projectiles – Simple problems. (12-hours)

UNIT II : Simple Harmonic Motion – Simple problems. (10-hours)

UNIT III: Motion under the action of central forces – Simple problems. (12-hours)

UNIT IV : Impulsive forces - Simple problems. (6-hours)

UNIT V : Collision of elastic bodies – Simple problems. (10-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

Text Book: Dynamics, M. K. Venkataraman, Agasthiar publications, 12th Edition, 2006.

Unit I - Chapter VI : Sections 6.1 to 6.15
Unit II - Chapter X : Sections 10.1 to 10.7
Unit III - Chapter XI : Sections 11.1 to 11.14
Unit IV - Chapter VII: Sections 7.1 to 7.6
Unit V - Chapter VIII: Sections 8.1 to 8.8

Reference Books :

1. Dynamics, A. V. Dharmapadam, S. Viswanathan Printers and Publishers Pvt. Ltd., Chennai, 1998.
2. Dynamics, K. Viswanath Naik and M. S. Kasi, Emerald publishers, 1992.

FOURTH SEMESTER

10UMSC08 MODERN ALGEBRA - II 4 Credits

Contact hours per week: 6 Total Hours: 90

Objective: The major objective of this course is to study Homomorphisms, Automorphisms, Permutation groups and rings . The course gives a better understanding of algebra and provides an adequate foundation for futher study in linear algebra.

UNIT: I Homomorphisms – Cauchy's Theorem for Abelian groups – Sylow's theorem for Abelian groups. (7-hours)

UNIT: II Automorphisms – Inner automorphisms – Cayley's theorem. (7-hours)

UNIT: III Permutation Groups – Transpositions – cycles. (7-hours)

UNIT: IV Definition and Examples of Rings – Some Special classes of Rings – Commutative ring – Field – Integral Domain – Homomorphisms of Ring. (7-hours)

UNIT: V Ideals and Quotient Rings – More Ideals and Quotient Rings – Maximal Ideal. (7-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Topics in Algebra, I.N.Herstein, John Wiley & Sons, 2nd edition, Reprint 2007.

CONTENTS:

For unit I: Section 2.7
For unit II: Sections 2.8 and 2.9
For unit III: Section 2.10
For unit IV: Sections 3.1, 3.2 and 3.3
For unit V: Sections 3.4 and 3.5

REFERENCE BOOKS:

1. Algebra, Thomas W.Hungerford, Springer international Edition, Reprint 2005.
2. A Text Book of Modern Algebra, R.Balakrishnan, N.Ramabhadran, Vikas Publishing House Pvt Ltd, 1985 Edition.
3. Surjeet Singh, Qazi Zameeruddin: modern Algebra – Vikas Publishing House Pvt. Ltd., Delhi.

FOURTH SEMESTER

10UMSS02 **OPERATIONS RESEARCH -** II **2 Credits**

Contact hours per week: 3 **Total Hours:45**

Objective: The objective of this paper is to introduce the special form of Linear Programming problems such as Transportation and Assignment problems; and sequencing techniques which will help the students to develop logical reasoning for applying mathematical tools and managerial skills to life oriented problems.

UNIT – I: Transportation Problem : LP formulation of the Transportation Problem, Existence of Solution in Transportation Problem, The Transportation table, Loops in Transportation tables, Finding an initial basic feasible solution: (i)North West corner rule . (ii) Vogel's approximation method. – Simple problems. (7-hours)

UNIT –II: Transportation Problem : Test for optimality, Degeneracy in Transportation Problem, Transportation Algorithm (MODI method), Some exceptional cases – Unbalanced Transportation problem. – Simple problems. (7-hours)

UNIT -III: Assignment Problem: Introduction, Mathematical formulation of the Assignment problem, Solution of Assignment Problem – Hungarian Assignment Method. – Simple problems. (7-hours)

UNIT -IV: Sequencing problems: Introduction, Problem of Sequencing, Basic terms used in sequencing, Processing n jobs through two machines. –Simple problems. (7-hours)

UNIT -V: Sequencing problems: Processing n jobs through k machines, Processing 2 jobs through k machines –Simple problems. (7-hours)

(Mathematical Derivations in ALL Units may be omitted)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Operations Research (13th Edition), Kantiswarup, P.K. Gupta & Man Mohan, Sultan Chand & Sons, New Delhi, 2007.

CONTENTS:

For Unit I: Chapter 10: Sections 10.2, 10.3, 10.5, 10.6 and 10.9
For Unit II: Chapter 10: Sections 10.10, 10.12, 10.13 and 10.15.
For Unit III: Chapter 11: Sections 11.1-11.3.
For Unit IV: Chapter 12: Sections 12.1-12.4.
For Unit V: Chapter 12: Sections 12.5 and 12.6.

REFERENCE BOOKS:

1. Operations Research-An introduction – H.A.Taha, Prentice Hall of India (P) Limited, New Delhi, 2006.
2. D.Philips, A.Ravindran Solberg, Operations Research: Principles and Practice, JOHN WILEY & SONS, 1976.

FIFTH SEMESTER

10UMSC09 REAL ANALYSIS – I 5 Credits

Contact hours per week: 6 Total hours: 90

Objective: 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.

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*. (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. (15-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 . (15-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. (15-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. (15-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Mathematical Analysis by Tom. M. Apostal, Addison Wesley, Second Edition 1974.

CONTENTS:

For Unit I: Chapter 1: Sections 1.1 - 1.20 (Except 1.15 - 1.17)

For Unit II: Chapter 2: Sections 2.1 - 2.15.

For Unit III: Chapter 3: Sections 3.1 - 3.12 (In 3.12, Definition, concepts & statement only)

For Unit IV: Chapter 3: Sections 3.13 - 3.16 and Chapter 4: Sections 4.1 - 4.5 & 4.7.

For Unit V: Chapter 4: Sections 4.8, 4.9, 4.12, 4.16, 4.19, 4.20, 4.22, 4.23.

REFERENCE BOOKS*:*

1. Principles of Mathematical Analysis, Water Rudian, McGraw- Hill. Inc, Third Edition, 1976.

2. A primer of Real function by Ralp. P. Boas, The mathematical Association of America, 1960

FIFTH SEMESTER

10UMSC10 COMPLEX ANALYSIS – I 5Credits

Contact hours per week: 5 **Total hours: 75**

Objective: To enable the learners

(i) To understand in depth the algebraic and geometric nature of complex numbers.

(ii) To get a chance to explore the concept of analytic functions, the theory of Power Series, Exponential functions and Trigonometric functions.

UNIT I: The Algebra of Complex Numbers: Arithmetic operations - Square Roots – Justification - Conjugation, Absolute Value - Inequalities. (12 hours**)**

UNIT II: The Geometric Representation of Complex Numbers: Geometric Addition and Multiplication - The Binomial Equation - Analytic Geometry - The Spherical Representation. (12 hours**)**

UNIT III: Introduction to the Concept of Analytic Function: Limits and Continuity - Analytic functions - Polynomials - Rational Functions. (12 hours)

UNIT IV: Elementary Theory of Power Series: Sequences - Series - Uniform Convergence – Power Series - Abel's Limit Theorem. (13-hours**)**

UNIT V: The Exponential and Trigonometric functions: The Exponential - The Trigonometric functions - The Periodicity - The Logarithm. (13-hours)

(Pre Model Test - 3 hours,Model Test - 3 hours,Seminar/ Library – 7 hours)

TEXT BOOK: Complex Analysis, by Lars V.Ahlfors , McGRAW HILL International Editions 3rd Edition, 1979

CONTENTS:

For Unit I, Chapter 1: Sections 1.1 - 1.5.
For Unit II, Chapter 1: Sections 2.1 - 2.4.
For Unit III, Chapter 2: Sections 1.1 - 1.4.
For Unit IV, Chapter 2: Sections 2.1 - 2.5.
For Unit V, Chapter 2: Sections 3.1 - 3.4.

REFERENCE BOOKS:

1. Complex Variables and Applications by Ruel V. Churchill and others, Mc Graw Hill 3rd edition, 1974.
2. Functions of a Complex Variable, E.G. Philips, Longman Group Limited, 1957.
3. Invitation to Complex Analysis, R.P. Boas, Random house, Newyork, 1987.

FIFTH SEMESTER

10UMSC11 LINEAR ALGEBRA 5 Credits

Contact hours per week: 6 Total hours: 90

Objective: To enable the students to study how to solve system of linear algebraic equations, a new algebraic structure vector space and its properties, linear transformations on vector spaces and their relation between matrices.

UNIT I: Linear equations: Fields - Systems of linear equations - Matrices and elementary row operations - Row reduced echlon matrices - Matrix multiplication - Invertible matrices. (15-hours)

UNIT II: Vector Spaces: Vector spaces – Subspaces - Bases and dimension - coordinates - Summary of row equivalence. (15-hours)

UNIT III: Linear transformation: Linear transformations - The algebra of linear transformations - Isomorphism. (15-hours)

UNIT IV: Representation of transformations by matrices - Linear functionals. (15-hours)

UNIT V: The double dual - The transpose of a linear transformation. (15-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK : Linear Algebra, Kenneth Hoffman & Ray Kunze, Second edition, Prentice Hall of India, 2010.

CONTENTS :

For Unit I: Chapter 1: Sections 1.1 - 1.6
For Unit II: Chapter 2: Sections 2.1 - 2.5
For Unit III: Chapter 3: Sections 3.1 - 3.3
For Unit IV: Chapter 3: Sections 3.4 and 3.5
For Unit V: Chapter 3: Sections 3.6 and 3.7

REFERENCE BOOKS:

1. Topics in algebra, I.N.HersteinVikas Publishing House Pvt. Ltd., 1981
2. Linear Algebra, Schaum Series, McGraw-Hill, bare company, 1988.
3. Linear Algebra , S.Kumaresan, Prentiee-Hall of India, 2001.
4. Linear Algebra, G.Hadley, Narosa, Publising House, 1988.
5. Introduction to linear Algebra , Serge Lang, Springer, 2005.

FIFTH SEMESTER

10UMSC12 DISCRETE MATHEMATICS 3Credits

Contact hours per week: 3 **Total hours: 45**

Objective: 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.

UNIT I: Recurrence Relations and Generating functions: Recurrence - an introduction; Polynomials and their Evaluations; Recurrence Relations; Solution of Finite order Homogeneous (linear) Relations. (7-hours)

UNIT II: Recurrence Relations and Generating functions: Solution of Non-homogeneous relations; Generating Functions; Some common recurrence relations; Primitive Recursive functions. (7-hours)

UNIT III: Logic: Introduction; TF-Statements; Connectives; Atomic and Compound Statements; Well Formed (statement) Formulae; The Truth table of a Formulae. (7-hours**)**

UNIT IV : Logic: Tautology; Tautological Implications and Equivalence of Formulae; Replacement Process; Functionally Complete Sets of Connectives and Duality Law; Normal Forms; Principal Normal Forms. (7-hours)

UNIT V: Lattices and Boolean algebra: Lattices; Some properties of Lattices; New lattices; Modular and distributive lattices. (7-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOKS: Discrete Mathematics, Dr. M. K. Venkataraman, Dr. N. Sridharan, N. Chandrasekaran, The National Publishing Company, 2000.

Contents:

For Unit I: Sections 4.1, 4.2, 5.1 to 5.4
For Unit II: Sections 5.5 to 5.8
For Unit III: Sections 9.1 to 9.6
For Unit IV: Sections 9.7 to 9.12
For Unit V: Sections 10.1 to 10.4

REFERENCE BOOK:

1.Discrete and Combinatorial Mathematics - An applied introduction, Ralph P. Grimaldi, Addison-wesley Publishing Company, Third Edition, 1994.
2.Discrete Mathematical Structures with Applications to Computer Science, J.P Tremblay R.Manohar, TATA Mc Graw-Hill, Edition 2001.

FIFTH SEMESTER

10UMS13 PROGRAMMING IN 'C' 3Credits

Contact hours per week: 4 **Total hours: 60**

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.

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 - Type conversions in expressions - Operator precedence - Mathematical functions - Reading a character - Writing a character - Formatted input and output. (12-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. (10-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- Simple programs. (12-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. (6-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. (10-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK : Programming in ANSI C by E. Balagurusamy, Tata McGRAW Hill Publishing Company Limited (2004), Third Edition.

CONTENTS:

For Unit I: Chapters 1 - 4
For Unit II: Chapters 5 and 6
For Unit III: Chapters 7 and 8
For Unit IV: Chapter 9
For Unit V: Chapter 11

REFERENCE BOOKS:

1. The C programming language, B.W.Kernighan and D.M.Ritchie, Prentice Hall (1997).
2. Programming in C, S.G.Kochan, Hyden (1983)
3. Programming with C, K.R.Venugopal S.R.Prasad, Tata McGRAW Hill Publishing company limited (1997)
4. Programming with C, Schaum series.

FIFTH SEMESTER

10UMS14 PROGRAMMING LAB IN 'C' 2 Credits

Contact hours per week: 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 print Pascal's triangle.
7. Program to calculate the range of values.
8. Program to evaluate the power series $e^x = 1 + x + x^2 / 2! + \ldots$.using if …else to test the accuracy.
9. Program to sort a list in ascending / descending order.
10. Program to calculate mean and standard deviation of a given series of numbers.
11. Program for finding the addition of two matrices.
12. Program for finding the multiplication of two matrices.
13. Program to find trace of a square matrix.
14. Program to find transpose of the given matrix.
15. Program to sort a list of strings in alphabetical order.
16. Program to compute nCr value.
17. Program to check whether the number is prime or not.
18. Program to check whether the year is leap year or not.
19. Program to illustrate the use of pointers in one dimensional array.
20. Program to illustrate the use of pointers in functions.

FIFTH SEMESTER

10UMSS03 OPERATIONS RESEARCH – III 2 Credits

Contact hours per week: 3 Total hours: 45

Objective: The objective of this paper is to introduce Queueing theory and Inventory controls which will help the students to develop logical reasoning for applying mathematical tools and managerial skills to real life problems.

UNIT – I: Queueing Theory: Introduction, Queueing system, Elements of a Queueing system. Operating characteristics of a queueing system, Classification of Queueing models, Poisson Queueing System: Model I: (M/M/1): (∞/FIFO). – Simple problems. (7-hours)

UNIT –II: Queueing Theory: Poisson Queueing System: Model III: (M/M/1): (N/FIFO), Model V: (M/M/C): (∞/FIFO), Model VI: (M/M/C): (N/FIFO) - Simple Problems. (7-hours)

UNIT -III: Inventory control - 1: Introduction, Types of inventories, Reasons for carrying **inventories**, The inventory decisions, objectives of scientific inventory control, Costs associated with inventories, Factors affecting inventory control, the concept of EOQ. - Simple Problems. (7-hours)

UNIT -IV: Inventory control - 1: Deterministic inventory Problems with no shortages: Case 1. The fundamental problem of EOQ. Case 2. Problem of EOQ with Several production runs of unequal length. Case 3. Problem of EOQ with finite replenishment (Production) - Simple Problems. (7-hours)

UNIT -V: Inventory control - 1: Deterministic inventory Problems with shortages: Case 1. The problem of EOQ with instantaneous production and various order cycle time Case 3. Problem of EOQ with finite replenishment (Production). Problems of EOQ with price breaks: Case 1. The Problems of EOQ with one price break. Case 2. The Problems of EOQ with more than one price break. - Simple Problems. (7-hours)

(Mathematical Derivations in ALL Units may be omitted)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Operations Research (13th Edition), Kantiswarup, P.K. Gupta & Man Mohan, Sultan Chand & Sons, New Delhi, 2007.

CONTENTS:

For Unit I: Chapter 21: Sections, 21.1-21.4, 21.7and 21.9(Model -I).
For Unit II: Chapter 21: Section 21.9(Model –III, V, VI).
For Unit III: Chapter 19: Sections 19.1-19.7 and 19.9.
For Unit IV: Chapter 19: Section 19.10
For Unit V: Chapter 19: Section 19.11 and 19.12.

REFERENCE BOOKS:

1. Operations Research-An introduction – H.A.Taha, Prentice Hall of India (P) Limited, New Delhi, 2006.
2. D.Philips, A.Ravindran Solberg, Operations Research: Principles and Practice, JOHN WILEY & SONS, 1976.

SIXTH SEMESTER

10UMSC15 REAL ANALYSIS – II 4 Credits

Contact hours per week: 6 Total hours:90

Objective: 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.

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. (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. (15-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. (15-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. (15-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. (15-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK : Mathematical Analysis by TOM. M. Apostal , Narosa Publishing House, Second Edition 1990.

CONTENTS:

For Unit I: Chapter 5: Sections 5.1 to 5.12.
For Unit II: Chapter 6: Sections 6.1 to 6.8.
For Unit III: Chapter7: Sections 7.1 to 7.10
For Unit IV: Chapter7: Sections 7.11 to 7.17
For Unit V: Chapter7: Sections 7.18 to 7.22

REFERENCE BOOKS:

1. Methods of Real Analysis , Goldberg R.R, Oxford and IBH Publishing Co., 1973.
2. A first course in Mathematical Analysis , D. Soma Sundaram, B. Choudhary, Narosa Publishing House, 1996.
3. Principles of Mathematical Analysis, Walter Rudin, McGraw – Hill.Inc., Third Edition, 1976.

SIXTH SEMESTER

10UMSC16 COMPLEX ANALYSIS – II 4 Credits

Contact hours per week: 6 Total hours:90

Objective: On completion of the course the learners are expected to

(i) have a good understanding of conformality and linear transformations

(ii) have studied fundamental theorems, Cauchy' integral formula, local properties of analytic functions and related results.

(iii) have developed a solid base for further study.

UNIT I: Conformality: Arcs and closed curves - Analytic functions in Regions – Conformal mapping - Length and area. (15-hours)

UNIT II: Linear Transformations: The Linear group - The cross ratio - Symmetry – Oriented circles - Families of circles. (15-hours)

UNIT III: Fundamental Theorems: Line Integrals - Line Integrals as Functions of Arcs – Cauchy's Theorem for a Rectangle - Cauchy's Theorem in a Disk. (15-hours)

UNIT IV: Cauchy's Integral Formula: The Index of a point with respect to a closed curve – The Integral formula - Higher Derivatives. (15-hours)

UNIT V: Local Properties of Analytic Functions: Removable singularities, Taylor's Theorem- Zeros and poles - The Local mapping - The Maximum principle. (15-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Complex Analysis, Lars V.Ahlfors ,McGRAW HILL International Editions 3rd Edition, 1979.

CONTENTS:

For Unit I: Chapter 3: Sections 2.1 - 2.4.
For Unit II: Chapter 3: Sections 3.1 - 3.5
For Unit III: Chapter 4: Sections 1.1, 1.3 - 1.5
For Unit IV: Chapter 4: 2.1- 2.3
For Unit V: Chapter 4: 3.1-3.4

REFERENCE BOOKS:

1. Complex Variables and applications, Ruel V. Churchill and others, Mc Graw Hill 3rd edition, 1974.
2. Functions of a Complex variable, E.G. Philips, Longman Group Limited, 1957.
3. Invitation to complex Analysis, R.P. Boas, Random house, Newyork, 1987.

SIXTH SEMESTER

10UMSC17 THEORY OF NUMBERS 4 Credits

Contact hours per week: 5 Total hours: 75

Objective: This course exposes the elementary basic theory of numbers and several famous theorems, function and some unsolved problems about primes to the students in order to enable them to deeper their understanding of the subject.

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. (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 - Residue systems. (12 -hours)

UNIT- III: Solving Congruences: Linear congruences - the theorems of Fermat and Wilson Revisited - The Chinese Remainder theorem - Polynomial congruences. (12 -hours)

UNIT- IV: Arithmetic Functions: Combinational study of $\Phi(n)$ - Formulae for d(n) and $\sigma(n)$ - Multiplicative arithmetic functions - The Mobius Inversion Formula. (13-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. (13 -hours)

(Pre Model Test - 3 hours,Model Test - 3 hours,Seminar/ Library – 7 hours)

TEXT BOOK: Number Theory- George E. Andrews- HPS (India) 1989.

CONTENTS:

UNIT- I: Chapters 1 and 2
UNIT- II: Chapter 3: 3.1, 3.2, 3.3.
Chapter 4: 4.1, 4.2.
UNIT-III: Chapter- 5
UNIT- IV: Chapter- 6
UNIT- V: Chapter- 7 and 8.

REFERENCE BOOKS:

1. Elementary number theory- David M. Burten, McGraw- Hill, 1997.
2. Elements of number theory- Kumaravelu et al, SKV nagercoil, 2002.
3. Basic number theory- S.B. Malik ,Vikas publishing House Pvt Ltd, 1998.
4. An Introduction to the theory of numbers- I. Niven et al., Wiley eastern Ltd, 1985.
5. Number theory- Telang, Tata McGraw- Hill publishing company Ltd, 1984.
6. An Introduction to the theory of numbers-G.H.Hardy et.al., Oxford, 1960.
7. Elementary theory of numbers- C.Y.Hsiung, Allied publishers, 1995.

SIXTH SEMESTER

10UMSC18 GRAPH THEORY 3 Credits

Contact hours per week: 3 Total hours:45

Objective: Graph theory is a major area of Combinatorics. In this Course we introduce the learners to some basic topics in graph theory.

UNIT: I Graphs: Varieties of graphs; Walks and connectedness; Degrees; Operation on Graphs; **Matrices:** The adjacency matrix; The incidence Matrix. (7-hours)

UNIT: II Blocks: Cutpoints, bridges, and blocks; Block graphs and cut point graphs **Trees:** Characterization of trees; Centers and centroids, (7-hours)

UNIT: III Connectivity: Connectivity and line-connectivity. **Traversibility:** Euelerian graphs. (7-hours)

UNIT: IV Traversibility: Hamiltonian graphs, **Factorization:** 1-factorization; 2-factorization. (7-hours)

UNIT: V Planarity: Plane and planar graphs; Outer planar graphs. (7-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Graph Theory, Frank Haray, Narosha Publishing, 2001.

CONTENTS:

For unit I: Sections 2.1 to 2.3, 2.7, 13.1 and 13.2
For unit II: Sections 3.1, 3.2, 4.1 and 4.2
For unit III: Sections 5.1 and 7.1
For unit IV: Sections 7.2, 9.1 and 9.2
For unit V: Sections 11.1 and 11.2

REFERENCE BOOKS:

1. A Text Book on Graph Theory, R. Balakrishnan and K. Ranganathan, Springer Verlog, New York, 2000.
2. Graph Theory, R.Gould, The Benjamin/ Cummings Publishing Company, Inc., California, 1988.
3. Pearls in Graph Theory, N. Hartsfield and G. Ringel, Academic Press, 1990.
4. Graph Theory with Applications, J.A. Bondy and U.S.R. Murty, Macmillan Company, 1976.

SIXTH SEMESTER

10UMSC19 OBJECT ORIENTED PROGRAMMING WITH C++ 3 Credits

Contact hours per week: 4 **Total hours:60**

Objective: 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.

UNIT I: Beginning with C++ - Tokens - Expressions and Control structures. (12-hours)

UNIT II: Functions in C++ - Constructors and Destructors. (10-hours)

UNIT III: Classes and objects (12-hours).

UNIT IV: Operator overloading and Type conversions, Pointers,Virtual Functions and Polymorphism. (6-hours)

UNIT V: Inheritance: Extending classes. (10-hours)

(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Object Oriented Programming with C++ by E. Balagurusamy, Tata Mc Graw Hill Publishing Company, New Delhi.

CONTENTS:

For Unit I: Chapters 2 and 3
For Unit II: Chapters 4 and 6
For Unit III: Chapter 5
For Unit IV: Chapters 7 and 9
For Unit V: Chapter 8

REFERENCE BOOKS:

1. Object Oriented Programming in turbo C++ by Robert lafore,Waite group, 1992.
2. The C++ Programming language by Bjarne Stroustroup, Addison - Wesley, 1991.
3. Teach Yourself C++, Herbert Schildt Osborne / Mc Graw Hill, 1994.

SIXTH SEMESTER

10UMSC020 PROGRAMMING LAB IN OOP WITH C++ 2 Credits

Contact hours per week: 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

SIXTH SEMESTER

10UMSS04 OPERATIONS RESEARCH - IV 3 Credits

Contact hours pre week:3 Total hours:45

Objective: The objective of this paper is to introduce Game theory which helps the students to solve practical problems in decision making under competitive situations. Also we introduce Network scheduling techniques which will help the students for planning and scheduling large projects in engineering fields.

UNIT – I: Game and strategies: Introduction, Two person zero sum games, Some basic terms, The Maximin - Minimax Principle.- Simple Problems (7-hours)

UNIT– I: Game and strategies: Games without Saddle points - mixed strategies, Graphical Solution of 2 × n and m × 2 games. - Simple Problems. (7-hours)

UNIT -III: Replacement Problem : Replacement of equipment / Asset that deteriorates gradually: Case (i) Value of money does not change with time . Case (ii) Value of money changes with time. Selection of the best equipment amongst two. - Simple problems. (7-hours)

UNIT -IV: Network scheduling by PERT / CPM: Introduction, Network: Basic Components, Logical sequencing, Rules of Network construction, Concurrent activities, Critical Path Analysis. - Simple problems. (7-hours)

UNIT -V: Network scheduling by PERT / CPM: Probability considerations in PERT, Distinction between PERT and CPM. - Simple Problems. (7-hours)

(Mathematical Derivations in ALL Units may be omitted)
(Premodel - 3-hours, Model- 3-hours, Seminar/ Library - 7-hours)

TEXT BOOK: Operations Research (13th Edition), Kantiswarup, P.K. Gupta & Man Mohan, Sultan Chand & Sons, New Delhi, 2007.

CONTENTS:

For Unit I: Chapter 17: Sections, 17.1-17.4.
For Unit II: Chapter 17: Sections, 17.5 and 17.6.
For Unit III: Chapter 18: Sections 18.1 and 18.2.
For Unit IV: Chapter 25: Sections 25.1 – 25.6.
For Unit V: Chapter 25: Sections 25.7 and 25.8.

REFERENCE BOOKS:

1. Operations Research-An introduction – H.A.Taha, Prentice Hall of India (P) Limited, New Delhi, 2006.
2. D.Philips, A.Ravindran Solberg, Operations Research: Principles and Practice, JOHN WILEY & SONS, 1976.