FATIMA COLLEGE (AUTONOMOUS)

Re-Accredited with "A" Grade by NAAC (3rd Cycle)
74th Rank in India Ranking 2020 (NIRF) by MHRD
Maryland, Madurai- 625 018, Tamil Nadu, India

NAME OF THE DEPARTMENT : MATHEMATICS

NAME OF THE PROGRAMME : B.SC

PROGRAMME CODE : UAMA/USMA
ACADEMIC YEAR : 2020 - 21

FATIMA COLLEGE (AUTONOMOUS), MADURAI-18

DEPARTMENT OF MATHEMATICS

MAJOR CORE – CREDITS

PROGRAMME CODE: UAMA/USMA

S. No	SEM.	COURSECODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
1.	I	19M1CC1/ 19G1CC1	Calculus	6	4	40	60	100
2.		19M2CC2/ 19G2CC2	Classical Algebra	6	4	40	60	100
3.	II	19M2CC3/ 19G2CC3	Differential Equations	6	4	40	60	100
4.		19M2CC4/ 19G2CC4	Numerical Methods	6	4	40	60	100
5.	III	19M3CC5/ 19G3CC5	Modern Algebra	6	4	40	60	100
6.		19M3CC6/ 19G3CC6	Vector Calculus and Fourier Transforms	6	4	40	60	100
7.	IV	19M4CC7/ 19G4CC7	Sequences and Series	6	4	40	60	100
8.		19M4CC8/ 19G4CC8	Linear Algebra	6	4	40	60	100
			TOTAL	**48**	**32**			

9.	**V**	M5CC9/ G5CC9	Real Analysis	6	5	25	75	100
10.		M5CC10/ G5CC10	MECHANICS	6	5	25	75	100
11.		M5CC11/ G5CC11	COMPUTER PROGRAMMING IN C	6	5	25	75	100
12.		M5ME1/ G5ME1	GRAPH THEORY	6	5	25	75	100
13.		M5ME2/ G5ME2	FUZZY MATHEMATICS	6	5	25	75	100
14.	**IV**	M6CC12/ G6CC12	COMPLEX ANALYSIS	6	5	25	75	100
15.		M6CC13/G 6CC13	NUMERICAL METHODS	6	4	25	75	100
16.		M6CC14/ G6CC14	OPERATIONS RESEARCH	6	4	25	75	100
17.		M6ME3/ G6ME3	OBJECT ORIENTED PROGRAMMING WITH C++	3	3	25	75	100
18.		M6ME4/ G6ME4	ASTRONOMY	5	3	25	75	100
19.		M6ME5/ G6ME5	LATTICES AND BOOLEAN ALGEBRA	5	5	25	75	100
20.		M6ME6/ G6ME6	AUTOMATA THEORY	5	5	25	75	100
21.		M6ME7/ G6ME7	THEORY OF NUMBERS	5	5	25	75	100

ALLIED - 20 CREDITS

S. No	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. Mks
1.	I	19M1AC1/ 19G1AC1	Statistics	5	5	40	60	100
2.	II	19M2AC2/ 19G2AC2	Advanced Statistics	5	5	40	60	100
3.	III	19M3ACP1/ 19G3ACP1	Allied Physics - I	3	3	40	60	100
4.		19M3ACP2/ 19G3ACP2	Allied Physics Practical - I	2	2	40	60	100
5.	IV	19M4ACP3/ 19G4ACP3	Allied Physics - II	3	3	40	60	100
6.		19M4ACP4/ 19G4ACP4	Allied Physics Practical-II	2	2	40	60	100
			TOTAL	**20**	**20**			

VALUE EDUCATION , ENVIRONMENTAL AWARENESS, NON MAJOR ELECTIVE, SKILL BASED COURSES - 12 CREDITS

S. No	SEM.	COURSECODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
1.	I	19M1VE/ 19G1VE	Value Education	1	1	40	60	100
2.	II	19M2VE/ 19G2VE	Value Education	1	1	40	60	100
3.	III	19M3EE/ 19G3EE	Environmental Education	1	1	40	60	100
4.	IV	19M4EE/ 19G4EE	Environmental Education	1	1	40	60	100
5.	I	19M1NME/ 19G1NME	Quantitative Aptitude	2	2	40	60	100
6.	II	19M2NME/ 19G2NME	Quantitative Aptitude	2	2	40	60	100
7.	III	19M3SB1/ 19G3SB1	Applications of Calculus & Differential Equations	2	2	40	60	100
8.	IV	19M4SB2/ 19G4SB2	Foundations of Mathematics	2	2	40	60	100

V	M5SB3/ G5SB3	FOURIER TRANSFORMS	2	2	25	75	100
	M5SB4/ G5SB4	ADVANCED LINEAR PROGRAMMING	2	2	25	75	100
VI	M6SB5 / G6SB5	MATLAB	2	2	25	75	100
	M6SB6 / G6SB6	APPLIED DYNAMICS	2	2	25	75	

I B.Sc. Mathematics

SEMESTER –I

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19M1CC1 / 19G1CC1	CALCULUS	**Lecture**	6	4

COURSE DESCRIPTION

This course provides broad view on differential and integral calculus.

COURSE OBJECTIVE/S

To enable the students learn higher derivatives, Curvature, Singular points, Envelopes, Asymptotes, Reduction formula, Multiple integrals and Fourier series in Calculus.

SYLLABUS

UNIT –I HIGHER DERIVATIVES AND CURVATURE (20 HRS.)

n^{th} Derivative of some standard functions- Leibnitz theorem- p-r equations – Curvature , centre and radius of curvature - Evolutes.

UNIT –II SINGULAR POINTS, ENVELOPES AND ASYMPTOTES (25 HRS.)

Envelopes - Multiple points – classification of double points – cusps – nodes –conjugate points- Asymptotes-Curve Tracing.

UNIT –III REDUCTION FORMULA (10 HRS.)

Reduction formula for $\sin^n x$, $\cos^n x$, $\tan^n x$, $\cot^n x$, $\mathrm{cosec}^n x$, $\sec^n x$, and $\sin^m x \cos^n x$.

UNIT –IV MULTIPLE INTEGRALS (20 HRS.)

Double and Triple integrals – Jacobian (self-study) - Change of variables in double and triple integral.

UNIT –V FOURIER SERIES (15 HRS.)

Definition – Sine Series & Cosine Series.

SELF STUDY:
UNIT IV - Jacobian

TEXT BOOKS:

1. Dr. S. Arumugam and A. ThangapandiIssac - Calculus (Differential and Integral Calculus) - New Gamma Publishing House, June 2014. Unit I: (PART I Sections – 2.12, 2.13, 3.3, 3.4, 3.5)

   Unit II: (PART I Sections – 3.6, 3.10, 3.11(excluding Asymptotes of polar curves), 3.12.

   Unit III: (PART II Section 2.8)

   Unit IV: (PARTI Section 3.9, PART II Sections 3.2, 3.3, 3.4)

   Unit V: (PART II Chapter 5)

REFERENCES:

1. Narayanan & Manickavasagam Pillai – Calculus - S.Viswanathan (Printers & Publishers) Pvt Ltd , 2008.
2. AnitM.Agarwal -Differential Calculus- MeerutArihantPrakashan -2008.
3. Shanthi Narayanan- Differential Calculus - Shyam Lal Chairtable Trust, 1994.
4. Shanthi Narayanan -Integral Calculus - S.Chand and Company Ltd, 1994.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Explain higher derivatives and apply Leibnitz theorem to find the nth derivative of functions.
CO 2	Solve problems on curvature, envelopes, asymptotes and curve tracing.
CO 3	Construct reduction formula for trigonometric functions.
CO 4	Define Jacobian, double & triple integrals and apply the knowledge of change of variables to solve the problems in double and triple integrals.
CO 5	Construct Fourier series by recalling integration.

I B.Sc. Mathematics

SEMESTER –I

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19M1CC 2 / 19G1CC2	CLASSICAL ALGEBRA	**Lecture**	6	4

COURSE DESCRIPTION

This course is designed to understand the concepts of algebra which are useful for solving various real word problems.

COURSE OBJECTIVE/S

To enable the students learn Set theory, Binomial, Exponential, Logarithmic series, Theory of equations and to apply them to solve problems.

SYLLABUS

UNIT –I THEORY OF SETS, RELATIONS AND FUNCTIONS (18 HRS.)

Set inclusion-Union f sets-Intersection of sets-difference of sets- complement of a setSymmetric difference of sets-Cartesian product of sets-Relations-Equivalence relationsPartial order-Functions

UNIT –II BINOMIAL SERIES (18 HRS.)

Summation and approximation using Binomial Series.

UNIT –III EXPONENTIAL AND LOGARITHMIC SERIES (18 HRS.)

Exponential & Logarithmic series (Proof not expected). Summation and approximation using Exponential and Logarithmic series.

UNIT –IV THEORY OF EQUATIONS (18 HRS.)

An equation of nth degree has exactly n roots, Relation between the roots and coefficients irrational roots – imaginary roots – Symmetric functions of the roots in terms of the coefficients. Sum of the powers of the roots (Newton's theorem)

UNIT –V TRANSFORMATION OF EQUATIONS (18 HRS.)

Transformation of equations –Reciprocal equations – To increase or decrease the roots of a given equation by a given quantity-Form of the quotient and remainder when a polynomial is divided by a polynomial-Removal of terms-To form an equation whose roots are any power of the roots of a given equation – Descartes Rule of signs – multiple roots – Roll's theorem and applications– Descartes Rule of signs – Newton's method and Honer's method to solve algebraic equations.

Self Study:

Unit V - Hyperbolic functions.

TEXT BOOKS:

1. Modern Algebra – Arumugam and Isaac , New Gamma Publishing House 2002. Unit I –Chapter 1(section 1.2 -1.8) & chapter 2(section 2.1-2.4)

2. S. Natarajan, T. K. Manicavachagam Pillai and K. S. Ganapathy - Algebra Vol I - S. Viswanathan (Printers and Publishers), Pvt. Ltd, 2008. Unit II - Chapter 3: Sections 10, 12& 14

Unit III - Chapter 4: Sections 1-9, 11-12

Unit IV - Chapter 6: Sections 1-14

Unit V - Chapter 6: Sections 15 - 26

REFERENCES:

1. P.R.Vittal and V.Malini - Algebra & Trigonometry, Margham Publications, 2008.

2. Sudhir K Pundirsingh- Algebra & Trigonometry, MeeratPragathi prakashan,2003.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Explain sets, relations and functions.
CO 2	Define binomial series, logarithmic and exponential series and solve problems.
CO 3	Identify Relations between the roots and coefficients of equations.
CO 4	Explain the transformations of equations.
CO 5	Recognize the important Methods in finding roots.

I B.Sc. Mathematics

SEMESTER –I

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19M1AC1 / 19G1AC1	STATISTICS	**Lecture**	5	5

COURSE DESCRIPTION

This course is designed to make the students understand the importance of statistical literacy in today's data rich world.

COURSE OBJECTIVE/S

To enable the students learn moments, correlation, regression, curve fitting, random variables, analysis of time series and index numbers which will be used in various social sciences, business management, public administration, etc.

SYLLABUS

UNIT –I MOMENTS AND CORRELATION (15 HRS.)

Moments – Measures of skewness, Kurtosis, Correlation- rank correlation and product moment correlation coefficient.

UNIT –II REGRESSION AND CURVE FITTING (15 HRS.)

Regression- Regression lines - curve fitting.

UNIT –III RANDOM VARIABLES AND DENSITY FUNCTION (15 HRS.)

Random variables- distribution functions- probability density functions – Various measure of central tendency – dispersion - skewness and kurtosis for continuous probability distribution Joint probability mass function and properties –Transformation of one dimensional and two dimensional random variables.

UNIT –IV MATHEMATICAL EXPECTATION (15 HRS.)

Mathematical expectation – Addition theorem of expectation, multiplication theorem of expectation- Expectation of a linear combination random variables – covariance- Correlation coefficient –linear combination of random variables – conditional expectation and conditional variance – Moment generating function – cumulants – Characteristic function.

UNIT –V ANALYSIS OF TIME SERIES AND INDEX NUMBERS (15 HRS.)

Components of a time series- measurements of trends. Index numbers (Self Study).

Self Study:

Unit V- Index numbers**.**

TEXT BOOKS:

1. S.C.Gupta and V.K.Kapoor ,Fundamentals of Mathematical statistics- Sultan Chand & Sons, Revised edition - June 2002 for Unit III and IV.

UNIT III: Chapter: 5- Sections: 5.1 to 5.7

UNIT IV: Chapter: 6- Sections: 6.1 to 6.6, 6.8

2. S. Arumugam and Thangapandi Isaac, Statistics–New Gamma publishing house, January 2006 for Unit I, II and V.

UNIT I: Chapter: 4- Sections: 4.0 to 4.2.

Chapter: 6- Sections: 6.0 to 6.2

UNIT II: Chapter: 6- Sections: 6.3.

Chapter: 5

UNIT V: Chapter: 9 and 10

REFERENCES:

1. Kapoor, Mathematical statistics, second edition, Delhi PusthkSadan, 1961.

2. H.C.Saxena, Elementary statistics, AbhirorPrakashan, New Delhi, 2008. .

3. S.C. Gupta and V.K Kapoor, Fundamental of Applied Statistics, third edition, Sultan Chand & Sons, New Delhi.

4. T. Veerarajan, Fundamentals of Mathematical Statistics, Yesdee Publishing Private Limited, Chennai, 2017.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Solve problems on moments, skewness, kurtosis and correlation.
CO 2	Construct regression line and curve equation.
CO 3	Explain random variables and probability density function
CO 4	Solve problems on expectation.
CO 5	Define and explain analysis of time series and index numbers

I B.Sc. Physics

SEMESTER –I

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19P1ACM1	ALLIED MATHEMATICS - I	**Lecture**	5	5

COURSE DESCRIPTION

This course provides the basic concepts in various branches of Mathematics

COURSE OBJECTIVE/S

Enable the students to develop the skills of Mathematical Reasoning and Analytical thinking in Algebra, Theory of equations, Trigonometry and Differential Calculus.

SYLLABUS

UNIT –I ALGEBRA (15 HRS.)

Exponential and Logarithmic series (Proof not expected) Summation and approximation using Binomial, Exponential and Logarithmic series.

UNIT –II THEORY OF EQUATIONS (15 HRS.)

Theory of Equation - An n^{th} Degree equation has exactly n roots – Relation between roots and coefficients.

UNIT –III ROOTS OF THE EQUATIONS (15 HRS.)

Newton's and Horner's methods of finding roots correct to two places of decimals.

UNIT –IV TRIGONOMETRY (15 HRS.)

Expansions of sin nx, cos nx, tan nx, $\sin^n x$, $\cos^n x$ - Series of sin x, cos x. Hyperbolic functions (Self Study) –Logarithms of complex numbers.

UNIT –V DIFFERENTIAL CALCULUS (15 HRS.)

Derivatives of Hyperbolic functions – Successive differentiation - Leibnitz theorem.

Self Study:

Unit IV - Hyperbolic functions.

TEXT BOOKS:

1. Arumugam and Issac - Ancillary Mathematics - New Gamma Publishing House - 2004.

REFERENCES:

1. S. Natarajan, T. K. Manicavachagam Pillai and K. S. Ganapathy - Algebra Vol I - S. Viswanathan (Printers and Publishers), Pvt. Ltd. - 2008

2. S.Narayanan and T. K. Manicavachagam Pillai - Trigonometry, S. Viswanathan (Printers and Publishers), Pvt. Ltd. - 2008.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Find summation of any series.
CO 2	Explain the concepts of theory of equations.
CO 3	Calculate roots of equations using different methods.
CO 4	Expand trigonometric functions.
CO 5	Apply the Leibnitz's theorem to find the nth derivative.

I B.A & B.Sc.

SEMESTER –I

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19M1NME/ 19M2NME/ 19G1NME/ 19G2NME	QUANTITATIVE APTITUDE	**Lecture**	2	2

COURSE DESCRIPTION

This course is designed to help the students to appear in competitive examinations.

COURSE OBJECTIVE/S

To enable the students do the problems using short cut methods on the topics – Profit & Loss, Partnership, Time & Work and Time & Distance.

SYLLABUS

UNIT –I PROBLEMS ON AGES (6 HRS.)

Problems related with ages.

UNIT –II PROFIT AND LOSS (6 HRS.)

Profit and Loss: Cost Price – Selling Price – Profit or Gain – Loss – Gain percentage - Loss percentage.

UNIT –III PARTNERSHIP (6 HRS.)

Partnership – Ratio of Division of Gains – Working and Sleeping Partners.

UNIT –IV TIME & WORK (6 HRS.)

Time and Work: Important facts and formulae on time and work -Problems.

UNIT –V TIME & DISTANCE (6 HRS.)

Time and Distance: Important facts and formulae on speed, time and distance – Problems.

TEXT BOOKS:

1. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S. Chand & Company Ltd, Revised Edition 2008.

UNIT I: Chapter 17

UNIT II: Chapter 11

UNIT III: Chapter 13

UNIT IV: Chapter 15

UNIT V: Chapter 17

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Solve problems on ages .
CO 2	Illustrate profit and loss with examples.
CO 3	Explain partnership and related problems.
CO 4	Discuss problems on time and work.
CO 5	Solve problems on time and distance.

I B.Sc. Mathematics

SEMESTER –II

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19M2CC3 / 19G2CC3	DIFFERENTIAL EQUATIONS	**Lecture**	6	4

COURSE DESCRIPTION

This course will provide the knowledge for solving ordinary and partial differential equations.

COURSE OBJECTIVE/S

To enable the students get thorough knowledge of solving Differential Equations of first order, second order, Laplace transforms Partial differential equations.

SYLLABUS

UNIT –I DIFFERENTIAL EQUATIONS OF FIRST ORDER (18 HRS.)

Homogeneous equations – Non homogeneous equations of the first degree in x and y (Self Study) – Linear equations – Bernoulli's equation – Exact differential equation – Equations solvable for p – solvable for x – solvable for y – Clairauts equation.

UNIT –II DIFFERENTIAL EQUATIONS OF SECOND ORDER (18 HRS.)

Linear equations with constant coefficients with terms of the form e^{ax} V on RHS – Linear equations with variable coefficients – Equations reducible to the linear homogeneous equations – methods of variation of parameters – Simultaneous linear differential equations.

UNIT –III LAPLACE TRANSFORMS (18 HRS.)

Laplace transforms – Laplace transforms of periodic functions – Some general theorems – The Inverse Laplace transforms – Solution of Differential equations using Laplace transforms.

UNIT –IV PARTIAL DIFFERENTIAL EQUATIONS (18 HRS.)

Formation of Partial Differential equations – First order Partial Differential Equations – Some standard forms – Lagrange's method – Charpit's method.

UNIT –V APPLICATIONS (18 HRS.)

Applications of first order equations: Growth, decay and chemical reactions.

SELF STUDY:

Unit I - Homogeneous equations – Non homogeneous equations of the first degree in x and y.

TEXT BOOKS:

1. S. Narayanan, T.K. Manickavachagam Pillay - Differential Equation and its Applications – S. Viswanathan (Printers and Publishers) Pvt. Ltd.2006.

UNIT I : Chapter : 2- Sections : 1 – 6.4 & Chapter : 4 - Sections 1 – 4.

UNIT II : Chapter : 5 - Sections : 1 – 6, Chapter : 6 - Sections : 1 – 6.

UNIT III : Chapter :9 -Sections : 1 – 10.

UNIT V : Chapter: 3 - Section: 1.

2. Dr. S. Arumugam and Issac - Differential Equation and Applications – New Gamma Publishing House Nov- 2011. Chapters 2, 4

UNIT II : Chapter : 2 - Sections : 2.5 Type D

UNIT IV : Chapter : 4 - Sections : 4.0 – 4.5.

REFERENCES:

1. N.Ch.S.N.Iyengar – Differential Equations – Anmol publications pvt.ltd – 2000

2. Rasinghania - Differential Equations – S.Chand & Company limited – 1997.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Solve problems in differential equations of first order.
CO 2	Classify homogeneous and Non homogeneous differential equations of second order and solve problems.
CO 3	Solve differential equation problems using Laplace transform.
CO 4	Define Partial differential equations and solve problems.
CO 5	Solve problems on Growth, decay and chemical reactions

I B.Sc. Mathematics

SEMESTER –II

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19M2CC 4 / 19G2CC4	NUMERICAL METHODS	**Lecture**	6	4

COURSE DESCRIPTION

This course enables the students to solve equations using various Numerical Methods.

COURSE OBJECTIVE/S

To enable the students to solve Algebraic, Transcendental, Differential Equations using various Numerical methods like Bisection, Runge-Kutta, Euler and Taylor.

SYLLABUS

UNIT –I ALGEBRAIC AND TRANSCENDENTAL EQUATION (15 HRS.)

Introduction - Bisection method - Iteration method – Regula-falsi method – NewtonRaphson method. (No derivations).

UNIT II: SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS (15 HRS.)

Introduction- – Gauss Elimination method – Gauss Jordan method – Calculation of inverse of a matrix – Gauss Jacobi Iteration method – Gauss-Seidel iteration method.(No derivations).

UNIT III: FINITE DIFFERENCES & INTERPOLATION (20 HRS.)

Difference operators – Other difference operators- Relation between the operators - Newton's forward Interpolation formula- Newton's backward Interpolation formula – Gauss forward Interpolation formula - Gauss backward Interpolation formula – Stirling's formula - Lagrange's interpolation formula – Divided difference – Newton's Divided difference formula – Inverse interpolation. (No derivations).

UNIT IV: NUMERICAL DIFFERENTIATION AND INTEGRATION (20 HRS.)

Derivatives using Newton's forward difference formula- Derivatives using Newton's backward difference formula- Derivatives using Central difference formula-Maxima and minima of the interpolating polynomial- Numerical Integration – Trapezoidal Rule – Simpson's one third rule. (No derivations).

UNIT V: NUMERICAL SOLUTION OF DIFFERENTIALEQUATION(20 HRS.)

Taylor series method – Picard's method – Euler's method – Modified Euler's methodRunge -Kutta methods –Second order Runge-Kutta method-Higher order Runge-Kutta method- Predictor-Corrector formulae-Milne's Predictor-Corrector formulae-Adam's Predictor-Corrector equations. (No derivations).

TEXT BOOKS:

1.Dr. M.K. Venkataraman, Numerical Methods in Science and Engineering, The National publishing company, fifth edition.

Unit I : Chapter III -Sections 1 to 5

Unit II: Chapter IV- Sections 1,2,3,6

Unit III: Chapter V-Sections 1 to 12, 14 to 18 Chapter VI - Sections 1 to 5. Chapter VII-Sections 1 to 5. Chapter VIII - Sections 1 to 5

Unit IV: Chapter IX- Sections 1 to 8, 10

Unit V : Chapter XI-Sections 6,9,10,12,13,14,16,19,20,21

REFERENCES:

1. S. Arumugam, S. Thangapandi Isaac and A. Soma Sundaram, Numerical Analysis, New Gamma Publishing House 2007.

2. S.S.Sastry, Introductory methods of Numerical analysis, Prentice Hall of India

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Solve algebraic and transcendental equations using various methods.
CO 2	Identify the various methods of solving simultaneous linear algebraic equations.
CO 3	Recognize difference operators and apply the concept of interpolation.
CO 4	Compute the values of the derivatives at some point using numerical differentiation and integration.
CO 5	Solve problems on higher order differential equations using Euler's, Runge- kutta and Predictor- Corrector methods

I B.Sc. Mathematics

SEMESTER –II

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19M2AC2 / 19G2AC2	ADVANCED STATISTICS	**Lecture**	5	5

COURSE DESCRIPTION

This course provides a strong background in statistical tools which will be used in various physical and social sciences.

COURSE OBJECTIVE/S

To enable the students to know the concepts of discrete distributions, continuous distributions, Test of significance for large and small samples and analysis of variance.

SYLLABUS

UNIT –I DISCRETE DISTRIBUTIONS (15 HRS.)

Binomial distribution and Poisson distribution

UNIT –II CONTINUOUS DISTRIBUTION (15 HRS.)

Normal Distribution - Normal Distribution as a limiting form of binomial distribution – characteristics of Normal Distribution – Area property – Fitting of Normal Distribution.

UNIT –III TEST OF SIGNIFICANCE FOR LARGE SAMPLES (15 HRS.)

Concept of sampling distribution - Test of significance for large samples using normal distribution.

UNIT –IV TEST OF SIGNIFICANCE FOR SMALL SAMPLES (15 HRS.)

$\chi 2$, Student-t, $\chi 2$, F distributions (no derivation for t, $\chi 2$, F distributions), Test of significance $\chi 2$ for small samples using t, $\chi 2$, F distributions.

UNIT –V ANALYSIS OF VARIANCE (15 HRS.)

Analysis of variance - One way and two way classification, Randomized block design - Latin square. Self Study: Unit I - Poisson distribution.

TEXT BOOKS:

1. S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematical statistics- Sultan Chand & Sons, Revised edition - June 2002 for Unit I to IV.

UNIT I : Chapter : 8 - Sections : 8.1 – 8.5.

UNIT II : Chapter : 9 - Sections : 9.1, 9.2.

UNIT III : Chapter : 14 - Sections : 14.1 – 14.8.

UNIT IV : Chapter : 15 - Sections : 15.1 - 15.6, Chapter : 16 - Sections : 16.1 – 16.8

2. S.P.Gupta, Statistical Mehthods - Sultan Chand & Sons, (Rev.2000)

UNIT V: Chapter: 14

REFERENCES:

1. H.C.Saxena, Elementary Statistics,Abhiror Prakashan,New Delhi,2008.

2. S.C. Gupta and V.K Kapoor , Fundamentals of Applied Statistics, Sultan Chand & Sons,2004.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Classify discrete and continuous random variables and characteristics of Binomial distribution and Poisson distribution
CO 2	Explain and illustrate the properties of Normal distribution and solve variety of problems.
CO 3	Distinguish between a population and a sample and explain testing of hypothesis.
CO 4	Explain chi square distribution, t- distribution and describe their various applications is Statistics.
CO 5	Define F- distribution and apply it to solve problems in analysis of variance.

I B.Sc. Physics

SEMESTER –II

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19P2ACM2	ALLIED MATHEMATICS – II	**Lecture**	5	5

COURSE DESCRIPTION

This course provides the fundamentals concepts in various branches of Mathematics

COURSE OBJECTIVE/S

To enable the Physics Major Students to develop the skills of Mathematical reasoning and Analytical thinking in differential equation, Laplace transforms and Fourier series and Vector Calculus.

SYLLABUS

UNIT –I DIFFERENTIAL EQUATIONS - I (15 HRS.)

Equations of the form $\frac{dy}{dx} = \frac{(ax+by+c)}{(a_1x+b_1y+c_1)}$ - Bernoulli's equations - Exact equations. Linear equations of 2 nd order with constant coefficient with terms of the form e^{ax} v on R.H.S .

UNIT –II DIFFERENTIAL EQUATIONS - II (15 HRS.)

Equations of second order with variable coefficients (Right hand side of the form e^{ax} , x^n , cos ax, sin ax, e^{ax} v)

UNIT –III LAPLACE TRANSFORMS & FOURIER SERIES (15 HRS.)

Standard Transforms – Inverse Laplace Transforms – application of Laplace transform to differential equations - Fourier series.

UNIT –IV VECTOR CALCULUS-DIFFERENTIATION OFVECTORS(15 HRS.)

Vector differentiation, velocity, acceleration, vector operators – gradient , divergence, curl(Self Study). Their simple properties, directional derivatives – solenoidal – irrotational vectors.

UNIT –V INTEGRATION OF VECTOR AND ITS APPLICATIONS (15 HRS.)

Line, surface and volume integrals – Gauss, Greens and Stokes theorems (statements of the theorems only) – simple problems.

Self Study :

Unit IV - Vector differentiation, velocity, acceleration, vector operators – gradient , divergence, curl.

TEXT BOOKS:

1. Dr. S. Arumugam & Issac , Ancillary Mathematics, New Gamma Publishing House.

REFERENCES:

1. S.Narayanan and T. K. Manicavachagam Pillai, Differential Equations and its Applications, S. Viswanathan (Printers and Publishers), Pvt. Ltd, 2006 2. N.Ch.S.N.Iyengar, Differential Equations, Anmol publications pvt.ltd – 2000

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Solve linear differential equations.
CO 2	Solve second order linear differential equations with variable coefficient.
CO 3	Define Laplace transform and apply it to solve differential equation.
CO 4	Explain the concepts of gradient, divergence, curl and their properties
CO 5	Apply line, volume and surface integrals to verify the Gauss divergence and Stoke’s theorem.

I B.Sc. Mathematics

SEMESTER –III

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19M3CC 5/ 19G3CC5	MODERN ALGEBRA	**Lecture**	6	4

COURSE DESCRIPTION

This course introduces the abstract concepts of modern algebra.

COURSE OBJECTIVE/S

To enable the students to study Groups, Rings and Fields with various conditions imposed on sets, which finds application in different fields of science.

SYLLABUS

UNIT –I GROUPS **(18 HRS.)**

Definitions and Examples – Elementary properties of a group – Equivalent Definitions – Permutation Groups - Subgroups - Cyclic Groups - Order of an Element.

UNIT –II NORMAL SUBGROUPS **(18 HRS.)**

Cosets and Lagrange’s Theorem - Normal Subgroups and Quotient Groups - Isomorphism – Homomorphisms

UNIT –III RINGS **(18 HRS.)**

Definitions and examples – Elementary properties of rings – Isomorphism – Types of rings – Characteristic of a ring – Subrings.

UNIT –IV IDEALS **(18 HRS.)**

Ideals – Quotient Rings – Maximal and Prime Ideals – Homomorphism of rings (self study) – Field of quotients of an integral domain – Ordered Integral domain –Unique Factorization domain.

UNIT –V POLYNOMIAL RINGS **(18 HRS.)**

Euclidean domain – Every P.I.D is a U.F.D – Polynomial Rings – Polynomial Rings Over U.F.D – Polynomials Over Q.

SELF STUDY:

UNIT IV -Homomorphism of rings.

TEXT BOOKS:

1. Dr. S. Arumugam and A..ThangaPandi Isaac - Modern Algebra – Scitech Publications (India) Private Limited - 2003.

UNIT I : Chapter : 3- Sections : 3.1 – 3.7.

UNIT II : Chapter :3- Sections : 3.8 – 3.11.

UNIT III :Chapter :4 -Sections : 4.1 – 4.6.

UNIT IV : Chapter :4 -Sections : 4.7-4.13

UNIT V: Chapter: 4 -Sections: 4.14- 4.18

REFERENCES

1. A.R.Vasishtha - Modern Algebra –Krishna Prakashan Media (P) Ltd.,Delhi-2006.

2. Surgeet Singh - Modern Algebra –Vikas Publishing House-III Edition 2003.

3. N.S. Gopalakrishnan - University Algebra – New Age International Limited- II Edition – 2005.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Classify groups and explain their properties.
CO 2	Describe cosets and Lagrange's theorem.
CO 3	Explain the characteristics of different types of rings and their properties.
CO 4	Classify various types of ideals.
CO 5	Construct polynomial rings over UFD.

I B.Sc. Mathematics

SEMESTER –III

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19M3CC 6/ 19G3CC6	VECTOR CALCULUS AND FOURIER TRANSFORM	**Lecture**	6	4

COURSE DESCRIPTION

This course emphasizes the fundamental concepts of vector calculus and Fourier transforms.

COURSE OBJECTIVE/S

To enable the students to learn the concepts of differentiation of vectors, line and surface integrals, applications of Green, Gauss and Stokes theorems and Fourier transform.

SYLLABUS

UNIT –I DIFFERENTIATION OF VECTORS (15 HRS.)

Differentiation of vectors – Gradient – geometrical interpretation of gradient Directional derivative.

UNIT II: DIVERGENCE AND CURL (15 HRS.)

Divergence and Curl – solenoidal and irrotational vectors.

UNIT III: LINE AND SURFACE INTEGRALS (20 HRS.)

Line integrals – Surface integrals – Theorems of Green, Gauss and Stokes.

UNIT IV: FOURIER TRANSFORMS - FINITE TRANSFORM (20 HRS.)

Introduction - Fourier transforms - Fourier cosine transform - Fourier sine transform Alternative form of Fourier complex integral formula - Relationship between Fourier transform and Laplace transform. Finite Fourier transforms - Inversion formulas.

UNIT V: PROPERTIES OF FOURIER AND FINITE TRANSFORM (20 HRS.)

Linear property - Shifting property - Modulation theorem - Conjugate symmetry property - Transform of derivatives – Derivatives of the transform-

Convolution theorem - Parsevel's identity (without proof). - Finite Fourier transforms of derivatives. SELF STUDY: Differentiation of vectors.

TEXT BOOKS:

1. Arumugam & Issac - Analytical Geometry 3D, Vector calculus & Trigonometry – New Gamma Publishing House, January 2006.

UNIT I: Chapter 5: Sections – 5.0 - 5.3

UNIT II: Chapter 5: Section – 5.4

UNIT III: Chapter 7: Sections – 7.0 - 7.3 2. T. Veerarajan - Engineering Mathematics III Edition - Tata Mcgrew- Hill publishing Company Limited, New Delhi.

UNIT IV: Chapter 6: Sections - 6.1 - 6.5, 6.7(Example 1 – 7)

UNIT V: Chapter 6: Sections - 6.6, 6.7 (Finite Fourier Transforms of derivatives, Examples 8, 9, 10)

REFERENCES

1. S.Narayanan & T. k.Manicavachagam Pillay - Vector algebra & Analysis – South India Saiva Siddanta Works Publishing Society – Fourth Edition – 1986.

2. Goyal & Gupta - Integral Transforms - PragatiPrakashan, Meerut, 1987.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Explain the concept of differentiation of vectors.
CO 2	Compute divergence and curl of vectors.
CO 3	Solve problems on line and surface integrals.
CO 4	Compute fourier sine and cosine transforms.
CO 5	Describe the properties of fourier transforms.

I B.Sc. Mathematics

SEMESTER –III

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19M3SB1 / 19G3SB1	APPLICATIONS OF CALCULUS AND DIFFERENTIAL EQUATIONS	**Lecture**	2	2

COURSE DESCRIPTION

This course deals with applications of calculus and differential equations.

COURSE OBJECTIVE/S

This course will enable students to develop a more profound understanding of Applications of calculus and differential equations and to solve related problems in Geometry, Physics, Chemistry, Mechanics etc.

SYLLABUS

UNIT –I BETA AND GAMMA FUNCTIONS (6 HRS.)

Introduction – Definition of Beta and Gamma Functions – Properties and results involving Beta and Gamma functions.

UNIT –II MAXIMA MINIMA OF FUNCTIONS OF TWO VARIABLES(6 HRS.)

The method of finding the Maxima Minima of functions of two variables.

UNIT –III TRAJECTORIES (6 HRS.)

Trajectories Introduction – Cartesian coordinates – Polar Coordinates; Orthogonal trajectories.

UNIT –IV THE BRACHISTOCHRONE PROBLEM (6 HRS.)

The Brachistochrone Problem – TautoChronous property of the Cycloid - Simple Electric Circuit.

UNIT –V FALLING BODIES AND DYNAMICAL PROBLEMS (6 HRS.)

Falling Bodies and other rate problems – Dynamical Problems with Variable Mass. Falling Bodies – Dynamical Problem with Variable Mass.

TEXT BOOKS:

1. Dr S. Arumugam and A. ThangapandiIssac - Calculus, New Gamma Publishing House 2006.

UNIT I: Chapter 4(Part II)

UNIT II: Chapter 3(Part I) - Section – 3.7 2.

2. Dr S. Arumugam and A. ThangapandiIssac - Differential Equations and Applications, New Gamma Publishing House 2008.

UNIT III: Chapter 6 - Sections – 6.1

UNIT IV: Chapter 6 - Sections – 6.4 to 6.6

UNIT V: Chapter 6 - Sections – 6.7, 6.12

REFERENCES

1. T.K. Manickavasagam Pillai, S. Narayanan - Calculus-S.Viswanathan (Printers & Publishers) Pvt Ltd , 2008.

2. T.K. Manickavasagam Pillai, S. Narayanan - Differential Equations and Applications–S. Viswanathan (Printers and Publishers) Pvt. Ltd.2006.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Explain Beta and Gamma functions and their properties.
CO 2	Solve the problems in Maxima minima of functions of two variables.
CO 3	Describe trajectories and orthogonal trajectories.
CO 4	Solve Brachistrochone problems
CO 5	Discuss dynamical problems with variable mass

II B.Sc. Chemistry

SEMESTER –III

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19C3AC M1	ALLIED MATHEMATIC S - I	**Lecture**	5	5

COURSE DESCRIPTION

The course develops Mathematical knowledge needed by the chemistry students.

COURSE OBJECTIVE/S

To enable the students to understand mathematical concepts like matrices, higher derivatives of functions, solving differential equations, trigonometric series, measures of dispersion and moments.

SYLLABUS

UNIT –I MATRICES **(15 HRS.)**

Introduction – Matrices – Rank of a Matrix – Elementary Transformations – Simultaneous Linear Equations - Cayley Hamilton theorem – Eigen Values and Eigen Vectors. (Only Problems)

UNIT II: HIGHER DERIVATIVES OF FUNCTIONS **(15 HRS.)**

Derivatives of hyperbolic functions - Successive differentiation and Leibnitz theorem.

UNIT III : EXACT DIFFERENTIAL EQUATIONS AND HIGHER ORDER DIFFERENTIAL EQUATIONS **(15 HRS.)**

Exact equations. Linear equations of 2 nd order with constant coefficient with terms of the form $e^{ax} v$ on R.H.S .

UNIT IV : TRIGONOMETRIC SERIES **(15 HRS.)**

Expansions of sin nx, cos nx, tan nx, $\sin^n x$, $\cos^n x$ - Series of sin x, cos x.

UNIT V : MEASURES OF DISPERSION AND MOMENTS **(15 HRS.)**

Mean, Median, Mode, Standard Deviation, Karl Pearson’s coefficient of skewness, Moments, Skewness and Kurtosis using moments.

SELF STUDY:

UNIT V: Mean, Median, Mode, Standard Deviation

TEXT BOOKS:

1. S. Arumugam & Isaac, Ancillary Mathematics, New Gamma Publishing House, Nov 2004.

2. S. Arumugam & Isaac, Statistics, New Gamma Publishing House, 2006.

3. S. Arumugam & Isaac, Calculus, New Gamma Publishing House, 2005.

REFERENCES:

1. S.Narayanan and T. K. Manicavachagam Pillai, Differential Equations and its Applications, S. Viswanathan (Printers and Publishers), Pvt. Ltd, 2006.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Explain higher derivatives and apply Leibnitz theorem to find the nth derivative of functions.
CO 2	Solve problems on curvature, envelopes, asymptotes and curve tracing.
CO 3	Construct reduction formula for trigonometric functions.
CO 4	Define Jacobian, double & triple integrals and apply the knowledge of change of variables to solve the problems in double and triple integrals.
CO 5	Construct Fourier series by recalling integration.

II B.Sc. Computer Science

SEMESTER –III

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19B3ACM1	LINEAR PROGRAMMING	**Lecture**	5	5

COURSE DESCRIPTION

The course develops Mathematical knowledge needed by the computer science students.

SYLLABUS

UNIT –I INTRODUCTION TO LPP (15 HRS.)

Formulation – Classification - Graphical Solutions of LPP - Simple examples of LPP - Slack and Surplus variables - Standard form of LPP - Definition of objective function-Linear and Non-negative Constraints - Feasible Solution - Basic Feasible Solution - Optimum Basic Feasible Solution - Degenerate solution.

UNIT –II SIMPLEX METHOD (15 HRS.)

Computational procedure of the simplex method - Tie for entering basis vector and leaving basis vector - Unbounded Solution - Solution using Artificial Variables - Charne's method of penalties and Two Phase Simplex method - Restricted and unrestricted variables – Infeasible solution - Inverse of a matrix using Simplex method.

UNIT –III DUALITY & DUAL SIMPLEX METHOD (15 HRS.)

Concept of Duality – Statement of Dual of a given Primal - The form of the Dual when the primal has restricted variables and / or unrestricted variables and when primal is in mixed form - How to obtain optimum solution to Dual form that of Primal and vice-versa - Solution of LPP by Dual Simplex method.

UNIT –IV TRANSPORTATION PROBLEM (15 HRS.)

Mathematical formulation - existence of feasible solution - Feasible solution by North West Corner rule - Matrix Minima method (Self-Study) - Vogel's

Approximation method - Optimal solution to a TP by Modified Distribution method - Degeneracy in TP - Unbalanced TP (Self-Study).

UNIT V: ASSIGNMENT PROBLEM **(15 HRS.)**

Mathematical formulation - Assignment algorithm rule for finding optimal assignment - Unbalanced AP - Travelling salesman problem as an AP.

SELF STUDY:

UNIT IV : Matrix Minima method , Unbalanced TP.

TEXT BOOK:

Kanti Swarup and others, Operation Research, Sultan Chand and sons – 14th Edition 2008.

UNIT I - Chapters 2, 3

UNIT II - Chapter 4

UNIT III - Chapter 5

UNIT IV - Chapter 10

UNIT V - Chapter 11

REFERENCES:

1. Sankaranarayanan and Mangaldoss, Linear Programming

2. R.K.Gupta, Operations Research

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Define basic concepts of Linear Programming problems
CO 2	Apply various simplex methods to solve linear programming problems
CO 3	Construct dual problem and solve the primal problem
CO 4	Solve transportation problems
CO 5	Distinguish assignment problem and travelling salesman problem

II B.Sc. Mathematics

SEMESTER –IV

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19M4CC 7 / 19G4CC7	SQUENCES AND SERIES	**Lecture**	6	4

COURSE DESCRIPTION

This course introduces the concept of sequence and series and to enable the students to understand the fundamental ideas in Real Analysis.

COURSE OBJECTIVE/S

To enable the students to learn theorem and problems in sequences and series which is essential for learning higher Mathematics .

SYLLABUS

UNIT –I SEQUENCES **(20 HRS.)**

Sequences – Bounded Sequences – Monotonic Sequences – Convergent Sequences – Divergent and Oscillating Sequences – The Algebra of Limits – Behaviour of Monotonic Sequences.

UNIT –II LIMITS AND SUBSEQUENCES **(15 HRS.)**

Some Theorems on Limits – Subsequences – Limit Points – Cauchy Sequences – The upper and Lower Limits of a Sequence.

UNIT –III SERIES OF POSITIVE TERMS **(20 HRS.)**

Infinite Series - Comparison Test – Kummer's Test – Root test and Condensation Test – Integral Test.

UNIT –IV ALTERNATING SERIES **(20 HRS.)**

Alternating Series – Absolute Convergence – Tests for Convergence of series of arbitrary terms.

UNIT –V REARRANGEMENT OF SERIES **(15 HRS.)**

Rearrangement of series – Multiplication of series – Power Series.

TEXT BOOKS:

1. S. Arumugam and A. Thangapandi Issac, Sequences and Series, New Gamma Publishing House 2002.

Unit – I: Chapter 3 (Sec 3.1 – 3.7)

Unit – II: Chapter 3 (Sec 3.8 – 3.12)

Unit – III Chapter 4

Unit – IV Chapter 5 (Sec 5.1 – 5.3)

Unit – V Chapter 5 (Sec 5.4 – 5.6)

REFERENCES:

1. M.K.Venkatraman and Mrs. Manoramma Sridhar, Sequences and Series, The National Publishing Company 2002.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Define basic concepts of sequences.
CO 2	Explain subsequences and Cauchy sequences.
CO 3	Differentiate various convergence test for series and use them to solve problems.
CO 4	Recognize alternating, convergent, conditionally and absolutely convergent series.
CO 5	Distinguish the behaviour of series and power series.

II B.Sc. Mathematics

SEMESTER –IV

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19M4CC 8 / 19G4CC8	LINEAR ALGEBRA	**Lecture**	6	4

COURSE DESCRIPTION

This course will focus on matrix as linear transformations relative to a basis of a vector space.

COURSE OBJECTIVE/S

To enable the students to understand matrix and vector space concepts which can be applied in Graph Theory, Linear Programming, Physics and Chemistry etc .

SYLLABUS

UNIT –I VECTOR SPACES **(18 HRS.)**

Definition and Examples of Vector spaces – Subspaces – Linear Transformation – Span of a set.

UNIT –II BASIS AND DIMENSION **(18 HRS.)**

Linear Independence – Basis and Dimension – Rank and Nullity - Matrix of a Linear Transformation.

UNIT –III INNER PRODUCT SPACES **(18 HRS.)**

Definition and Examples of inner product spaces – Orthogonality – Orthogonal Complement.

UNIT –IV THEORY OF MATRICES **(18 HRS.)**

Algebra of Matrices – Types of Matrices – The Inverse of a Matrix – Elementary Transformations. Rank of a Matrix – Simultaneous Linear Equations – Characteristic Equation and Cayley Hamilton Theorem, Eigen Values and Eigen Vectors.

UNIT –V BILINEAR FORMS **(18 HRS.)**

Bilinear forms – Quadratic forms.

TEXT BOOKS:

1. Dr. S. Arumugam and A..Thanga Pandi Isaac - Modern Algebra – Scitech Publications (India) Private Limited - 2003.

UNIT I Chapter 5: 5.0-5.5

UNIT II Chapter 5 : 5.6 – 5.8

UNIT III Chapter 6

UNIT IV Chapter 7

UNIT V Chapter 8

REFERENCES:

1. Surgeet Singh, Modern Algebra, Vikas Publishing House-III Edition 2003.

2. N.S. Gopalakrishnan ,University Algebra , New Age International Limited-II Edition - 2005.

3. Alan Doerr & Kenneth Levasseur – Applied Discrete Structures for Computer Science - Galgotia Publications Pvt. Ltd. - Edition 1989.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Define Vector Space and explain its various concepts.
CO 2	Illustrate Inner Product Spaces.
CO 3	Define basic concepts of matrices and solve linear equations.
CO 4	Appraise Eigen Value and Eigen Vectors of matrices.
CO 5	Describe bilinear forms and quadratic forms.

II B.Sc. Mathematics

SEMESTER –IV

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19M4SB2 / 19G4SB2	FOUNDATIONS OF MATHEMATICS	**Lecture**	2	2

COURSE DESCRIPTION

This course helps the students to develop their problem solving skills.

COURSE OBJECTIVE/S

To enable the students learn some basic concepts of Trigonometry, Number Theory and Algebra and to solve problems.

SYLLABUS

UNIT –I TRIGONOMETRY (6 HRS.)

Hyperbolic functions, Inverse Hyperbolic functions.

UNIT –II COMPLEX QUANTITIES (6 HRS.)

Logarithms of complex quantities.

UNIT –III PROPERTIES OF INTEGERS (6 HRS.)

Euclid's First Theorem, Euclid's Second Theorem, Law of Trichotomy, Fundamental Theorem of Arithmetic, Division Algorithm, Calculation of LCM and GCD.

UNIT –IV CONGRUENCES (6 HRS.)

Congruences and Chinese Remainder theorem (Only Statements & Problems).

UNIT –V INEQUALITIES (6 HRS.)

Triangule inequalities, Relation between arithmetic, harmonic and geometric means, CauchySchwartz inequality.

TEXT BOOKS:

1. S. Narayanan and T. K. Manicavachagam Pillai - Trigonometry , S. Viswanathan (Printers and Publishers), Pvt. Ltd, 2008.

UNIT I Chapter 4 – Section 2.1, 2.2, 2.3

UNIT II Chapter 5 - Section 5

2. Dr. N. Vijayarangan - Foundations of Mathematics – Scitech Publications (India) Pvt. Ltd.

UNIT III Chapter 3 (Relevant topics) UNIT IV Chapter 3 (Relevant topics)

3. Dr. S Arumugam and A Thangapandi Issac – Sequences and series-New Gamma Publishing House-July 2010.

UNIT V Chapter 2 (Section 2.1 - 2.4)

REFERENCES:

1. P.R.Vittal & V.Malini - Algebra & Trigonometry, Margham Publications, 2008.

2. Sudhir K Pundir singh- Algebra & Trigonometry, Meerat Pragathi prakashan,2003.

3. Alan Doerr & Kenneth Levasseur – Applied Discrete Structures for Computer Science - Galgotia Publications Pvt. Ltd. - Edition 1989.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Recall some expansions of Trigonometric functions.
CO 2	Explain Logarithms of Complex quantities.
CO 3	Describe properties of integers.
CO 4	Solve puzzles using Chinese remainder Theorem.
CO 5	Analyse inequalities.

II B.Sc. Chemistry

SEMESTER –IV

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19C4ACM2	FOUNDATIONS OF MATHEMATICS	**Lecture**	5	5

COURSE DESCRIPTION

The course provides the mathematical skills needed by the chemistry students for advanced study.

COURSE OBJECTIVE/S

To enable the students to understand the mathematical concepts like groups, integration, Laplace transform, Correlation, Regression and curve fitting.

SYLLABUS

UNIT –I GROUPS **(15 HRS.)**

Groups- Definition and Examples – Elementary properties of Group – Equivalent Definitions of a group – Permutation group – subgroups – cyclic groups – order of an element – Cosets and Lagrange's theorem. (No proof for theorems).

UNIT –II INTEGRAL CALCULUS **(15 HRS.)**

Definite Integral - Integration by parts – Reduction Formula.

UNIT –III LAPLACE TRANSFORMS **(15 HRS.)**

Definitions - Standard Laplace transforms – Inverse Laplace transforms – Applications to solutions of simple differential equations.

UNIT –IV CORRELATION AND REGRESSION **(15 HRS.)**

Correlation – Rank Correlation – Regression.

UNIT –V CURVE FITTING **(15 HRS.)**

Principle of Least Squares – Fitting a straight line – Fitting a second degree parabola.

SELF STUDY:

UNIT II: Definite Integral

TEXT BOOKS:

1. S. Arumugam & Isaac, Ancillary Mathematics, New Gamma Publishing House, 2006.

2. S. Arumugam & Isaac, Statistics, New Gamma Publishing House, 2006.

REFERENCES:

1. S.C. Gupta and V.K Kapoor, Fundamental of Applied Statistics, third edition, Sultan Chand & Sons, New Delhi

2. Surgeet Singh, Modern Algebra,Vikas Publishing House-III Edition 2003.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Describe the concepts of groups, subgroups and normal subgroups.
CO 2	Compute the definite integral and construct reduction formula.
CO 3	Solve differential equations using Laplace transforms.
CO 4	Explain the concepts of correlation, rank correlation coefficient and regression.
CO 5	Apply the principle of least squares to fit a straight line and parabola.

II B.Sc. Computer Science

SEMESTER –IV

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	19B4ACM 2	ALGEBRA AND GRAPH THEORY	**Lecture**	5	5

COURSE DESCRIPTION

This course enables the students to have better application of abstract concepts through Graph Theory.

COURSE OBJECTIVE/S

To study the concepts of functions, matrices and graph theory.

SYLLABUS

UNIT –I RELATIONS AND FUNCTIONS **(15HRS.)**

Properties of Relations – Inverse Relations – Equivalence Classes – Partition of a set – Fundamental theorem on Equivalence Relations – Graphs of Relations and Hasse Diagram – Composition of Relations – Relation Matrix - Closure Operations of Relations – Minsets, Maxsets – Duality Principle – Functions – Types of Functions – Inverse Function – Theorems on Functions – Permutations and Combinations.

UNIT –II THEORY OF MATRICES **(15HRS.)**

Matrix inversion – System of Equations – Consistency of Systems of Linear Equations – Eigen Values, Eigen Vectors – Diagonalization Process – Induction Principle – Peano's Postulates.

UNIT –III INTRODUCTION **(15HRS.)**

What is a Graph ? – Application of Graphs – Finite and infinite Graphs – Incidence and Degree – Isolated vertex, Pendant Vertex and Null Graph – Brief History of Graph Theory – Isomorphism – Subgraphs – Isomorphism .

UNIT –IV PATHS AND CIRCUITS **(15HRS.)**

Walks, Paths and Circuits – Connected Graphs Disconnected Graphs and Components – Euler Graphs – Hamiltonian Paths and Circuits .

UNIT –V TREES AND FUNDAMENTAL CIRCUITS (15HRS.)

Trees – Some Properties of Trees – Pendant Vertices in a Tree – Spanning Tree – Cut Sets – Some Properties of a Cut Set .

SELF STUDY:

UNIT II: System of Equations

TEXT BOOKS:

1. Prof. V.Sundaresan, K.S. Ganapathy Subramanian, K. Ganesan, Discrete Mathematics for B.E. (Computer Science & Engineering), Meenakshi Agency, Nov.2002

UNIT I : Chapter 1 (pages 1.11 – 1.39)

UNIT II : Chapter 2 (pages 2.23 – 2.35)

2. Narsingh Deo Graph theory with Applications to Engineering and Computer Science, Prentice Hall of India Private Limited, New Delhi, 2008.

UNIT III : Chapter 1 (Sec 1.1 – 1.5), Chapter 2 (Sec 2.1 – 2.2)

UNIT IV : Chapter 2 (Sec 2.4 – 2.6, 2.9)

UNIT V : Chapter 3 (Sec 3.1 – 3.3, 3.7), Chapter 4 (Sec 4.1, 4.2).

REFERENCE BOOKS:

1. F.Harary Addison, Graph theory, Wesley Publishing Company, 1972.

2. Trembley J.P and Manohar, Discrete Mathematical structure with Applications to Computer Science, R.P.Mcgraw-Hill, 1975.

3. Doerr, A.E. Levasseur, Applied Discrete Structures of Computer Science, Galgotia.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Recall relations and functions
CO 2	Appraise Eigen values and Eigen vectors
CO 3	Define various types of graphs
CO 4	List out the characterization of trees
CO 5	Apply different algorithms to find the shortest path in graphs

II & III B.A / B.Sc.

SEMESTER –IV

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
USMA	**19UGVAG1**	COMPUTATIONAL MATHEMATICS	**Lecture**		

COURSE DESCRIPTION

This course is designed to help the students to appear in competitive examinations.

COURSE OBJECTIVE/S

1. Demonstrate the use of mathematical reasoning by justifying through numerical skills.

2. Examine various techniques in solving the problems

SYLLABUS

UNIT –I PROBLEMS ON NUMBERS, AGES AND TRAINS

Divisibility rules- LCM& HCF-unit digit-Arithmetic &Geometric Progression-Problems on ages-Problems on two trains moving on same direction-Problems on two trains moving on opposite direction.

UNIT II: PIPES AND CISTERNS

Problems on pipes &cisterns - shortcuts.

UNIT III: PROFIT AND LOSS

Profit and Loss: Cost Price – Selling Price – Profit or Gain – Loss – Gain percentage - Loss percentage.

UNIT IV: PARTNERSHIP

Partnership – Ratio of Division of Gains – Working and Sleeping Partners.

UNIT V: TIME & WORK AND TIME & DISTANCE

Time and Work: Important facts and formulae on time and work -Problems.

Time and Distance: Important facts and formulae on speed, time and distance – Problems.

Text Book:

1. R. S. Aggarwal , Quantitative Aptitude for Competitive Examinations, S. Chand & Company Ltd, Revised Edition 2008.

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES
CO 1	Solve problems on numbers, ages and trains.
CO 2	Illustrate profit and loss with examples
CO 3	Explain partnership and related problems
CO 4	Discuss problems on time and work
CO 5	Solve problems on time and distances

IIIB.Sc. Mathematics

SEMESTER –V

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	M5CC9/G5CC9	Real Analysis	**Lecture**	6	5

COURSE DESCRIPTION

This course introduces the basic concepts in analysis and to enable the students to understand fundamental ideas and theorems on metric spaces.

COURSE OBJECTIVE/S

To study the fundamental concepts and techniques of open sets, closed sets, continuous functions, compactness and connectedness.

SYLLABUS

UNIT –I METRIC SPACES (18 HRS.)

Countable sets - Uncountable sets - Inequalities of Holder and Minkowski - Metric spaces: definition and examples - Bounded sets in a metric space – Open ball in a metric space-open sets- Subspaces.

UNIT –IICOMPLETE METRIC SPACES (18 HRS.)

Interior of a set - Closed sets - Closure - Limit point - Dense sets - Completeness - Baire's Category theorem

UNIT –III CONTINUITY (18 HRS.)

Continuity - Definition and examples of a Continuous function – Homeomorphism - Isometry - Uniform Continuity - Discontinuous functions on R.

UNIT –IV CONNECTEDNESS (18 HRS.)

Definition and Examples - Connected subsets of R - Connectedness and Continuity.

UNIT –V COMPACTNESS (18 HRS.)

Definition and examples - Compact space - Compact subsets of R - Equivalent Characterization for Compactness - Compactness and Continuity.

TEXT BOOKS:

1. Dr. S. Arumugam& A. ThangapandiIssac - Modern Analysis, New Gamma Publishing house, Edition 2010.

TEXT BOOK I

UNIT I Chapters: 1, 2 (sec 2.1 – 2.5)

UNIT II Chapters: 2 (sec 2.6 – 2.10), 3

UNIT III Chapter: 4

UNIT IV Chapter: 5

UNIT V Chapter: 6

REFERENCES:

1. Copson - Metric spaces - Universal book stall, New Delhi – 1989
2. Methods of Real Analysis - Richard R. Goldberg - Oxford and IBH publishing Co. Pvt. Ltd., New Delhi – 1970
3. A Course of Mathematical Analysis - Dr. P. K. Mittal & Shanti Natayanan - Chand Publishing

III B.Sc. Mathematics

SEMESTER –V

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	M5CC10/ G5CC10	MECHANICS	Lecture	6	5

COURSE DESCRIPTION

This course describes laws, principles, and postulates governing the statics and Dynamics of the system in physical reality.

COURSE OBJECTIVE/S

Enable the students to apply the laws, principles, postulates, governing the statics of the system and to apply the laws and principles governing dynamics of the system, in physical reality.

SYLLABUS

UNIT –I INTRODUCTION AND FORCES ACTING AT A POINT(18 HRS.)

Introduction – Resultant and components: Definition – Simple cases of finding the resultant – Parallelogram of Forces – Analytical expression for the resultant of two forces acting at a point – Triangle of forces – Lami's Theorem – Resultant of any number of coplanar forces acting at a point – Condition of equilibrium of any number of forces acting up on a particle.

UNIT –IIPARALLELFORCES AND MOMENTS, COUPLES (18 HRS.)

Introduction – Condition of equilibrium of three coplanar parallel forces – Centre of two parallel forces – Moment of a force – Geometrical representation of a moment – Sign of the moment – Varigon's theorem – Generalized theorem of moments - Couples - Equilibrium of three forces acting on a rigid body.

UNIT –III FRICTION (18 HRS.)

Introduction – Experimental results – Statical, dynamical and limiting friction – Laws of friction – Friction a passive force – Coefficient of friction – Angle of friction – Cone of friction – Numerical values – Equilibrium of a particle on a rough inclined plane – Equilibrium of body on a rough inclined plane under a force parallel to the plane –Equilibrium of a body on a rough inclined plane under any force – Problems on friction.

UNIT –IVPROJECTILE (18 HRS.)

Definitions-Path of a Projectile-Characteristic of the motion of a Projectile – Velocity of the projectile in magnitude and direction- Range on an Inclined Plane– Motion on the surface of a smooth inclined plane - Enveloping parabola.

UNIT –V MOTION UNDER THE ACTION OF CENTRAL FORCES (18 HRS.)

Velocity and acceleration in polar coordinates-Equations of motion in polar coordinates-Differential equation of the central orbit-Pedal Equation of some of the well known curves – Velocities in a central orbit – Apses and apsidal distances – Law of the inverse square-Law of the inverse cube.

TEXT BOOKS:

1. Dr. M.K. Venkataraman - A Text book of Statics, Agasthiar Publications-2007.
2. Dr.M.K. Venkataraman - A Text Book of Dynamics, Agasthiar Publications-2007.

TEXT BOOK I

UNIT I Chapters I, II.
UNIT II Chapters III, IV, V.

UNIT III Chapter VII.

TEXT BOOK II

UNIT IV Chapter VI.

UNIT V Chapter XI.

REFERENCES:

1. P. Duraipandian& Lakshmi Duraipandian- Mechanics, S. Chand & Co., Fourth edition, Reprint 2003.
2. M.L. Khanna - Statics, Fourth edition, South Asian Books, 1900.
3. M.L. Khanna – Dynamics of a rigid body, Jai Prakash Nath& Co., Meerut, 1975.

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SEMESTER –V

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	M5CC11 /G5CC11	COMPUTER PROGRAMMING IN C	Lecture	6	5

COURSE DESCRIPTION

This course provides skills in designing and writing simple programs in C.

COURSE OBJECTIVE/S

C language is one of the most popular computer languages today and the programs written in C are powerful, efficient, fast and compact. Realizing the need for educating our students in the various applications of mathematics, we have introduced this course.

SYLLABUS

UNIT –I C FUNDAMENTALS, OPERATORS AND EXPRESSIONS (18 HRS.)

Character Set – C Tokens – Keywords and Identifiers – Constants – Variables – Data types – Declaration of variables – Assigning values to variables – Defining symbolic constants – Operators & Expressions : Introduction – Arithmetic of operators – Relational operators – Logical operators – Assignment operators – Increment and decrement operators – Conditional operator – Bitwise operators – Special operators – Arithmetic expressions – Evaluation of expressions – Precedence of arithmetic operators – Some computational problems – Type conversions in expressions – Operator precedence and associativity – Mathematical functions.

UNIT –II DATA INPUT, OUTPUT & CONTROL STATEMENTS (18 HRS.)

Reading a character – Writing a character – Formatted input – Formatted output - Decision making and branching: The if Statement – The if…else statement – Nesting of if…else statements – The else if ladder – The switch statement - The “ ?:” Operator – The goto statement – Decision making and looping : The while statement - The do statement - The for statement - Jumps in loops.

UNIT –III ARRAYS& HANDLING OF STRINGS (18 HRS.)

One dimensional arrays – Two dimensional arrays – Initializing two dimensional arrays – Handling of character strings : Declaring and initializing string variables – Reading string from terminal – Writing strings to screen – Arithmetic operations on characters – Putting strings together – Comparison of two strings – String handling functions – Table of strings

UNIT –IV USER – DEFINED FUNCTIONS & POINTERS (18 HRS.)

Need for user-defined functions – A multi-function program – Form of C functions – Return values and their types – Calling a function – Category of functions – No arguments and no return values – Arguments but no return values – Arguments with return values – Handling of non-integer functions – Nesting of functions – Recursion – Functions with arrays - The scope and lifetime of variables in functions. Pointer : Understanding pointers – Accessing the address of a variable – Declaring and initializing pointers – Accessing a variable through its pointer – Pointer expressions – Pointer increment and scale Factor – Pointers and arrays.

UNIT –V STRUCTURES & FILES (18 HRS.)

Structure definition – Giving values to members – Structure initialization – Comparison of structure variables – Arrays of structures – Arrays within structures – Structures within structures – Structures and functions –Unions – Size of structures – Bit fields. File management in C: Defining and opening a file-closing a file-Input / Output operations on files-Error handling during I / O operations-Random access to files-Command line arguments.

TEXT BOOKS:

1. E. Balagurusamy - Programming in ANSI C - Tata McGraw-Hill Publishing Company Ltd. – Fourth Edition - 2000

TEXT BOOK I

UNIT I Chapters: 2, 3

UNIT II Chapters: 4, 5, 6

UNIT III Chapter: 7, 8 excluding section 7.8, 7.9 (Multidimensional Arrays),

UNIT IV Chapter: 9, Chapters 11: sections 11.1-11.10 excluding section 11.7

UNIT V Chapter: 10, 12 excluding section 10.7

REFERENCES:

1. Byron S. Gotfried - Theory and problems of programming with C (Schaums Series)
   Tata – McGraw Hills Edition - 1991.
2. Kernighan &Brian.W - The C programming language, Prentice – Hall of India, Private Limited, New Delhi - 1999

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SEMESTER –V

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	M5ME1/ G5ME1	GRAPH THEORY	Lecture	5	5

COURSE DESCRIPTION

This course is designed to introduce the students the basics of graph theory.

COURSE OBJECTIVE/S

Enable the students to have knowledge on graphs, sub graphs, Eulerian and Hamiltonian graphs, trees, planar graphs and coloring.

UNIT –I GRAPHS AND SUBGRAPHS (15 HRS.)

Definition and Examples – Degrees – Subgraphs – Isomorphism – Ramsey Numbers – Independent Sets and Coverings – Intersection Graphs - **Line Graphs** – **Matrices(Self-Study)** – Operations on Graphs.

UNIT –II DEGREE SEQUENCES AND CONNECTEDNESS (15 HRS.)

Degree Sequences – Graphic Sequences – Walks, Trails and Paths – Connectedness and Components – **Blocks(Self-Study)** – Connectivity.

UNIT –III EULERIAN AND HAMILTONIAN GRAPHS (15 HRS.)

Eulerian Graphs – Hamiltonian Graphs.

UNIT –IV TREES AND MATCHINGS (15 HRS.)

Characterization of Trees – **Centre of a Tree (Self-Study)** – Matchings – Matchings in Bipartite Graphs .

UNIT –V PLANARITY AND COLOURABILITY (15 HRS.)

Definition and Properties – Characterization of Planar Graphs – **Thickness, Crossing and Outer Planarity (Self-Study)** – Chromatic Number and Chromatic Index – The Five Colour Theorem.

TEXT BOOK:

1. Arumugam S and Ramachandran S, Invitation to Graph Theory – Scitech Publications (India) Pvt. Ltd, 2012.

   UNIT I : Chapters: 2

   UNIT II : Chapters: 3, 4

UNIT III : Chapter: 5

UNIT IV : Chapters: 6, 7

UNIT V : Chapter: 8, 9.1 & 9.2

REFERENCES:

1. Choudum S A, A first Course in Graph Theory, MACMILLAN INDIA LIMITED, Chennai, First Edition, 1987.
2. Harary, Graph Theory ,Narosa Publishing House, 2001.
3. Kumaravelu S and SusheelaKumaravelu,Graph Theory ,
   First Edition, 1999.
4. Chartrand &Pinzang ,Introduction to graph Theory, Tata Mcgraw-Hill Publishing Company Limited , Edition 2006.
5. John Clark, A first look at Graph Theory, Affliated to East West Press, Pvt Ltd 1995.

III B.Sc. MATHEMATICS
SEMESTER –V

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UAMA/USMA	M5ME2/ G5ME2	FUZZY MATHEMATICS	Lecture	5	5

COURSE DESCRIPTION

This course discusses the fundamentals of fuzzy set theory and fuzzy logic.

COURSE OBJECTIVE/S

To enable the students to understand the basic concepts of the theory of fuzzy sets, fuzzy logic, fuzzy operations, fuzzy relations and ordering.

UNIT –I FUZZY SETS AND FUZZY LOGIC (15 HRS.)

Introduction - Crisp Sets - The Notion of Fuzzy Sets - Basic concepts of Fuzzy Sets - Classical Logic - Fuzzy Logic.

UNIT –II OPERATIONS ON FUZZY SETS (15 HRS.)

Fuzzy Complement - **Fuzzy Union - Fuzzy Intersection-Combinations of Operations** - General Aggregation Operations.

UNIT –III FUZZY RELATIONS (15 HRS.)

Crisp and Fuzzy Relations - Binary Relations - Binary Relations on a Single set - Equivalence and Similarity Relations.

UNIT –IV FUZZY RELATION EQUATION (15 HRS.)

Compatibility or Tolerance Relations – Orderings – Morphisms – Fuzzy Relation Equations.

UNIT –V $\alpha-$CUT PROPERTIES AND FUZZY NUMBERS (15 HRS.)

Additional properties of $\alpha-$cuts, Fuzzy Numbers, Arithmetic Operations on Intervals, Arithmetic Operations on Fuzzy Numbers, Lattice of Fuzzy Numbers.

TEXT BOOKS:

1. George J. Klir and Tina A. Folger, *Fuzzy sets, Uncertainty and Information*, Prentice Hall of India, 2005.
2. George J. Klir /Bo Yuan, *Fuzzy sets and Fuzzy Logic, Theory and Applications* Prentice Hall of India, 2004.

UNIT I	:	Chapter: 1 (From Text Book 1)
UNIT II	:	Chapter: 2 (2.2 to 2.6) (From Text Book 1)
UNIT III	:	Chapter: 3 (3.1 to 3.4) (From Text Book 1)
UNIT IV	:	Chapter: 3 (3.5 to 3.8) (From Text Book 1)
UNIT V	:	Chapter:2(sec 2.1) & Chapter:4 (4.1, 4.3 to 4.5) (From Text Book 2)

REFERENCES:

1. Zimmermann, *Fuzzy Set Theory and its applications*, Affiliated East West Press Pvt Ltd, 2nd Edition 1996.

III B.Sc. MATHEMATICS
SEMESTER –V

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UAMA/USMA	M5SB3/G5 SB3	FOURIER TRANSFORMS	Lecture	2	2

COURSE OBJECTIVE

Enable the students to apply Fourier transforms which plays an important role in the study of continuous time signals.

UNIT I: FOURIER TRANSFORMS [6 HRS]

Introduction - Fourier transforms - Fourier cosine transform - Fourier sine transform

UNIT II: ALTERNATIVE FORM OF FOURIER TRANSFORMS [6 HRS]

Alternative form of Fourier complex integral formula - Relationship between Fourier transform and Laplace transform.

UNIT III: PROPERTIES OF FOURIER TRANSFORM [6 HRS]

Linear property - Shifting property - Modulation theorem - Conjugate symmetry property

UNIT IV: DERIVATIVES OF THE FOURIER TRANSFORM [6 HRS]

Transform of derivatives – Derivatives of the transform-Convolution theorem - Parsevel's identity (without proof).

UNIT V: FINITE FOURIER TRANSFORMS [6 HRS]

Finite Fourier transforms - Inversion formulas - Finite Fourier transforms of derivatives

TEXT BOOK:

T. Veerarajan - Engineering Mathematics III Edition - Tata Mcgrew- Hill publishing Company Limited, New Delhi.

REFERENCE BOOK:

Goyal & Gupta - Integral Transforms - PragatiPrakashan, Meerut, 1987.

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SEMESTER –V

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UAMA/USMA	M5SB4/G5 SB4	ADVANCED LINEAR PROGRAMMIN G	Lecture	2	2

COURSE OBJECTIVE

To enable the students to convert real problems into a Mathematical model and solve them using different techniques. That is through method of duality, Gomory's method, Branch and Bound Technique, Dynamic programming method .

UNIT I: DUALITY IN LINEAR PROGRAMMING [6 HRS]

Introduction – General Primal-Dual pair-Formulating a Dual Problem, Primal-Dual pair in matrix form, Duality theorems – Complementary Slackness theorems- Duality and Simplex method- Economic Interpretation of duality – Dual Simplex method .

UNIT II: INTEGER PROGRAMMING – GOMORY'S METHOD[6 HRS]

Introduction - Pure and Mixed Integer Programming Problem-Gomory's All-IPP Method Construction of Gomory's constraints - Fractional Cut Method - (All and Mixed Integer LPP)

UNIT III: INTEGER PROGRAMMING – BRANCH & BOUND METHOD [6 HRS]

Branch and Bound Method-Applications of Integer Programming

UNIT IV: DYNAMIC PROGRAMMING -I [6 HRS]

Introduction – The Recursive Equation Approach – Characteristics of Dynamic Programming **UNIT V: DYNAMIC PROGRAMMING -II [6 HRS]**

Solution of LPP by Dynamic Programming **(Only problems)**

TEXT BOOK:

KantiSwarup , P K Gupta , Man Mohan - Operations Research – Sultan Chand and sons – Educational Publishers, New Delhi.14th Edition, 2008 .

Unit I: Chapter: 5 **Unit II:** Chapter: 7 (Sec 7.1 to 7.6)

Unit III: Chapter: 7 (Sec 7.7 to 7.8) **Unit IV:** Chapter: 13 (Sec 13.1, 13.2, 13.3)

Unit V: Chapter: 13 (Sec 13.7)

REFERENCE BOOKS :

1. Hamdy A. Taha – Operations Research- Prentice Hall of India Private Limited, New Delhi- 8th Edition – 2006.

2. R.K.Gupta - Operations Research- Theory and Applications- Macmillan India Limited- 3rd Edition – 2007.

3. J.K.Sharma- Operations Research Theory And Applications – Macmillan Publishers India Ltd, 5th Edition.

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SEMESTER –VI

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	M6CC12/ G6CC12	COMPLEX ANALYSIS	**Lecture**	6	5

COURSE DESCRIPTION

This course provides various concepts in complex analysis of one variable

COURSE OBJECTIVE/S

Enable the students to learn complex number system, Analytic functions, conformal mapping, Taylor and Laurent Series expansions, Complex integration which can be applied in almost every branch of Mathematics

SYLLABUS

UNIT –I COMPLEX NUMBERS & BILINEAR TANSFORMATIONS (18HRS.)

Geometrical representation of complex numbers – n-th roots of complex number- Circles and straight line – Regions in the complex plane – The extended complex plane – Elementary transformations – Bilinear transformations – Cross ratio – Fixed points of bilinear transformation – Some special bilinear transformations.

UNIT –II ANALYTIC FUNCTIONS (18 HRS.)

Introduction - Functions of a complex variable – Limits – Theorems on limit – Continuous functions – Differentiability - The Cauchy – Riemann equations – Analytic functions – Harmonic functions – Conformal mapping.

UNIT –III COMPLEX INTEGRATION (18 HRS.)

Definite integral – Cauchy's theorem – Cauchy's integral formula - Higher derivatives.

UNIT –IV SERIES EXPANSIONS (18HRS.)

Introduction - Taylor's series – Laurent's series – Zeros of an analytic function – singularities.

UNIT –V CALCULUS OF RESIDUES (18 HRS.)

Introduction – Residues – Cauchy's residue theorem – Evaluation of definite integrals.

TEXT BOOKS:

2. S.Arumugam, A.Thangapandi Isaac &A.Somasundaram - Complex Analysis - SciTech Publications (India) Pvt.Ltd-2009

REFERENCES:

5. T. K. Manicavachagam Pillay ,Dr. S. P.Rajagopalan and Dr .S. Sattanathan- S.Viswanathan (Printers & Publishers), Pvt.Ltd., 2007 - Complex Analysis
6. P. Duraipandian, Laxmi Duraipandian& D. Muhilan- Emerald Publishers, 1986- Complex Analysis
7. P.Duraipandian, Laxmi Duraipandian&D.Muhilan, - Emerald Publishers, 1986- Complex Analysis

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SEMESTER –VI

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	M6CC13/ G6CC13	NUMERICAL METHODS	Lecture	5	4

COURSE DESCRIPTION

This course enables the students to solve equations using various Numerical Methods.

COURSE OBJECTIVE/S

To enable the students to solve Algebraic, Transcendental, Differential Equations using various Numerical methods like Bisection, Runge-Kutta, Euler and Taylor.

SYLLABUS

UNIT I: ALGEBRAIC AND TRANSCENDENTAL EQUATIONS (15 HRS)

Introduction - Bisection method - Iteration method – Regula-falsi method – Newton-Raphson method. (No derivations).

UNIT II: SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS (15 HRS)

Introduction – Gauss Elimination method – Gauss Jordan method – Calculation of inverse of a matrix – Gauss Jacobi Iteration method – Gauss Seidel iteration method.(No derivations).

UNIT III: FINITE DIFFERENCES & INTERPOLATION (15 HRS)

Difference operators – Other difference operators- Relation between the operators -Newton's forward Interpolation formula - Newton's backward Interpolation formula – Gauss forward Interpolation formula - Gauss backward Interpolation formula – Stirling's formula - Lagrange's interpolation formula – Divided difference – Newton's Divided difference formula – Inverse interpolation. (No derivations).

UNIT IV: NUMERICAL DIFFERENTIATION AND INTEGRATION

(15 HRS)

Derivatives using Newton's forward difference formula - Derivatives using Newton's backward difference formula - Derivatives using Central difference formula - Maxima and minima of the interpolating polynomial - Numerical Integration – Trapezoidal Rule – Simpson's one third rule. (No derivations).

UNIT V: NUMERICAL SOLUTION OF DIFFERENTIAL EQUATION (15 HRS)

Taylor series method – Picard's method – Euler's method – Modified Euler's method - Runge-Kutta methods – Second order Runge-Kutta method - Higher order Runge-Kutta method - Predictor-Corrector formulae-Milne's Predictor - Corrector formulae - Adam's Predictor-Corrector equations. (No derivations).

TEXT BOOK:

Dr. M.K. Venkataraman - Numerical Methods in Science and Engineering - The National publishing company – fifth edition.

Unit I- Chapter III -Sections 1 to 5.

Unit II- Chapter IV- Sections 1,2,3,6.

Unit III- Chapter V-Sections 1 to 12, 14 to 18.

Chapter VI - Sections 1 to 5.

Chapter VII-Sections 1 to 5.

Chapter VIII - Sections 1 to 5.

Unit IV - Chapter IX- Sections 1 to 8, 10.

Unit V - Chapter XI-Sections 6,9,10,12,13,14,16,19,20,21.

REFERENCE BOOKS:

1. S. Arumugam, S. Thangapandi Isaac & A. Soma Sundaram - Numerical Analysis ,
   New Gamma Publishing House-2007.
2. S.S. Sastry **-** Introductory methods of Numerical analysis, Prentice Hall of India Private Limited 1991.
3. M.K. Jain, R.K. Jain, S.R.K. Iyengar **-** Numerical Methods for Scientific and Engineering Computation, New Age International (p) Limited, Publishers

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SEMESTER –VI

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	M6CC14 / G6CC14	OPERATIONS RESEARCH	Lecture	5	4

COURSE DESCRIPTION

This helps in solving problems in different environments that needs decisions.

COURSE OBJECTIVE/S

To aim at familiarizing the students with quantitative tools and techniques, which are frequently applied to business decision making and to provide a formal quantitative approach to problem solving.

SYLLABUS

UNIT I: SEQUENCING PROBLEM [15 HRS]

Introduction – problem of sequencing – Basic terms used in sequencing - Processing n jobs through two machines – Processing n jobs through k machines - Processing 2 jobs through k machines.

UNIT II: GAMES AND STRATEGIES [15 HRS]

Introduction – Two person zero sum games – Some basic terms - The maximin-minimax principle – Games without saddle points – mixed strategies – Graphical solution of 2 x n and m x 2 games – Dominance property – Arithmetic method for n x n game – General solution of m x n rectangular games.

UNIT III: INVENTORY CONTROL [15 HRS]

Introduction – Types of Inventories-Reasons for carrying inventories-The Inventory decisions – Cost associated with inventories – Factors affecting inventory control - Economic Order Quantity(EOQ) – Deterministic inventory problems with no shortages - Deterministic inventory problems with shortages . **(Only Problems, No derivation)**.

UNIT IV: QUEUING THEORY [15 HRS]

Introduction- Queuing system – Elements of Queuing system – Operating characteristics of queuing system –Deterministic queuing system – Probability distributions in queuing systems – Classification of queuing models – Definition of transient and steady states – Poisson queuing systems –Model I (M/M/1): (∞ / FIFO) – Model II (M/M/I): (∞/SIRO) - Model III (M/M/1): (N/FIFO).

UNIT V: NETWORK SCHEDULING BY PERT/CPM [15 HRS]

Introduction – Network and basic components – Logical sequencing – Rules of network construction – Critical path analysis – probability considerations in PERT

TEXT BOOK:

Kanti Swarup, P.K Gupta and Man Mohan – Introduction to Management Science -Operations Research - Sultan Chand & Sons - 2015

Unit I - Chapter 12: Sections 12.1 to 12.6

Unit II - Chapter 17: Sections 17.1 to 17.9

Unit III - Chapter 19: Sections 19.1 to 19.4, 19.6,19.7, 19.9-19.11.

Unit IV - Chapter 21: Sections 21.1 to 21.9 (Upto model III)

Unit V - Chapter 25: Sections 25.1 to 21.4, 25.6, 25.7

REFERENCE BOOKS:

1. Prem Kumar Gupta and D.S Hira - Problems in Operations Research, Sultan Chand & Sons - 2007
2. P.K Gupta and Man Mohan - Problems in Operations Research, Sultan Chand & Sons – 2007

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SEMESTER –VI

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	M6ME3/ G6ME3	OBJECT ORIENTED PROGRAMMING WITH C++	Lecture	3	3

COURSE DESCRIPTION

This course introduces the student to object-oriented programming through a study of the concepts of program specification and design, algorithm development.

COURSE OBJECTIVE/S

In the expanding field of computer education, one of the fastest growing, versatile and much sought after languages is C++. This course enables the students to understand the fundamentals of the language, the concepts related to the syntax of the language.

SYLLABUS

UNIT I: BEGINNING WITH C++, TOKENS, EXPRESSIONS AND CONTROL STRUCTURES, FUNCTIONS IN C++ (9 HRS)

What is C++ - Applications of C++ - A simple C++ program – More C++ statements – Structure of C++ program – Tokens – Keywords – Identifiers – Variables – Operators – Manipulators – Expressions – Control structures. Introduction – The main function – Function prototyping – Call by reference – Return by reference – Return by reference – Inline function – Default arguments – Const arguments – Function overloading – Friend and virtual functions – Math library functions.

UNIT II: CLASSES AND OBJECTS (9 HRS)

Introduction – C structures revisited – Specifying a class – Defining member functions – A C++ program with class – Making an outside function inline – Nesting of member functions – Private member functions – Arrays within a class – Memory allocation for objects – Static data members – Static member functions – Arrays of objects – Objects as function arguments – Friendly functions – Returning objects – Const member functions – Pointers to members – Local classes.

UNIT III: CONSTRUCTORS AND DESTRUCTORS AND OPERATOR OVERLOADING (9 HRS)

Constructors and destructors Introduction – Defining operator overloading – Overloading unary operators - Overloading binary operators - Overloading binary operators using friends – Manipulation of strings using operators – Rules for overloading operators – Type conversions

UNIT IV: INHERITANCE (9 HRS)

Introduction – Defining derived classes – Single inheritance – Making a private member inheritable – Multilevel inheritance – Multiple inheritance – Hierarchical inheritance – Hybrid inheritance – Virtual base classes – Abstract classes – Constructors in derived classes – Member classes: Nesting of classes.

UNIT V: POINTERS, VIRTUAL FUNCTIONS AND POLYMORPHISM (9 HRS)

Introduction – Pointers – Pointers to objects –this pointer – Pointers to derived classes – Virtual functions – Pure virtual functions.

TEXT BOOK:

E. Balagurusamy - Object Oriented Programming with C++, Tata McGraw-Hill Publishing Company Limited – Fourth Edition - 2007.

Unit-I: Chapter 2- 2.1 to 2.4, 2.6, Chapter 3- 3.2 to 3.24 Chapter 4- 4.1 to 4.11

Unit-II: Chapter 5- 5.1 to 5.19,

Unit-III: Chapter 6-6.1 to 6.11 Chapter 7- 7.1 to 7.8,

Unit-IV Chapter 8-8.1 to 8.12

Unit-V: Chapter 9- 9.1 to 9.7

REFERENCE BOOKS:

1. Robert Lafore – Object-Oriented Programming in Microsoft C++ - Galgotia publication – Third Edition – 2004.
2. Stephen Prata - C++ primer plus - Galgotia publication pvt. Ltd. – 1997.

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SEMESTER –VI

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	**M6ME4/ G6ME4**	**ASTRONOMY**	**Lecture**	5	3

COURSE OBJECTIVE/S

To introduce the concepts about the celestial bodies such as Earth, Moon and Planets and to import the knowledge on duration of day and night, lunar and solar eclipses, maximum number of eclipses.

SYLLABUS

UNIT I: SPHERICAL TRIGONOMETRY (15 HRS)

Spherical trigonometry – formulae only – celestial sphere – diurnal motion – sidereal day – different systems of coordinates – equinoxes, solstices, apparent annual motion of the sun – ecliptic – latitude of a place – hour angle of a star at rising – circumpolar star.

UNIT II: EARTH (15 HRS)

Earth – dip – definition and effects – twilight – duration

UNIT III: REFRACTION (15 HRS)

Refraction – tangent and Cassini's formula – effects of refraction on right ascension, declination, small vertical and horizontal arcs and on dip

UNIT IV: MOON (15 HRS)

Moon – Introduction – phases of moon – sidereal and synodic month-lunar day and lunar time –the tides.

UNIT V: ECLIPSES

(15 HRS)

Eclipses – solar and lunar – occurrences – conditions for the occurrences – ecliptic limits – maximum and minimum number of eclipses in a year.

TEXT BOOK:

S.Kumaravelu and Susheela Kumaravelu, Astronomy, Reprinted, Sri Vishnu Arts, 2004.

Unit I : Chapter 2; Unit II : Chapter 3;

Unit III : Chapter 4; Unit IV: Chapter 12;

Unit V : Chapter 13

REFERENCE BOOK: Robert .H. Baker, Introduction in Astronomy, 6^{th} Edition.

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SEMESTER –VI

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	**M6ME5/ G6ME5**	**LATTICES AND BOOLEAN ALGEBRA**	**Lecture**	5	5

COURSE DESCRIPTION

This course helps the students to know more about Lattices and Boolean Algebra and their usefulness in other areas of Mathematics.

COURSE OBJECTIVE/S

To enable the students understand the computational aspects of Sets, Relations, Mathematical logic, Graphs, Trees and Algebraic structure in the field of Mathematics.

UNIT –I POSETS AND LATTICES (20 HRS.)

Diagrammatical representation of a poset – Isomorphisms – Duality – Product of two Posets – Semi Lattices – Complete Lattices – Sub Lattices.

UNIT –II IDEALS (10 HRS.)

Dual Ideals – Principal Ideals – Principal Dual Ideals – Prime Ideals – Complements – Length and Covering Conditions.

UNIT –III MODULAR AND DISTRIBUTIVE LATTTICES (20 HRS.)

Direct Products – Ideal lattice – Isomorphism Theorem – **Distributive Lattices** – Direct Product.

UNIT –IV BOOLEAN ALGEBRA (15 HRS.)

Boolean Algebra – Boolean Rings – Boolean Functions – Conjunctive Normal Form – **Disjunctive Normal Form**.

UNIT –V SWITCHING CIRCUITS (10 HRS.)

Switching Circuits – Representation of Circuits – **Simplification of Circuits**

– Design of Circuits – Don't Care Conditions – Design of n-terminal Circuits – Non-Series-Parallel Circuits.

TEXT BOOK:

1. Vijay K. Khanna, *Lattices and Boolean Algebras*, Vicas Publishing house Pvt Ltd – Second Edition, 2008

   UNIT I : Chapter 2

   UNIT II : Chapter 3 (pages 38 – 57)

   UNIT III : Chapter 4

   UNIT IV : Chapter 5 (pages 96 – 99 and 107 – 125)

   UNIT V **:** Chapter 5 (pages 125 – 145)

REFERENCES:

1. Mendelson Elliott, *Theory and problems of Boolean Algebra*, Schaums Outline Series, New York McGraw Hill Publications, 1970.
2. Whitesitt. J Eldon, *Boolean Algebra and its Applications*, Massachusetts: Adition Wesley, 1962.

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SEMESTER –VI

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	**M6ME6/ G6ME6**	**AUTOMATA THEORY**	**Lecture**	5	5

COURSE OBJECTIVE/S

It provides techniques useful in a wide variety of applications and helps to develop a way of thinking that leads to understanding of the structure behavior and limitations and capabilities of logical machines.

SYLLABUS

UNIT I: FINITE AUTOMATA (15 HRS)

Deterministic Finite Accepters: Deterministic Accepters and Transition Graphs – Languages and DFA's – Regular Languages - Non Deterministic Finite Accepters: Definition of a Non Deterministic Accepter - Equivalence of Deterministic and Non Deterministic Finite Accepters – Reduction of the number of States in Finite Automata.

UNIT II: REGULAR LANGUAGES AND REGULAR GRAMMARS (15 HRS)

Regular Expressions: Formal Definition of a Regular Expression – Languages Associated with Regular Expressions – Connection between Regular Expression and Regular Languages: Regular Expression Denote Regular Languages – Regular Expression for Regular Languages - Regular Expression for Describing Simple Patterns - Regular Grammars: Right and Left Linear Grammars - Right Linear Grammars Generate Regular Languages - Right Linear Grammars for Regular Languages Equivalence of Regular Languages and Regular Grammars.

UNIT III: PROPERTIES OF REGULAR LANGUAGES (15 HRS)

Closure Properties of Regular Languages: Closure under Simple Set Operations – Closure under Other Operations - Elementary Questions about Regular Languages – Identifying Non regular Languages: Using the Pigeonhole Principle – A Pumping Lemma.

UNIT IV: CONTEXT FREE – LANGUAGES (15HRS)

Context – Free Grammars: Examples of Context Free Languages – Leftmost and Rightmost Derivations – Derivation Tress – Parsing and Ambiguity:

Parsing and Membership – Ambiguity in Grammars and Languages - Context – Free Grammars and Programming Languages.

UNIT V: PUSHDOWN AUTOMATA (15 HRS)

Nondeterministic Pushdown Automata: Definition of a Pushdown Automaton – The Language accepted by a Pushdown Automaton – Pushdown Automata and Context-free Languages: Pushdown Automata for Context-free Languages - Context-free Grammar for Pushdown Automata – Deterministic Pushdown Automata and Deterministic Context-free Languages – Grammars for Deterministic Context-free Languages.

TEXT BOOK:

Peter Linz, An Introduction to Formal Languages and Automata, Fourth Edition, Narosa Publishing House

Unit I : Chapter 2

Unit II : Chapter 3

Unit III : Chapter 4

Unit IV : Chapter 5

Unit V : Chapter 7

REFERENCE BOOKS:

1. Adesh K. Pandey , An Introduction to Automata Theory and Formal Languages

2. S.P.Eugene Xavier, Theory of Automata, Formal Languages and Computation

3. John E. Hopcroft, Rajeev Motwani, Jeffery D. Ullman , Introduction to Automata

Theory, Languages and Computation

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SEMESTER –VI

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGOR Y	HRS/WEE K	CREDIT S
UAMA/USMA	**M6ME7/ G6ME7**	**THEORY OF NUMBERS**	**Lecture**	5	5

COURSE DESCRIPTION

The students are introduced about the basic topics of Number Theory which includes Divisibility, Primes, Congruences, positive divisors, Fermat's and Wilson's theorem, Quadratic reciprocity.

COURSE OBJECTIVE/S

To present the students an introduction to an area of the pure Mathematics which has intrigued non professionals as well as the greatest minds of human kind since the dawn of history.

UNIT I: DIVISIBILITY THEORY (15 HRS)

Divisibility of integers – Division Algorithm - Greatest Common Divisor – Euclidean Algorithm - Least Common Multiple.

UNIT II: PRIME AND COMPOSITE NUMBERS (15 HRS)

Prime number – Composite number – Coprime – Twin Primes – Siamese Twin – The Sieve of Erastosthenes – Positional representation of an integer – Divisors of an integer – Arithmetic functions – Product of Divisors.

UNIT III: CONGRUENCES (15 HRS)

Congruences –Residues – Residue Classes - Complete Residue System - Reduced Residue system – Divisibility Tests - Linear Congruence - Chinese Remainder Theorem .

UNIT IV: QUADRATIC RESIDUES (20 HRS)

Quadratic Residues –Euler's Criterion- Legendre Symbols - Quadratic Reciprocity Law – Jacobi Symbol.

UNIT V: FERMAT'S THEOREM AND ITS APPLICATIONS (10 HRS)

Introduction - Fermat's Theorem – Euler's Extension of Fermat's Theorem – nverse modulo m – Wilson's Theorem-Converse of Wilson's Theorem.

TEXT BOOK:

Kumaravelu , Susheela Kumaravelu ,First Edition, January 2002.

UNIT I Chapter 3

UNIT II Chapter 4 (Section 77 to 97)

UNIT III Chapter 6

UNIT IV Chapter 8 (Section 255 to 286)

UNIT V Chapter 7 (Section 191 to 209)

REFERENCE BOOKS:

1. David.M.Burton, *Elementary Number Theory*, McGraw Hill Book Company, 7th Edition ,2006.

Pundir Pundir , *Theory of Numbers* ,A Pragathi Edition , 2006.

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SEMESTER –VI

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	M6SB5 / G6SB5	MATLAB	Lecture	2	2

COURSE DESCRIPTION

This course provides knowledge of basic concepts in MATLAB.

COURSE OBJECTIVE/S

To enable the students write simple programs using MATLAB

SYLLABUS

LIST OF MATLAB PROGRAMS:

1. To evaluate the arithmetic operators namely addition, subtraction, multiplication, division, unary minus, unary plus, exponentiation.
2. To calculate the sum of a series.
3. To use various arithmetic operations on matrices such as addition, subtraction, multiplication, division, exponentiation.
4. To find some useful commands related to matrices such as determinant, rank, eigen vectors, orthogonal.
5. To compute characteristic polynomial of a matrix, polynomial differentiation, polynomial integration.
6. To compute polynomial addition, subtraction, multiplication, division and root of a polynomial.
7. To solve a set of linear algebraic equations.
8. To find the mean, median, standard deviation, cumulative sum, cumulative product ofa given statistical data
9. To plot a bar graph , horizontal bar graph for a given data
10. To obtain the differentiation of a given expression and evaluating thedefinite integral.

TEXT BOOKS:

1. Rajkumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, *MATLAB and its applications in Engineering*
2. Rudra Pratap, Getting started with MATLAB – *A quick introduction for scientists and Engineers*

   TEXT BOOK-1

   Sections 2.5.1, 2.9, 3.9, 3.10.1, 4.4, 4.5, 4.6, 4.7, 4.9, 4.10, 4.11, 6.7.4, 6.7.5, 9.3.2.1, 9.3.2.3

   TEXT BOOK -2

   Sections 5.1.1, 5.3

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SEMESTER –VI

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAMA/USMA	M6SB6 / G6SB6	APPLIED DYNAMICS	Lecture	2	2

COURSE DESCRIPTION

This course will provide a sound knowledge of the concepts and principles in Dynamics.

COURSE OBJECTIVE/S

The aim of the course is to help the students to understand the behaviour of projectiles. collision of elastic bodies, Simple harmonic motion and its properties, motion under the action of central forces.

SYLLABUS

UNIT I: IMPULSIVE FORCES [6 HRS]

Impulse-Impulsive forces-Impact of two bodies- -Loss of Kinetic Energy in impact - Motion of a Shot and Gun – Impact of water on a surface.

UNIT II: COLLISION OF ELASTIC BODIES [6 HRS]

Introduction-Definitions-Fundamental laws of impact-Impact of a Smooth Sphere on a Fixed Smooth Plane

UNIT III: COLLISION OF ELASTIC BODIES- DIRECT IMPACT [6 HRS]

Direct Impact of Two Smooth Spheres-Loss of kinetic energy due to direct impact of smooth spheres.

UNIT IV: PARALLEL AND PERPENDICULAR AXES [6 HRS]

Definition-The Theorem of Parallel Axes- The Theorem of Perpendicular Axes

UNIT V: MOMENT OF INERTIA **[6 HRS]**

Moment of Inertia in some particular cases- Dr. Routh's Rule –Equimomental systems.

TEXT BOOK:

Dr. M. K. Venkataraman - A Text book of Dynamics - Agasthiar Publications,Fourteenth Edition-2011

Unit – I : Chapter 7 **Unit – II** : Chapter 8 (8.1 – 8.4)

Unit – III : Chapter 8 (8.5 & 8.6) **Unit – IV** : Chapter 12 (12.1 – 12.3)

Unit – V : Chapter 12 (12.4 – 12.6)

REFERENCE BOOKS:

1. P. Duraipandian & Lakshmi Duraipandian-Mechanics –S. Chand &Company- Fourth Edition-Reprint-2003.

2. Kaushal Kumar Singh- A Text book of Dynamics- Asoke K.Ghosh ,PHI Learning Private Limited-2011.