NOORUL ISLAM CENTRE FOR HIGHER EDUCATION

NOORUL ISLAM UNIVERSITY, KUMARACOIL

M.Sc. MATHEMATICS

CURRICULUM & SYLLABUS

SEMESTER – I

SL. NO.	SUBJECT CODE	SUBJECT	L	T	P	C
THEORY						
1.	MA1701	Algebra I	4	1	0	5
2.	MA1702	Analysis I	4	1	0	5
3.	MA1703	Differential Equations	4	1	0	5
4.	MA1704	Fuzzy Mathematics	4	1	0	5
5.	xxxE1	Elective - I	3	1	0	4
TOTAL CREDITS			**19**	**5**	**0**	**24**

MA1701 ALGEBRA - I 4 1 0 5

Objective:

To enable students comprehend more concepts in algebra with a view to develop his/her thinking and mathematical ability. To understand the basic algebraic structures prevailing in the set of numbers.

UNIT-I

A counting principle – Normal Subgroups and Quotient Groups – Homomorphisms - Automorphisms – Cayley's Theorem – Permutation Groups.

UNIT-II

Another counting principle - class equation for finite groups and its applications - Sylow's theorem- Direct products - Finite abelian groups-

UNIT-III

Introduction to Rings: Basic definitions and examples –Some special classes of Rings-Homomorphisms – Ideals and quotient rings – more Ideals and quotient rings –The field of Quotients of an integral domain

UNIT-IV

Euclidean Rings-A particular Euclidean Rings– Polynomial rings: Definitions and basic properties – Polynomials over the rational field- Polynomial rings over commutative Rings

UNIT-V

Introduction to Vector Spaces- Basic definitions – Linear independence and Bases-Dual Spaces-Inner product Spaces-Modules.

Text Book:

Topics in Algebra by I.N. Herstein, Second Edition, John Wiley and Sons, 2006, Reprint 2013.

Unit I : Chapter 2: Sections 2.5 to 2.10.

Unit II: Chapter 2: Sections 2.11 to 2.14.

Unit III: Chapter 3: Sections 3.1 to 3. 6.

Unit IV: Chapter 3: Sections 3.7 to 3.11.

Unit V: Chapter 4: Sections 4.1 to 4.5

MA1702 ANALYSIS - I 4 1 0 5

Objective:

To provide a strong foundation on the concepts in sequences and series and also enable the students to have a comprehensive idea about the underlying principles of Derivatives, continuous functions and the properties of Riemann-Stieltjes Integral .

Unit I: Basic Topology: Finite, Countable and uncountable sets – Metric Spaces – Compact Sets – Perfect sets – Connected Sets.

Unit II: Numerical sequences and series: Convergent sequences – Subsequences – Cauchy sequences – Upper and lower limits – Some special sequences - Series – Series of nonnegative terms – The number e – The root and ratio tests – Power series – Summation by parts – Absolute convergence – Addition and multiplication of series – Rearrangements.

Unit III: Continuity: Limits of functions – Continuous functions – Continuity and compactness –Continuity and connectedness - Discontinuities – Monotonic functions – Infinite limits and limits at infinity.

Unit IV: Differentiation: The Derivative of a real function – Mean value theorems - The continuity of derivatives – L' Hospital's rule – Derivatives of Higher order – Taylor's theorem –Differentiation of vector valued functions.

Unit V: The Riemann-Stieltjes integral: Definition and existence of the integral- Properties of the integral - Integration and Differentiation - Integration of vector - Valued functions-Rectifiable Curves.

Text Book: Principles of Mathematical Analysis (Third edition) by Walter Rudin, Chapters 2, 3, 4, 5 and 6.

MA1703 DIFFERENTIAL EQUATIONS 4 1 0 5

Objective:

To help students grasp problem solving techniques in power series solutions of second order ordinary differential equations with variable coefficients and some special functions of mathematical physics. Linear and non linear differential equations of first and second order are also studied in detail.

Unit I: Power Series Solutions and Special Functions: Series solutions of first and second order linear solutions. Regular singular point, Gauss's hyper geometric equations.

Unit II: Some Special functions of Mathematical Physics: Legendre polynomial, Bessel functions, The gamma function and their properties.

Unit III: Nonlinear equations: Simple critical points, nonlinear mechanics, conservative systems, periodic solutions, the Poincare-Bendixson theorems.

Unit IV: Laplace Transforms: Application to differential equation, derivatives and integrals of Laplace transforms, Convolutions and Abel's mechanical problems.

Unit V: The Existence and Uniqueness of solutions : the method of successive approximations, Picard's theorem, Systems, the second order linear equations.

Text Book: Differential Equations with Applications and Historical Notes by George F. Simmons, Sections 26 to 31, 44 to 46,50 to 57

MA1704 FUZZY MATHEMATICS 4 1 0 5

Objective:

To make the students to comprehend the fundamentals of Fuzzy set theory, Fuzzy relations, Fuzzy measures and Fuzzy algebra are incorporated.

Unit I Fuzzy Sets

The notion of Fuzzy sets, Basic concepts of Fuzzy sets, Operations on Fuzzy sets, Combinations of operations , Fuzzy logic

Unit II Fuzzy relations

Primary relations, Binary relations on a single set, equivalence and similarity relations, Compatibility, ordinary morphisms, and Fuzzy relatives equations.

Unit III Fuzzy measures

Probability measures, possibility and necessity measures, relationship among classes of Fuzzy measures, measures of fuzziness, classical measures of uncertainity.

Unit IV Fuzzy subgroups

Some elementary properties, union of two fuzzy subgroups, Fuzzy sub groups generated by a Fuzzy subset, Fuzzy normal subgroups, Fuzzy conjugate subgroups, Fuzzy Characteristic subgroups

Unit V Fuzzy Subrings

Some elementary properties, union of two fuzzy subrings, Fuzzy subring generated by a Fuzzy subset, Fuzzy ideal and homomorphisms,Fuzzy cosets, Fuzzy prime ideal, Fuzzy maximal ideals.

Text Books:

1. Fuzzy sets – Uncertainity and information by George J.Klir and Tina A.Folger, Prentice – Hall of India Pvt. (2006). Chapters: I, II, III & IV.

2. Fuzzy set theory and its applications – H.J.Zimmermann – Springer – Fourth Edition (2001). Chapter IV.
3. Fuzzy Algebra by Rajesh kumar ,Volume 1, university of Delhi publication Division .Chapter 2 , Section 2.1,2.2,2.3
   Chapter 3 and chapter 4 , Section 4.1,4.2.

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M.Sc. MATHEMATICS

CURRICULUM & SYLLABUS

SEMESTER – II

SL. NO.	SUBJECT CODE	SUBJECT	L	T	P	C
THEORY						
1.	MA1705	Algebra II	4	1	0	5
2.	MA1706	Analysis II	4	1	0	5
3.	MA1707	Numerical Analysis	4	1	0	5
4.	XXEE2	Elective - II	3	1	0	4
5.	XX17A1	Supportive Course-I	3	1	0	4
TOTAL CREDITS			**18**	**5**	**0**	**23**

MA1705 ALGEBRA II 4 1 0 5

Objective:

To enable students to comprehend the advanced topics in algebra like field extension, roots of polynomials, Galois Theory, finite fields, division rings and solvability by radicals. Also to develop computational skills in abstract algebra.

UNIT-I

Extension fields – The Transcendence of e - Roots - Polynomials - More about roots.

UNIT-II

The Elements of Galois theory - Solvability by radicals – Galois Groups over the Rationals.

UNIT-III

The Algebras of linear transformations – Characteristic roots – Matrices – Canonical forms-triangular form.

UNIT-IV

Canonical forms-Nilpotent Transformations, A Decomposition of V, Jordan form, Rational Canonical form-Trace and transpose.

UNIT-V

Hermitian, Unitary and Normal transformations-Real Quadratic forms – Finite Fields.

Text Book:

I.N. Herstein. Topics in Algebra (II Edition) Wiley Eastern Limited, New Delhi, 1975.

Unit I : Chapter 5: Sections 5.1 to 5.3 & 5.5.

Unit II: Chapter 5: Sections 5.6 to 5.8.

Unit III: Chapter 6: Sections 6.1 to 6.4.

Unit IV: Chapter 6: Sections 6.5 to 6.8.

Unit V: Chapter 6 &7: Sections 6.10,6.11 and 7.1

MA1706 ANALYSIS II 4 1 0 5

Objective :

To develop a firm footing in Analysis and also the concepts in sequences and series of function, Stone-Weierstrass theorem, Inverse function theorem and Stoke's theorem are included.

Unit I: Sequences and Series of functions: Discussion of Main problem - Uniform convergence - Uniform convergence and continuity-Uniform convergence and Integration.

Unit II: Uniform convergence and differentiation- Equicontinuous families of functions-The Stone-Weierstrass theorem.

Unit III: Functions of Several Variables: Linear transformations - Differentiation -The Contraction Principle –The Inverse function theorem-The Implicit function theorem.

Unit IV: Determinants - Derivatives of higher order – Differentiation of Integrals - Integration of Differential forms: Integration - Primitive Mappings-Partitions of unity - Change of Variables.

Unit V: Differential forms - Simplexes and Chains – Stokes' theorem –Closed forms and exact forms – Vector Analysis.

Text Book: Principles of Mathematical Analysis (Third Edition) by Walter Rudin, Chapters 7, 9 (except 9.30, 9.31 and 9.32) and 10.

MA1707 NUMERICAL ANALYSIS 4 1 0 5

Objective :

To provide the student an understanding of the basic principles of numerical methods and to apply them in solving algebraic equations and ordinary differential equations numerically. To introduce various difference operators to enable the students to apply them in interpolation and numerical differentiation and integration.

Unit I: The solution of nonlinear equations: A survey of iterative methods-Fixed point iteration-Polynomial Equations: Real roots-Complex roots and Muller's Method.

Unit II: Matrices and System of linear equations: The solution of linear systems by elimination-The pivoting strategy - The triangular factorization.

Unit III: Interpolation by polynomials: Polynomial forms- Existence and Uniqueness of the Interpolating polynomials - The divided difference table- The error of the interpolating polynomial-Interpolation in a function table based on equally spaced points.

Unit IV: Differentiation and Integration: Numerical differentiation-Numerical Integration: Some basic rules-Composite rules.

Unit V:. Numerical methods - Single step methods and multi step methods.

Text Book:

Numerical Methods for Scientific and Engineering Computation by M.K.Jain, S.R.K.Iyengar and R.K.Jain, New Age International Publishers, 2003, Fourth Edition.

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CURRICULUM & SYLLABUS

SEMESTER – III

SL. NO.	SUBJECT CODE	SUBJECT	L	T	P	C
THEORY						
1.	MA1708	Topology	4	1	0	5
2.	MA1709	Complex Analysis	4	1	0	5
3.	MA1710	Mathematical Statistics	4	1	0	5
4.	XX17A2	Supportive Course-II	3	1	0	4
PRACTICAL						
5.	CS1771	Computer Fundamentals and C Programming Lab	0	2	2	3
TOTAL CREDITS			**15**	**6**	**2**	**22**

MA1708 TOPOLOGY 4 1 0 5

Objective :

To enable the students how to distinguish spaces by means of simple topological invariants (compactness, connectedness and the fundamental group) and to explain how to construct spaces by gluing and to prove that in certain cases that the result is homeomorphic to a standard space, also to construct simple examples of spaces with given properties (eg compact but not connected or connected but not path connected).

Unit I: Topological spaces and continuous functions: Topological spaces - Basis for a topology – The order topology – The product topology on X x Y – The subspace topology - Closed sets and limit points.

Unit II: Continuous functions – The product topology – The quotient topology.

Unit III: Connectedness and Compactness: Connected spaces, components and local connectedness - Compact spaces.

Unit IV: Local compactness – Countability and Separation axioms: The Countability axioms – The Separation axioms- Normal spaces.

Unit V: The Uryshon lemma- The Tietze Extension theorem - The Tychonoff theorem: Tychonoff theorem.

Text Book: Topology (second edition) by J. R. Munkres, Sections 12 to 19, 22, 23, 25, 26, 29 to 33, 35, 37 and 38.

MA1709 COMPLEX ANALYSIS 4 1 0 5

Objective:

To train the students to get essential knowledge in complex analysis. The theory of analytic function, complex integration and bilinear transformations are discussed in detail.

Unit I: Complex Functions

Concept of Analytic Functions – Limits and Continuity – Analytic Functions – Polynomials – Rational Functions – Elementary Theory of Power Series - Sequences - Series – Uniform Convergence – Power series – Abel's Limit Theorem.

Unit II: Analytic Functions as Mappings

Conformality – Arcs and Closed Curves – Analytic Functions in Regions – Conformal Mapping-Lengths and Arcs-Linear Tranformations – The Linear Group – The Cross Ratio - Symmetry.

Unit III : Complex Integration

Fundamental Theorems : Line Integrals – Rectifiable Area – Line Integrals as Functions of Arcs – Cauchy's Theorem for a Rectangle – Cauahy's Theorem in a Disk.Cauchy's Integral Formula : The Index of a Point with Respect to a Closed Curve – The Integral Formula - Higher Derivatives.

Unit IV : Local Properties of Analytical Functions

Removable Singularities – Taylor's Theorem – Zeros and Poles – The Local Mapping – The Maximum Principle. The General Form of Cauchy's Theorem : Chains and Cycles - Simple Connectivity – Homology - The General Statement of Cauahy's Theorem – Proof of Cauahy's Theorem.The Calculus of Residues : The Residue Theorem – The Argument Principle – Evaluation of Definite Integrals.

Unit V : Harmonic Functions, Series and Product Developments

Harmonic Functions : Definition and Basic Properties – The Mean - Value Property – Poission's Formula – Schwarz's Theorem – The Reflection Principle.Series and Product Developments : Power Series – Expansions - Weierstrass's Theorem – The Taylor Series – The Laurent Series.

Text Book:

Complex Analysis **by L.V. Ahlfors (III edition) MeGraw Hill ISE, 1981.**

Unit I : Chapter 2: sections 1, 2.

Unit II : Chapter 3 : Sections 2, 3 (3.1 to 3.3 only) .

Unit III : Chapter 4: Sections 1, 2.

Unit IV : Chapter 4: Sections 3, 4(4.1 to 4.5 only) and 5

Unit V : Chapter 4 : Section 6

Chapter 5: Section 1.

MA1710 MATHEMATICAL STATISTICS 4 1 0 5

Objective:

To develop in the students the ability to understand more concepts in Statistics and to know more about various distributions.

Unit I

Introduction, Set Theory, The probability set functions, Conditional probability and Independence, Random variables of the discrete type, Random variables of the continuous type, properties of the distribution function, Expectation of a random variable, some special expectations Chebyshev's inequality.

Unit II

Distributions of two random variables, Conditional distributions and expectations, the correlation coefficient, Independent random variables, Extension to several random variables.

Unit III

The Binomial and related distributions, The Poisson distribution, The Gamma and Chi-square distributions, The Normal distribution, The Bivariate normal distribution.

Unit IV

Sampling theory, Transformations of variables of the discrete type, Transformations of variables of the continuous type, The Beta t, F distributions, Extensions of the change-of-variable technique, Distributions of order statistics the moment generating function technique, the distributions of $\bar{X}$ and nS^2/σ^2, Expectations of functions of random variables.

Unit V

Convergence in distribution, Convergence in probability, Limiting moment generating functions, the central limit theorem, some theorems on limiting distributions.

Text Book**:**

Introduction to Mathematical Statistics**, V Edition by R.V.Hogg and A.T.Craig, Pearson Education, Asia, 2002.**

Chapter 1: Sections : 1.1 to 1.10.
Chapter 2: Sections: 2.1 to 2.5.
Chapter 3: Sections: 3.1 to 3.5.
Chapter 4: Sections: 4.1 to 4.9.
Chapter 5: Sections : 5.1 to 5.5.

CS1771	*COMPUTER FUNDAMENTALS AND C PROGRAMMING LAB*	L	T	P	C
		0	1	2	3

1. FUNDAMENTALS OF COMPUTERS AND OPERATING SYSTEMS.

Evolution of computers – Organization of Modern Digital Computers – Single user Operating System – Multitasking OS – GUI.

2. OFFICE AUTOMATION

a. Word Processing
b. Data Base Management System
c. Spread Sheet Package
d. Presentation Software.

3. IMPLEMENTATION IN C

1. Input / output function
2. Control Functions
3. Functions
4. Arrays
5. Pointers
6. Structures and Unions
7. Files

Using case studies: Roots of a quadratic equation, Measures of location – Matrix Operations – Evaluation of trigonometric functions – Pay roll problems.

String operations like substring, concatenation, finding a string from a given paragraph, finding the number of words in a paragraph.

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M.Sc. MATHEMATICS

CURRICULUM & SYLLABUS

SEMESTER – IV

SL. No.	Course Code	Course Title	L	T	P	C
1.	MA1711	Functional Analysis	4	1	0	5
2.	MA1712	Operations Research	4	1	0	5
3.	MA1713	Graph Theory	4	1	0	5
PRACTICAL						
4.	MA17P1	Project and Viva - Voce	0	0	12	6
TOTAL			**12**	**3**	**12**	**21**

MA1711 FUNCTIONAL ANALYSIS 4 1 0 5

Objective

To enrich the knowledge of the students with the topics of functional analysis such as Banach Space, Hilbert Space and enable them to have comprehensive idea about the core principles of operators.

Unit I

Banach spaces-The definition and some examples – Continuous linear transformation – The Hahn- Banach theorem.

Unit II

Conjugate space N^* of normed linear space N – The natural imbedding of N in N^{**} - The open mapping theorem – The conjugate of an operator.

Unit III

Hilbert spaces – The definition and some simple properties – Orthogonal complements – Orthonormal sets – The conjugate space H^*.

Unit IV

Adjoint of an operator – Self-adjoint operators – Normal and unitary operators – Projections.

Unit V

Finite-dimensional spectral theory – Determinants and the spectrum of an operator – The spectral theorem.

Text Book :

G. F. Simmons, Introduction to Topology and Modern Analysis, Tata Mc Graw-Hill Edition, 2004.
Sections 46-59, 61 and 62.

MA1712 OPERATIONS RESEARCH 4 1 0 5

Objective :

To enable the students to understand and analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively and also formulating mathematical models in decision theory, PERT, CPM, deterministic and probabilistic inventory systems, queues, replacement and maintenance problems.

UNIT-I : DECISION THEORY

Steps in Decision theory Approach - Types of Decision-Making Environments - Decision Making Under Uncertainty - Decision Making under Risk - Posterior Probabilities and Bayesian Analysis - Decision Tree Analysis - Decision Making with Utilities.

UNIT-II : PROJECT MANAGEMENT : PERT AND CPM

Basic Differences between PERT and CPM - Steps in PERT/CPM Techniques - PERT/CPM Network Components and Precedence Relationships - Critical Path Analysis - Probability in PERT Analysis - Project time-cost Trade Off - Updating the Project.

UNIT-III : DETERMINISTIC INVENTORY CONTROL MODELS

Meaning of Inventory Control - Functional Classification - Advantage of Carrying Inventory - Features of Inventory System - Inventory Model building - Deterministic Inventory Models with no shortage - Deterministic Inventory with Shortages

UNIT-IV : QUEUEING THEORY

Essential Features of Queueing System - Operating Characteristic of Queueing System - Probabilistic Distribution in Queueing Systems - Classification of Queueing Models - Solution of Queueing Models - Probability Distribution of Arrivals and Departures.

UNIT-V : REPLACEMENT AND MAINTENANCE MODELS

Failure Mechanism of items - Replacement of Items Deteriorates with Time - Replacement of items that fail completely - other Replacement Problems.

Text Book

J. K. Sharma, Operations Research Theory and Applications, Third Edition (2007), Macmillan India Ltd.

UNIT 1 Chapter 11 : 11.1 - 11.8
UNIT II Chapter-13 : 13.1 - 13.7
UNIT III Chapter-14 : 14.1 - 14.8
UNIT IV Chapter-16 : 16.1 - 16.8
UN IT V Chapter-17 : 17.1 - 17.5

MA1713 GRAPH THEORY 4 1 0 5

Objective : To study and develop the concepts of graphs, subgraphs, trees, connectivity, Euler tours, Hamilton cycles, matching, coloring of graphs, independent sets, cliques, vertex coloring and di graphs.

Unit I: Graphs and subgraphs: Graphs and simple graphs - Graph isomorphism-Incidence - adjacency matrices – Subgraphs - Vertex degrees - Path and Connection cycles – Applications: The shortest path problem – Trees: Trees - Cut edges and bonds - Cut vertices-Cayley’s formula.

Unit II: Connectivity: Connectivity – Blocks - Euler tours and Hamilton cycles: Euler tours – Hamilton cycles – Applications: The Chinese postman problem.

Unit III: Matchings: Matchings - Matchings and coverings in bipartite graphs-Perfect matchings –. Edge colorings: Edge chromatic number - Vizing's theorem.

Unit IV: Independent sets and cliques: Independent sets- Ramsey's theorem-Turan's theorem.

Unit V
Directed Graphs, Directed Paths and Directed Cycles..

Text Book: Graph theory with Applications by J.A.Bondy and U.S.R.Murty, Chapters 1 (except 1.9), 2 (except 2.5), 3 (except 3.3.), 4 (except 4.4), 5 (except 5.5), 6, 7 (except 6.3, 7.4 and 7.5) and 10 (except 10.4, 10.5, 10.6 & 10.7).
Ref;
1..Graph Theory, J.A.Bondy and U.S.R.Murty. Springer. 2008 (650 pages).
2. Graph Theory, F.Harary, Addison Wesley (1969).

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LIST OF ELECTIVES

LIST OF SUPPORTIVE COURSES						
1.	MA17S1	Statistical Methods	3	1	0	4
2.	MA17S2	Mathematics for Competitive Examinations	3	1	0	4
3.	CS17S1	Office Automation	3	1	0	4
4.	CS17S2	C Programming and Problem Solving Methods	3	1	0	4
LIST OF ELECTIVES						
1.	MA17A1	Algebraic Number Theory	3	1	0	4
2.	MA17A2	Calculus of Variations and Integral Transforms	3	1	0	4
3.	MA17A3	Coding Theory	3	1	0	4
4.	MA17A4	Combinatorics	3	1	0	4
5.	MA17A5	Differential Geometry	3	1	0	4
6.	MA17A6	Measure Theory and Integration	3	1	0	4
7.	MA17A7	Mechanics	3	1	0	4
8.	MA17A8	Number Theory	3	1	0	4
9.	MA17A9	Partial differential Equations	3	1	0	4
10.	MA17B1	Stochastic Processes	3	1	0	4

SUPPORTING COURSE SYLLABUS

MA17S1 STATISTICAL METHODS 3 1 0 4

Objective:

To equip the students with different statistical techniques to summarize, analyse the interpret data, which are essential for decision making. Also to enable the students to solve statistical problems using computer packages like SPSS.

UNIT I PROBABILITY

Probability: Concept of random experiment- sample space, events, disjoint events- Definition of probability (frequency and axiomatic)-Addition and Multiplication theorem, Conditional probability - simple problems.

UNIT II DESCRIPTIVE STATISTICS AND DISTRIBUTIONS

Introduction to Statistics – Classification, Frequency distribution: Discrete and continuous frequency distribution. – Diagrammatic and Graphic representation: Bar diagram, Rectangle diagram and Pie diagram – Histograms- Frequency polygon, Advantages and limitations. Measures of Central Tendency - Dispersion – Standard deviation, Variance, Co-efficient of variation. - Applications of Binomial and Normal distributions. (Problems only)

UNIT III CORRELATION AND REGRESSION LINES

Correlation Analysis- Karl Pearson's correlation coefficient- Rank correlation- Regression lines.

UNIT IV TESTING OF HYPOTHESIS

Definition-Type I and Type II errors – Null Hypothesis, Alternative Hypothesis- One tailed and two tailed tests- Large sample tests. Tests for mean and equality of means. Small sample tests: t -test for mean, equality of means. F test

UNIT V STATISTICAL QUALITY CONTROL 9

Quality Control –Chance causes and Assignable causes - Control charts for variables – Control chart for Mean ($\overline{X}$) and Range (R). Control charts for Attributes, Proportion of defective (p chart), Number of defectives per unit (c chart).

REFERENCES:

1. Gupta.S.P " Statistical Methods" Sultan Chand &Sons 38th Edition 2004
2. Srivastava, S.C. "Fundamentals of Statistics", Sangya Srivastava Anmol Publications Private Limited, New Delhi,2006.
3. Bruce L. Bowcman, Richard T.O. Connell and Michael L. Hand, "Business Statistics in Practice", 2nd Edition, McGraw – Hill, 2001.
4. Richard I. Levin and David S "Statistics for Management", Prentice Hall of India, 2002.

MA17S2 MATHEMATICS FOR COMPETITIVE EXAMINATIONS

3 1 0 4

Unit I: Problems on Ages – Percentage.

Unit II: Profit and Loss – Ratio and Proportion.

Unit III: Time and Work – Simple Interest.

Unit IV: Compound Interest – Calendar.

Unit V: Stocks and Shares – Bankers' Discount.

Text Book: Quantitative Aptitude by R.S. Aggarwal (Edition 1996), Chapters 8, 10 to 12, 15, 21, 22, 27, 29 and 31.

		L	*T*	*P*	*C*
CS17S1	**OFFICE AUTOMATION**	*3*	*1*	*0*	*4*

Objective

To enable students to

- Acquire knowledge in the fundamental techniques in Computer.
- Good Knowledge in prepare a document.
- Develop efficient calculation through excel sheets.

UNIT – I

Introduction to office automation – A brief about latest packages – Introduction to Windows – Creation of Icons – Introduction to MS office – Importance of word processor, Spreadsheet database and presentations in office environment.

UNIT – II

Word basics – Editing with word – Copying and moving text – Searching – Replacing – Pictures in documents – Printing documents – formatting with word – formatting paragraphs, Sections Creating letters- Tables & footnotes – Spell Checking – Sorting – Fields, Annotation, Book marks and cross reference.

UNIT – III

Creating worksheet – Entering and editing text, Numbers and Formulas- Saving – Excel functions- Modifying worksheet – Range selection – Copying and moving Data – Defining Names – Inserting and deleting Rows and columns – Moving around worksheet – Naming Worksheet, Copying , Inserting & Deleting worksheet –Heading displaying

value – Changing and Selecting fonts, protesting data, Using styler & templates – Printing worksheet – Creating charts – managing data – Macros , linking worksheets.

UNIT – IV

Creation new database – modifying Database structure – Entering Data – Retrieving Data – Using Quires – changing screen displays – Searching the database – sorting – updating – Report generation – Mailing Labels – working with numbers, Dates and yes/no fields, working with multiple tables.

UNIT – V

Basic of power point – Creating and Editing slides – Formatting slides – Master slides – Templates – Coloring text and objects – Transitions – Heading slides – Using clip art gallery – chart creations – managing files.

TEXT BOOKS:

1. Joyce cox & polly urban – "quick course in microsoft office "Golgotia publications.
2. R.k. Taxali – "pc software for windows made simple" Tata mcgrawhill publishing company – 1998.

		L	*T*	*P*	*C*
CS17S2	**C PROGRAMMING AND PROBLEM SOLVING METHODS**	*3*	*1*	*0*	*4*

Objective

To enable students to

- Acquire knowledge in the fundamental techniques of problem solving.
- Analyze the program and follow the programming style.
- Develop efficient programs in C.

UNIT I

Introduction: Computer Architecture – Program development process – Structured and modular programming – Flowcharts – C Programming language – Program Development environments. Representing Data: Character Set – Keywords – Data Types – Constants – String Literals – Identifiers – Variables.

UNIT II

Arithmetic Operators and Expressions: Operators – Expressions – Advanced Concept – C Standard library – Input Output Facilities – Mathematical Library – Stream – Function Prototypes – Formatted Output – Manipulating Strings.

UNIT III

Conditional Control: If Statement – Logical Operator – The Switch Statement – Conditional expression operator.

Looping Control: The for Loop – while loop – do...while loop – Nested if – if else if – nested loop – loop interruption.

Arrays: Definition – Processing Array – One-dimensional array – Two dimensional Array – Multidimensional Arrays – Arrays and Strings.

UNIT IV

Function: Function call – User defined function – Program Structure – Method of Parameter passing – Passing Arrays to Function – Recursion.

Pointers: Fundamentals – Pointer Declarations – Passing pointers to a Function – Pointers and One Dimensional Arrays – Dynamic Memory Allocation – Pointers and Multidimensional arrays – Arrays of Pointers – Passing Functions to other functions.

UNIT V

Structures and Unions: Definition – Processing a Structure – Structures and Pointers – Passing Structures to Functions – Unions.

Data Files: Opening and Closing a Data File – Reading and Writing a Data File – Processing a Data File – Binary Files – Unformatted Data Files.

TEXT BOOK:

1. Bichkar R. S. " Programming with C", University press, 2012.
2. Gottfried.B, "Programming with C", Mc-Graw Hill, 2005.
3. Brian W. Kernighan, Dennis M.Ritchie "The C Programming language", Prentice Hall of India, New Delhi, 2004.
4. Deital & Deital, " C How to Program", Pearson Education, 2001.

MA17A1 ALGEBRAIC NUMBER THEORY 3 1 0 4

Objective:

To enable the students to compute norms and discriminants and to use them to determine the integer rings in algabraic number fields also assist the studenta to factorize ideals into prime ideals in algebraic number fields in straightforward examples.

Unit I: Algebraic Background: Rings and fields-Factorization of polynomials-Field extensions-Symmetric polynomials-Free abelian groups.

Unit II: Algebraic numbers: Algebraic numbers-Conjugates and discriminates- Algebraic integers-Integral bases-Norms and traces-Rings of integers.

Unit III: Quadratic cyclotomic fields: Quadratic fields- Cyclotomic fields. Factorization into irreducible: Trivial factorizations – Factorization into irreducible - Examples of non-unique factorization into irreducibles.

Unit IV: Prime factorization-Euclidean domains-Euclidean quadratic fields-Consequences of unique factorization-The Ramanujan- Nagell theorem.

Unit V: Ideals: Prime factorization of fields-The norm of an ideal – Nonunique factorization in cyclotomic fields.

Text Book: Algebraic Number Theory by I. N. Stewart and D. O. Tall, Chapters 1 to 5.

MA17A2 CALCULUS OF VARIATIONS AND INTEGRAL EQUATIONS

3 1 0 4

Objective:

To introduce the concepts of calculus of variation and its applications and also the various types of integral equations and the methods to solve such equations.

Unit I: Calculus of Variations and Applications: Maxima and Minima - The Simplest case-Illustrative examples-Natural boundary conditions and transition conditions – The variational notation-The more general case.

Unit II: Constraints and Lagrange multipliers-Variable end points - Sturm- Liouville problems-Hamilton's principle-Lagrange's equations

Unit III: Integral Equations: Introduction – Relations between differential and integral equations – The Green's function – Alternative definition of the Green's function.

Unit IV: Linear equation in cause and effect: The influence function – Fredholm equations with separable kernels – Illustrative example.

Unit V: Hilbert – Schmidt theory – Iterative methods for solving equations of the second kind – Fredholm theory.

Text Book: Methods of Applied Mathematics by Francis B. Hildebrand (Second Edition) Sections 2.1 to 2.11, 3.1 to 3.9 and 3.11.

MA17A3 CODING THEORY 3 1 0 4

Objective:

To make the students to have a thorough understanding of the theory and practice of error control coding techniques for digital data which are widely used in our everyday life. Topics covered in this syllabus include, linear codes, Hadamard codes, the binary Golay code, Bound on codes and the idempotent of a cycle code.

Unit I: Mathematical Background: Algebra – Krawtchouk Polynomials – Combinatorial theory- Shannon's Theorem: Introduction - Shannon's Theorem.

Unit II: Linear codes: Block codes – Linear codes – Hamming codes - Majority logic decoding – Weight Enumerators – The Lee metric.

Unit III: Some good codes: Hadamard codes and generalizations – The binary Golay code – The ternary Golay code- Constructing codes from other codes - Reed-Muller code – Kerdock codes..

Unit IV:. Bound on codes: The Gilbert bound – Upper bounds – Cyclic codes: Definitions- Generator matrix and check polynomial – Zeros of a cyclic code.

Unit V: The idempotent of a cyclic code – Other Representations of cyclic codes – BCH codes – Decoding BCH codes- Binary cyclic codes of length 2n (n odd).

Text Book: Introduction to Coding Theory by J. H. Van Lint, Chapters 1 (except 1.4), 2 (Sections 2.1 and 2.2 only), 3, 4, 5 (except 5.3), and Chapter 6 (except 6.8, 6.9 and 6.11).

MA17A4 COMBINATORICS 3 1 0 4

Objective:

To develop the calculating capacity by dealing with enumerating problems., Permutations and Combinations ,Piegeonhole Principle , Ramsey Numbers ,Generating Functions and Recurrence Relations.

UNIT I Permutations and Combinations

Two basic counting principles, Permutations, Circular permutations, Combinations, The injection and bijection principles, Arrangements and selection with repetitions ,Distribution problems

UNIT II The Piegeonhole Principle and Ramsey Numbers

Introduction, The piegeonhole principle, More examples, Ramsey type problems and Ramsey numbers, Bounds for Ramsey numbers

(Chapter 3 of the text) (20 hours)

UNIT III Principle of Inclusion and Exclusion

Introduction, The principle, A generalization, Integer solutions and shortest routes Surjective mappings and Sterling numbers of the second kind, Derangements and a generalization, The Sieve of Eratosathenes and Euler -function.

(Chapter -4 Sections 4.1 to 4.7 of the text) (25 hours)

UNIT IV Generating Functions

Ordinary generating functions, Some modelling problems, Partitions of integer,Exponential generating functions

UNIT V Recurrence Relations

Introduction, Two examples, Linear homogeneous recurrence relations, Generallinear recurrence relations, Two applications
(Chapter 5, 6 Sections 6.1 to 6.5) (25 hours)

Text Book:

Chen Chuan -Chong, Koh Khee Meng, Principles and Techniques in Combinatorics, World Scientific,1999.
Unit I Chapter 1
Unit II Chapter 3
Unit III Chapter -4 Sections 4.1 to 4.7
Unit IV & Unit IV Chapter 5, 6 Sections 6.1 to 6.5

MA17A5 DIFFERENTIAL GEOMETRY 3 1 0 4

Objective:

The main objective is to introduce space curves and their intrinsic properties of a surface and geodesics and also to explore the non-intrinsic properties of surfaces are explored.

UNIT-I : SPACE CURVES

Definition of a space curve - Arc length - tangent - normal and binormal - curvature and torsion - contact between curves and surfaces - tangent surface - involutes and evolutes - Intrinsic equations - Fundamental Existence Theorem for space curves - Helics.

UNIT-II : INTRINSIC PROPERTIES OF A SURFACE

Definition of a surface - curves on a surface - Surface of revolution - Helicoids - Metric - Direction coefficients - families of curves - Isometric correspondence - Intrinsic properties.

UNIT-III : GEODESICS I

Geodesics - Canonical geodesic equations - Normal property of geodesics - Existence Theorems - Geodesic parallels

UNIT-IV : GEODESICS II

Geodesics curvature - Gauss - Bonnet Theorem - Gaussian curvature - surface of constant curvature.

UNIT-V : NON INTRINSIC PROPERTIES OF A SURFACE

The second fundamental form - Principal curvature - Lines of curvature - Developable - Developable associated with space curves and with curves on surface - Minimal surfaces - Ruled surfaces.

TEXT BOOK:
T.J.Willmore, An Introduction to Differential Geometry, Oxford University Press,(17th Impression) New Delhi 2002. (Indian Print)
Unit I Chapter I : Sections 1 to 9 ;Unit II Chapter II: Sections 1 to 9 ;Unit III Chapter II: Sections 10 to 14 ;Unit IV Chapter II: Sections 15 to 18 ; Unit V Chapter III: Sections 1 to 8

MA17A6 MEASURE THEORY AND INTEGRATION 3 1 0 4

Objective:
To understand the concept of Lebesgue measure, Measure space and integration with respect to a measure .

Unit - I: Lebesgue Measure
Introduction, Outer measure, Measurable sets and Lebesgue measure, A nonmeasurable set, Measurable functions, Littlewood's three principles.

Unit - II: The Lebesgue Integral
The Riemann integral, The Lebesgue integral of a bounded function over a set of finite measure, The integral of a nonnegative function, The general Lebesgue integral, Convergence in measure.

Unit - III: Differentiation and Integration
Differentiation of monotone functions, Functions of bounded variation, Differentiation of an integral, Absolute continuity, Convex functions.

Unit - IV: Lp spaces, and Measure and Integration
The Lp spaces, The Holder and Minkowski inequalities. Measure spaces, Measurable functions, Integration.

Unit - V Multiple Lebesgue Integrals
Introduction, Step functions and their integrals, Upper functions and Lebesgue-integrable functions, Measurable functions and measurable sets in R^n, Fubini's reduction theorem for the double integral of a step function, Some properties of sets of measure zero, Fubini's reduction theorem for double integrals, The Tonelli-Hobson test for integrability.

Text Books
Contents and treatment as in the book “Real Analysis” by H.L. Royden, Prentice Hall of India, NewDelhi, 2004.
Unit – I Chapter 3: Sections 1 to 6.
Unit – II Chapter 4: Sections 1 to 5.
Unit – III Chapter 5: Sections 1 to 5.
Unit – IV Chapter 6: Sections 1and 2 and Chapter 11 Sections 1 to 3.
Contents and treatment as in the book “Mathematical Analysis” (Second Edition) by Tom M. Apostol, Narosa Publishing House, New Delhi. 1997.
Unit – V Chapter 15: Sections 1 to 8.

MA17A7 MECHANICS 3 1 0 4

Objective :

To study and comprehend mechanical systems under generalized coordinate systems, virtual work, energy and momentum, and mechanics developed by Newton, Langrange, Hamilton Jacobi and also the theory of Relativity.

UNIT-I : MECHANICAL SYSTEMS

The Mechanical system - Generalised coordinates - Constraints - Virtual work - Energy and Momentum

UNIT-II : LAGRANGE'S EQUATIONS

Derivation of Lagrange's equations- Examples - Integrals of motion.

UNIT-III : HAMILTON'S EQUATIONS

Hamilton's Principle - Hamilton's Equation - Other variational principle.

UNIT-IV : HAMILTON-JACOBI THEORY

Hamilton Principle function - Hamilton-Jacobi Equation - Separability

UNIT-V : CANONICAL TRANSFORMATION

Differential forms and generating functions - Special Transformations - Lagrange and Poisson brackets.

Text Book:

D. T. Greenwood, Classical Dynamics, Prentice Hall of India, New Delhi, 1985.
Unit I Chapter 1 : Sections 1.1 to 1.5
Unit II Chapter 2 : Sections 2.1 to 2.3 (Omit Section 2.4)
Unit III Chapter 4 : Sections 4.1 to 4.3 (Omit section 4.4)
Unit IV Chapter 5 : Sections 5.1 to 5.3
Unit V Chapter 6 : Sections 6.1, 6.2 and 6.3 (omit sections 6.4, 6.5 and 6.6)

MA17A8 NUMBER THEORY 3 1 0 4

Objective:

To enable the students to know more about numbers, Bell series, the Mobius function and the Euler totient function and also the application to the distribution of lattice points visible from the origin are incorporated.

Unit I

Introduction, Divisibility, Greatest common divisor, Prime numbers, The fundamental theorem of arithmetic, The series of reciprocals of the primes, The Euclidean algorithm, The GCD of more than two numbers, The Mobius function $\mu(n)$,

The Euler totient function φ(n), A relation connecting φ and μ , A product formula for φ(n), The Dirichlet product of arithmetical functions, Dirichlet inverses and the Mobius inversion formula , The Mangoldt function ∧(n).

Unit II

Multiplicative functions, Multiplicative functions and Dirichlet multiplication, The inverse of a completely multiplicative fucntion. Liouville's function λ(n), The divisor functions $\sigma_x(n)$, Generalized convolutions Formal power series ,The Bell series of an arithmetical function, Bell series and Dirichlet multiplication , Derivatives of arithmetical functions, The Selberg identity.

Unit III

Introduction, The big Oh notation. Asymptotic equality of functions, Euler's summation formula, Some elementary asymptotic formulas, the average order of d (n) , The average order of the divisor functions $\pm_n$, The average order of φ(n).

An application to the distribution of lattice points visible from the origin,The average order of μ (n) and Λ(n) The partial sums of a Drichlet product , Applications to μ (n) and Λ(n), Another identity for the partial sums of a Dirichlet prodect.

Unit IV

Introduction ,Chebyshev's functions ψ(n) and ϑ(n) . Definition and basic properties of congruences, Residue classes and complete residue systems, Linear congruences, Reduced residue systems and the Euler-Fermat theorem, Polynomial congruences modulo p, Langrange's theorem . Applications of Lagrange's theorem.

Simultaneous linear congruences, The Chinese remainder theorem .

Unit V

Quadratic residues, Legendre`s symbol and its properties,Evalution of ( - 1| p ) and (2 | p ) ,Gauss` lemma,The quadratic reciprocity law, Applications of the reciprocity Law, the Jacobi symbol, Applications of Diophantine equations,

Text Book:

Introduction to Analytic Number Theory **by T.M. Apostol, III edition, Narosa edition 1991.**

Unit I : Chapter 1: Sections 1.1 to 1.8 ; Chapter 2: Sections 2.1 to 2.8

Unit II : Chapter 2: Sections 2.9 to 2.19

Unit III: Chapter 3: Sections 3.1 - 3.12

Unit IV : Chapter 4 : Sections 4.1 and 4.2 , Chapter 5 : Sections 5.1 to 5.7.

Unit V : Chapter 9: Sections 9.1 to 9.8

MA17A9 PARTIAL DIFFERENTIAL EQUATIONS 3 1 0 4

Objective :

The core objective is to introduce to the students the various types of partial differential equations and how to solve these equations.

Unit I: Partial differential equations of the first order: Partial differential equations - Origins of first order partial differential equations-Cauchy's problem for first order equations-Linear equations of the first order-Nonlinear PDE of the first order-Cauchy's method of characteristics.

Unit II: Compatible systems of first order equations - Charpit's method-Special types of first order equations-Solutions satisfying given conditions -Jacobi's method.

Unit III: Partial differential equations of second order: The origin of second order equations-Second order equations in Physics-Higher order equations in Physics-Linear PDE with constant coefficients-Equations with variable coefficients.

Unit IV: Characteristic curves of second order equations-Characteristics of equations in three variables - Separation of variables.

Unit V: The method of integral transforms-Nonlinear equations of second order-Laplace's equation: The occurrence of Laplace's equation in Physics-Elementary solutions of Laplace's equations.

Text Book: Elements of Partial Differential Equations by Ian Sneddon, Chapter 2 (excluding sections 5, 6 and 14), Chapter 3 (excluding section 8) and Chapter 4 (Sections 1 and 2 only).

MA17B1 STOCHASTIC PROCESSES 3 1 0 4

Objective :

To make the students to comprehend the idea of a stochastic process, and to show how simple probability and matrix theory can be used to build the Markov chain into a beautiful and useful piece of applied mathematics and also enable the students to understand renewal theory, which deals the processes which occasionally "begin all over again"

Unit I

Generating Functions – Laplace transform – Important properties of Laplace transforms – Difference equations – Differential Difference equations – Matrix Analysis.

Unit II

Markov

Chains: Definitions and Examples – Higher Transition Probabilities – Generalization of independent Bernoulli Trials: Sequence of chain dependent trials – Classification of

States and Chains – Determination of Higher Transition Probabilities – Stability of a Markov System – Graph theoretic approach.

Unit III

Markov Processes with Discrete State Space : Poisson Process and its Extensions – Poisson Process – Poisson Process and Related Distributions – Generalizations of Poisson Process – Birth and Death Process – Markov Processes with Discrete State Space.

Unit IV

Markov Processes with Continuous State Space : Introduction –Brownian Motion – Wiener Process – Differential Equations for a Wiener Process –Kolmogorov Equations – First Passage Time distribution for Wiener Process – Ornstein Uhlenbeck Process.

Unit V

Renewal Process – Renewal Processes in Continuous Time – Renewal Equation – Stopping Time: Wald's Equation – Renewal Theorems.

Text Book:

Stochastic Processes by J.Medhi, New Age International Publiushers, Third Edition , 2009.

Unit 1: Chapter 1: Sections 1.1, 1.2 and Appendix A (pp 447 – 475).
Unit 2: Chapter 2: Sections 2.1 to 2.7.
Unit 3: Chapter 3: Sections 3.1 to 3.5.
Unit 4: Chapter 4: Sections 4.1 to 4.6.
Unit 5: Chapter 6: Sections 6.1 to 6.5.