



THE MADURA COLLEGE (Autonomous), MADURAI – 625 011
(AFFILIATED TO MADURAI KAMARAJ UNIVERSITY)
RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME: B.Sc., Mathematics

COURSE CODE : 3AM(2015-16)

COURSE TITLE : Mathematics - III

QN.NO : 4073

TIME : 3 Hours

MAX.MARKS :75

Unit I: Exact differential Equations: Equations of first order and first degree – Variable separable – Homogenous equations – Non-homogeneous equations – Exact differential Equations – Integrating factors.

Unit II: Linear equations of Higher Order: Linear equations with constant coefficients – Methods of finding complementary functions – Methods of finding particular Integrals – Problems.

Unit III: Partial differential Equations: Formation of partial differential equations – First order partial differential equations – Methods of solving First order partial differential equations – some standard forms – Charpit’s method.

Unit IV: Analytic Functions: Limits – Analytic functions- Cauchy Reimann Equations (C-R.equations) - Alternate forms of C.R. equations.

Unit V: Bilinear Transformations: Elementary Transformations – Problems – Bilinear Transformations – Cross Ratio – Fixed points of a bilinear Transformation.

Text Book: Allied Mathematics Paper III by S. Arumugam and A. T. Isaac, Edition 2012, New Gamma Publishing House.

Chapters: 1(1.2 - 1.4), 2, 4, 6, 7.

Reference Books: 1. Complex Analysis by S. Arumugam, A. T. Issac, A. Somasundaram, Reprint 2010, Scitech Publications (India) Pvt. Ltd.

2. Allied Mathematics by P. R. Vital, Margam Publications (2009).

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 3M (Upto 16)

COURSE TITLE : Modern Algebra-I

QN.NO : 4067

TIME : 3 Hours

MAX.MARKS :75

Unit I: Groups: Definition and Examples of Groups - Elementary Properties of a Group - Permutation Group.

Unit II: Subgroups: Definition - Cyclic Groups - Order of an Element - Cosets and Lagrange's Theorem.

Unit III: Isomorphism & Homomorphisms: Normal Subgroups and Quotient Groups - Isomorphism & Homomorphisms.

Unit IV: Rings & Subrings: Definition and Examples of Rings - Elementary Properties of Rings - Types of Rings - Characteristic of Ring - Subrings.

Unit V: Polynomial Rings: Ideals - Quotient Rings - Maximal and Prime Ideals - Field of Quotient of an Integral Domain - Unique Factorization Domain-Euclidean Domain -Polynomial Rings - Polynomial Rings Over U.F.D - Polynomials Over \mathbb{Q} .

Text Book: Modern Algebra by S. Arumugam and A.T. Isaac, Reprint 2011, Scitech Publications (India) Pvt. Ltd.

Chapters: 3 (3.1, 3.2, 3.4, 3.5 - 3.8, 3.9, 3.11), 4 (4.1, 4.2, 4.4 - 4.9, 4.11, 4.13, 4.14, 4.16 - 4.18).

Reference Books: 1. A Course in Abstract Algebra by Vijay K. Khanna and S.K. Bhambri, 3rd Edition, Vikas Publishing House Pvt. Ltd.(2009).

2. Basic Abstract Algebra by P.B. Battacharya and S.K. Jain, Cambridge University Press (1995).

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 3AS (Upto 16)

COURSE TITLE : Programming with C

QN.NO : 4069

TIME : 3 Hours

MAX.MARKS :75

Unit I: Fundamentals: C Fundamentals - The C Character Set - Identifiers and Keywords - Data Types - Constants - Variables and Arrays- Declarations - Expressions - Statements - Symbolic Constants - Arithmetic Operators - Unary Operators - Relational and Logical Operators - Assignment Operators - The Conditional Operator - Library Functions.

Unit II: Data Input and Output: The getchar Function - The putchar Function - The scanf Function - The printf Function -Writing a C Program - Entering the Program into the Computer - Compiling and Executing the Program.

Unit III: Control Flow: The if else Statement - The while Statement - The do while Statement - The for Statement - Nested Control Structures - The switch Statement - The break Statement - The Comma Operator - The goto Statement.

Unit IV: Functions: Accessing a Function - Function Prototypes - Passing Arguments to a Function - Recursion - Storage Classes - Automatic Variables - External (Global) Variables - Static Variables.

Unit V: Array and Structure: Defining an Array - Processing an Array - Passing Arrays to Functions -Multidimensional Arrays - Arrays and Strings - Structures and Unions - Defining a Structure - Processing a Structure - Structures and Pointers- Unions.

Text Book: Programming with C by Byron S. Gottfried, 2nd edition, Schaum’s Outline Series, Tata McGraw – Hill Publication (2001).

Chapters: 2, 3, 4(4.2- 4.6), 5(5.2- 5.4), 6(6.2- 6.11), 7(7.2- 7.6), 8(8.1- 8.4), 9(9.1- 9.5), 10(10.1- 10.5).

Reference Books: 1. Programming in ANSI C by E. Balagurusamy, 2nd Edition, Tata McGraw-Hill (2000).

2. Let us C by Yashavant Kanetkar, 7th Edition 2007, BPB Publications.

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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME: B.Sc., Mathematics

COURSE CODE : 3SM (Upto 16)

COURSE TITLE : Graph Theory

QN.NO : 4075

TIME : 3 Hours

MAX.MARKS :75

Unit I: Graphs and Subgraphs: Definition and examples of graphs-Degrees-Subgraphs-Independent sets and Coverings.

Unit II: Matrices and Degree Sequences: Matrices-Operations on Graphs-Degree Sequences-Graphic Sequences.

Unit III: Connectedness: Walks-Trails and Paths-Connectedness and Components.

Unit IV: Eulerian and Hamiltonian graphs: Eulerian Graphs-Hamiltonian Graphs.

Unit V: Trees: Characterization of Trees-Centre of a tree.

Text Book: Invitation to Graph Theory by S. Arumugam and S. Ramachandran, Reprint 2012, Scitech Publications (India) Pvt. Ltd.

Chapters: 2(2.1 - 2.3, 2.6, 2.8), 3(3.1 and 3.2), 4(4.1 and 4.2), 5(5.1 and 5.2), 6(6.1 and 6.2).

Reference Books: 1. An Introduction to Graph Theory by Gary Chartrand and Ping Zhang, 4th Edition Reprint 2008, Tata McGraw –Hill Publication.

2. Introduction to Graph Theory by Robin J. Wilson, 4th edition, Pearson Publication (2012).

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PROGRAMME: UG NME - Mathematics COURSE CODE : 3MNM(Upto 16)

COURSE TITLE : Quantitative Aptitude QN.NO : 4079

Mathematics – I

TIME : 3 Hours

MAX.MARKS :75

Unit I: Numbers – HCF and LCM of Numbers.

Unit II: Decimal Fractions – Simplifications

Unit III: Square roots and Cube roots – Average

Unit IV: Problems on Numbers – Problems on Ages

Unit V: Surds and Indices – Ratio and Proportions.

Text Book: Quantitative Aptitude by R. S. Aggarwal, 7th Fully Revised Edition 2008, S. Chand & Company Limited.

Chapters: 1 - 9 and 12

Reference Books: 1. A text Book of business Mathematics by G. K. Ranganath, C. S. Sampangiram and Y. Rajaram, Himalaya Publishing House(2008).

2. Quantitative Aptitude and Reasoning by R.V.Praveen, 2nd Revised Edition 2013, Prentice-Hall of India Pvt.Ltd.

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 4M (Upto 16)

COURSE TITLE : Sequence and Series

QN.NO : 4081

TIME : 3 Hours

MAX.MARKS :75

Unit I: Sequences: Sequences – Bounded Sequences – Monotonic Sequences – Convergent Sequences – Divergent and Oscillating Sequences – The algebra of limits.

Unit II: Sequences (Continued): Behaviour of Monotonic sequences – Some theorems on limits – Subsequences – Limit points - Cauchy Sequences.

Unit III: Series of Positive Terms: Infinite series – Comparison test – Kummer’s test – Raabee’s test – D’Alemberts Ratio test – De Morgan’s test – Problems.

Unit IV: Series of Positive terms (continued): Gauss test – Root test – Cauchy’s condensation test – Integral test and problems.

Unit V: Series of arbitrary terms: Alternating series – Leibnitz’s test - Absolute Convergence series – Test for convergence of series of arbitrary terms – Dirichelet’s test – Abel’s test – Problems - Conditionally convergent series.

Text Book: Sequences and Series by S. Arumugam and A. Thangapandi Issac, Latest Edition 2012, Gamma Publishing House.

Chapters: 3 (3.1 - 3.11), 4 (4.1 - 4.5), 5(5.1 - 5.3).

Reference Books: 1. Real Analysis Volume – I by K. Chandra Sekhara Rao and K.S. Narayanan, S. Viswanadhan (Printers and Publishing Private Limited) 2008.

2. Sequence and Series by M. K. Venkatraman and Manorama Sridhar, The National Publishing Company (2002).

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 4AS(Upto 16)

COURSE TITLE : Numerical Methods

QN.NO : 4083

TIME : 3 Hours

MAX.MARKS :75

Unit I: Solutions of Linear equations: – Bisection method – Iteration method – Regula falsi method – Newton Raphson’s method.

Unit II: Simultaneous linear equations: – Gauss elimination method – Inversion of matrix using Gauss elimination – Method of triangularization - Crout’s method – Iterative methods – Gauss – Jacobi method – Gauss seidal method.

Unit III: Finite differences: First difference – Differences of a polynomial – Factorial polynomial – Interpolation for equal interval - Newton’s forward interpolation formula – Newton’s backward interpolation formula.

Unit IV: Interpolation: Interpolation with unequal intervals – Divided differences – Lagrange’s interpolation formula – Lagrange’s inverse interpolation formula – Numerical differentiation Newton’s forward difference formula to get the derivative – Newton’s backward difference formula to compute the derivative – Stirling’s formula – problems.

Unit V: Numerical integration: Trapezoidal rule – Simpon’s one third rule – Simpon’s three - eight rule – Romberg’s integral - Numerical solution of ODE – Taylor series method – Euler method – Runge-kutta method.

Text Book: Numerical Method by P.Kandasamy, K.Thilagavathy and K.Gunavathi, Reprint 2008, S. Chand & Company Ltd.

Chapters:3(3.1- 3.4), 4(4.1 - 4.5,4.7 - 4.9), 5(5.1 - 5.4), 6(6.1 - 6.6), 8(8.1,8.2,8.5 - 8.7), 9(9.1 - 9.14), 11(11.1 - 11.5, 11.9 - 11.12).

Reference Books: 1. Numerical Analysis with Programming in C by S. Arumugam, A.T. Isaac & Somasundaram, New Gamma Publishing House(2007).

2. Numerical Methods for Science and Engineering Computation by M. K. Jain, S.R.K.Iyengar and R.K.Jain, 6th edition, New Age International Publishers (2012).



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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 4SM (Upto 16)

COURSE TITLE : Fourier Transforms

QN.NO : 4089

TIME : 3 Hours

MAX.MARKS :75

Unit I: Introduction: Fourier transform - Fourier sine and cosine transform - Fourier integral theorem - Problems.

Unit II: Inversion formula: Fourier transform, cosine and sine transform - Evaluation of Fourier transform.

Unit III: Properties: Fourier transforms - Shifting theorem - Change of scale -Convolution theorem - Parseval's identity - Problems.

Unit IV: Finite Fourier transforms: Finite Fourier Sine and Cosine Transforms - Derivatives - problems.

Unit V: Inversion formula: Finite Fourier transforms –Problems.

Text Book: Higher Engineering Mathematics – Vol II by S. Arumugam, A. T. Issac and A. Somasundaram, Scitech Publication (2010).

Chapter: 15 only.

Reference Books: 1. Engineering Mathematics by T. Veerarajan, Tata McGraw – Hill Publishing Company limited (2000).

2. Higer Engineering Mathematics by B. S. Grewal, 40th Edition 2010, Kannan Publishers.

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PROGRAMME: B.Sc.,

COURSE CODE : 4AM (Upto 16)

COURSE TITLE : Ancillary

QN.NO : 4091

Mathematics-IV

TIME : 3 Hours

MAX.MARKS :75

Unit I: Linear Programming Problems: Formulation of Linear Programming Problem – Mathematical Formulation of a Linear Programming Problem - Linear Programming Problem in summation Notation - Linear Programming Problem in Matrix Form – Canonical Form of a Linear Programming Problem – Standard Form of a Linear Programming Problem – Problems.

Unit II: Linear Programming Problems (Continued): Solution of Linear Programming Problem – Feasible Solution – Optimal Solution – Basic solution – Basic Feasible Solution – Graphical Method – Non Negativity Constraint – Constraint of the form $ax_1 + bx_2 (\leq, \geq) c$ where a, b are not both zero – Optimizing Objective Function – Problems.

Unit III: Linear Programming Problems (Continued): Simplex Method – Big-M Method – Problems.

Unit IV: Transportation Problems: Mathematical Formulation of Transportation Problems – North-west Corner Rule- Row Minima Method- Column Minima Method- Least Cost Method – Vogel Approximation Method - MODI Method.

Unit V: Assignment Problems: Mathematical Formulation of Assignment Problems – Solution to Assignment Problems – Travelling Salesman Problem – Problems.

Text Book: Topics in Operations Research Linear Programming by S. Arumugam and A. T. Isaac, Edition 2012, New Gamma Publishing House.
Chapters: 3(3.1 – 3.6), 4, 5.

Reference Books:

1. Operations Research by Kanti Swarup, P.K. Gupta and Man Mohan, 9th Edition 2001, Sultan Chand Publication.
2. Resource Management Techniques (Operations Research) by V. Sundaresen,

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PROGRAMME: B.Sc., Mathematics COURSE CODE : 5M1 (Upto 16)

COURSE TITLE : Mechanics QN.NO : 4095

TIME : 3 Hours MAX.MARKS :75

Unit I: Projectiles: Path of the projectile - Motion of the projectile - Velocity of the projectile - Range on the inclined plane - Enveloping parabola.

Unit II: Collision of elastic bodies: Newton’s experimental law - Principle of conservation of momentum - Direct impact of two smooth spheres - Loss of kinetic energy due to direct impact - Oblique impact - Loss of kinetic energy due to oblique impact.

Unit III: Simple Harmonic Motions: Composition of the simple harmonic motion of the same period and in the same straight line and in two perpendicular direction - Motion of the particle suspended by a spiral spring - Simple pendulum - Motion under the action of central forces - Velocities and acceleration in polar coordinates - Differential equation of central orbits - Pedal equation - Velocities in a central orbit.

Unit IV: Forces acting at a point: Parallelogram of forces – Triangle of forces - Lami’s theorem - Resultant of any number of coplanar forces acting at a point - Parallel forces and momentum - Varignon’s theorem on moments.

Unit V: Friction: Laws of friction - Equilibrium of a body on a range inclined plane under a force parallel to the plane - Equilibrium of a body on a rough inclined plane under any force - Problems.

Text books: 1. Dynamics by M.K. Venkatraman, 13th Edition, Agasthiar Publications. Chapters: 6(6.1- 6.17), 8(8.1- 8.9), 10(10.1- 10.13), 11(11.1- 11.11).

2. Statics by M.K. Venkatraman, 13th Edition 2010, Agasthiar Publications. Chapters: 2(1- 15), 3(1- 12), 7(1- 13).

Reference Books: 1. Mechanics by P. Duraipandian, Laxmi Duraipandian, 2005 edition, S. Chand.

2. Dynamics by N. P. Bali, Golden series, Firewall Media Publisher (2011).

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 5M2 (Upto 16)

COURSE TITLE : Real Analysis

QN.NO : 4097

TIME : 3 Hours

MAX.MARKS :75

Unit I: Preliminaries and Metric Spaces: Introduction - Countable sets - Uncountable sets - Inequalities of Holder and Minkowski - Definitions and examples of metric space - Bounded sets in a metric space - Open ball in a metric space - Open sets.

Unit II: Metric Spaces (Continued) and Complete Metric Space: Subspaces - Interior of a set - Closed sets - Closure - Limit point - Dense sets - Completeness - Baire's category theorem.

Unit III: Continuity: Continuity - Homeomorphism - Uniform continuity - Discontinuous functions on \mathbb{R} .

Unit IV: Connectedness: Definition and examples - connected subsets of \mathbb{R} - Connectedness and continuity.

Unit V: Compactness: Compact space - Compact subsets of \mathbb{R} - Compactness and continuity.

Text Book: Modern Analysis by S. Arumugam, A. Thangapandi Issac. New Gamma Publishing House (2012).

Chapters: 1 (Sec. 1.1 – 1.14), 2 (Sec. 2.1 – 2.4, 2.5 – 2.10), 3(Sec. 3.1 and 3.2), 4 (Sec. 4.1 – 4.4), 5 (Sec. 5.1 – 5.3), 6 (Sec. 6.1, 6.2, 6.4).

Reference Books: 1. Real Analysis Vol. I & Vol. II by Dr. K. Chandrasekara Rao, Dr. K. Narayanan and S. Viswanatham (Printers & Publishers) Pvt. Ltd(2008).
2. A First Course in Real Analysis by M.K. Singal and Asha Rani Singal, 2010 Edition, R. Chand & co Publication.

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 5M3 (Upto 16)

COURSE TITLE : Modern Algebra – II

QN.NO : 4099

TIME : 3 Hours

MAX.MARKS :75

Unit I: Vector Spaces: Vector Space - Definition and examples - Subspaces - Quotient Spaces - Vector Space Homomorphism - Linear span - Linearly dependence and independence - Basis.

Unit II: Inner Product Space: Inner Product Space - Definition - Examples - Norm of a Vector - Orthogonal and orthonormal set - Schwarz inequality - Gram Schmidt's orthogonalization process.

Unit III: Linear Transformations: Linear Transformation - Algebra of Linear Transformation - Invertible linear transformation.

Unit IV: Linear Transformation Continuations: Matrix of a linear transformation – Dual spaces – Transpose of a linear transformation.

Unit V: Fields: Fields – Subfields – Extension field – Algebraic extension – Roots of polynomials

Text Book: A Course in Abstract Algebra by Vijay K. Khanna and S. K. Bhambiri, 3rd Revised Edition 2008, Vikas Publishing House Private Limited.

Chapters: 9, 10, 12 (12.1, 12.2).

Reference Books: 1. Modern Algebra by Surjeet Singh and Qazi Zameeruddin, 8th Edition 2009, Vikas Publishing House Private Limited.

2. Modern Algebra by S. Arumugam and A. T. Issac, Scitech Publications (2006).

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PROGRAMME: B.Sc., Mathematics COURSE CODE : 5M4(A)(Upto 16)

COURSE TITLE : Operations Research QN.NO : 4101

TIME : 3 Hours

MAX.MARKS :75

Unit I: Linear programming problem (LPP): Introduction - mathematical formulation of the problem - graphical solution method - Some exceptional cases - General LPP - Canonical & standard form of LPP.

Unit II: Simplex method: Introduction – Fundamental properties of solutions - The computational procedure (Simplex Method) - Use of artificial variables (Two-Phase method & Big-M method)

Unit III: Duality in LPP: Introduction - General primal - Dual pair - Formulating a dual problem - Primal - Dual pair in matrix form - Duality theorems - Duality & simplex method - Dual simplex method.

Unit IV: Transportation problem and Assignment problem: Introduction - Solutions of transportation problem for finding an initial basic feasible solution & test for optimality (MODI method) - Degeneracy in transportation problem - Introduction to assignment problem - Mathematical formulation and solution - Travelling salesman problem.

Unit V: Network scheduling by PERT/CPM: Introduction - Network and basic components - Time calculation in network - Floats - CPM - PERT calculations - Distinction between PERT and CPM.

Text Book: Operations Research by Kanti Swarup, P.K. Gupta and Man Mohan, 9th Edition 2001, Sultand Chand Publication.

Chapters: 2, 3(3:1 – 3:5), 4(4:1 – 4:4), 5(5:1 – 5:5, 5:7, 5:9), 10(10:1 – 10:13), 11(11:1 – 11:6), 21(21:1- 21:8).

Reference Books: 1. Resource Management Techniques (Operations Research) by V. Sundaresen, K.S. Ganapathy Subramanian and K. Ganesan, A.R Publications (2000).

2. Principles of Operations Research by Harvey M. Wagner, 2nd edition, PHI Publications (1975).

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 5SM(Upto 16)

COURSE TITLE : Combinatorics

QN.NO : 4107

TIME : 3 Hours

MAX.MARKS :75

Unit I: Basic tools - sum and product rules - Permutations and Combinations - Pigeonhole principle –Problems.

Unit II: Ramsey numbers - Catalan numbers - Stirling numbers - Further basic tools.

Unit III: Generating permutation and combinations – sequences and selections
– The inclusion – Exclusion principle - Problems.

Unit IV: Systems of distinct representatives – Problems.

Unit V: Derangements – Combinatorial number theory – Permanent of a matrix – Rook and Hit polynomials - Sperner’s theorem – Partially orders set – Dilworth’s theorem.

Text Book: Combinatorics by V.K. Balakrishnan, Schaum’s Outlines (1995).

Chapters: 1, 2.

Reference Books: 1. Discrete Mathematics by T. K. Sharma, 3rd Edition, Macmillan (2013).

2. Combinatorics Theory and Applications by V. Krishnamurthy, East – West Press (1989).

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 5AS (Upto 16)

**COURSE TITLE : Programming with
Visual Basic**

QN.NO : 4109

TIME : 3 Hours

MAX.MARKS :75

Unit I: Introduction - Visual Programming Environment, IDE (Integrated Development Environment) - Menu bar - Tool bar - Project Explorer - Property Window - Form layout window - Tool box - Forms designer - Object browser.

Unit II: The Language - Variables, Data types, Modules, Control structures – If_Then Statement, If_Then_Else Statement, Select_Case statement, do_while_loop, do_loop_while, do_loop_until, While_Wend Statements.

Unit III: Event driven Programming- Mouse events- Keyboard events, Procedures- Sub procedures-Event procedures- Function procedures, Arrays- Fixed size array- Dynamic array- Multi dimensional array, Visual basic built in function- Date and Time functions- Format functions- String functions.

Unit IV: Menu driven Programming – Menu Editor- Dialog boxes- Predefined dialog box- Custom dialog box- Common dialog Control- Multiple Document Interface (MDI).

Unit V: Graphics -Graphical controls-Graphics methods, Database programming using Data control, using codes-Report Generation-Object linking and Embedding (OLE).

Text Book: Visual Basic 6.0 Programming by Content Development Group, Tata McGraw - Hill publishing company Limited(2002).

Chapters: 1 (1.1, 1.2, 1.5, 1.6, 1.7), 3 (3.1, 3.2, 3.3), 4 (4.2, 4.3), 5 (5.2), 7(7.3 only), 8 (8.2, 8.3).

Reference Books: 1. Mastering Visual Basic 6 by Evangelos Petroustos, BPB Publications(1998).

2. Visual Basic 6 by Murach’s Series, Reprint 2002, BPB Publications.

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 6M1 (Upto 16)

COURSE TITLE : Complex Analysis

QN.NO : 4113

TIME : 3 Hours

MAX.MARKS :75

Unit I: Analytic Functions: Functions of complex variable – limits - theorems on limit - continuous functions – differentiability - the Cauchy-Riemann equations - Analytic functions - Harmonic functions.

Unit II: Bilinear Transformations: Elementary transformations - bilinear transformations - cross ratio - fixed points of bilinear transformations - and some special bilinear transformations - power series.

Unit III: Complex Integration: Definite integral - Cauchy’s theorem - Cauchy’s integral formula - higher derivatives - problems.

Unit IV: Series Expansions: Taylor’s series - Laurent’s series - Zeros of an analytic function - singularities.

Unit V: Calculus of Residues: Residues, Cauchy’s residue theorem - evaluation of definite integrals - Contour Integrations.

Text Book: Complex Analysis by S. Arumugam, A. T. Issac and A. Somasundaram. Reprint 2010, Scitech Publications (India) Pvt. Ltd.

Chapters: 2 (2.1 – 2.8), 3 (3.1 - 3.5), 4 (4.3), 6 (6.1 – 6. 4), 7 (7.1 - 7.4), 8 (8.1 - 8.3).

Reference Books: 1. Complex Analysis by T. K. Manickavachagom pillay, S. P. Rajagopalan, and R. Sattanatham, 2007 edition, S. Viswanatham (Printers & Publishers).

2. Complex Analysis by Narayanan and T. K. Manickavachagom pillay, 1997 edition, S. Viswanatham (Printers & Publishers).

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 6M2 (Upto 16)

COURSE TITLE : Probability and Statistics

QN.NO : 4115

TIME : 3 Hours

MAX.MARKS :75

- **Unit I: Probability:** Introduction- sample space - Events- The probability of an event- some rules of probability - Conditional probability- Independent events - Baye’s theorem - Problems.
- **Unit II: Probability distribution & probability density:** Introduction - Probability distribution - Continuous random variables - Probability density functions - Multivariate distribution - Marginal distributions - Conditional distributions.
- **Unit III: Mathematical Expectations:** Introduction - Expected value of random variable- moments - Chebychev’s theorem - Moment generating functions - Product moments - Moments of linear combination of random variables - Conditional expectations.
- **Unit IV: Special Probability Distribution:** Introduction - discrete uniform distributions, Bernoulli’s distribution- binomial distribution- negative binomial and geometric distribution- hyper geometric distribution-Poisson distribution – multinomial distribution – the multivariate hyper geometric distribution.
- **Unit V: Special Probability Densities:** Introduction - uniform distribution- gamma, exponential and chi-square distribution- beta distribution- normal distribution- normal approximation to binomial distribution.

Text book: John E. Freund’s Mathematical statistics with application by Irwin miller, and Marylees miller, 7th edition 2003, Pearson.

Chapters: - 2(2.1- 2.8), 3(3.1- 3.7), 4(4.2- 4.8), 5(5.2- 5.7), 6(6.2- 6.6).

Reference Books: 1. Probability and Random Processes by T. Veerarajan, 11th reprint 2007, Tata McGraw – Hill Publishing Company limited.

2. Fundamentals of Mathematical statistics by S.C. Gupta and V.K. Kapoor, S. Chand & sons (1996).

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 6M3 (Upto 16)

**COURSE TITLE : Differential Equations
and Its Applications**

QN.NO : 4117

TIME : 3 Hours

MAX.MARKS :75

Unit I: Differential Equations of the first order and first degree: Preliminaries (not included for the examination) – Exact differential equations – Problems – Equations of the first order and higher degree: equations solvable for p – solvable for x – solvable for y – Clairaut’s equations, Second and higher order linear differential equations with constant coefficients.

Unit II: Linear differential equations with variable coefficients: Homogeneous linear equation with variable coefficients – Cauchy and Euler Homogeneous equations – Legendre’s linear equations – Method of reduction of orders – Method of variation of parameters – Simultaneous linear differential equations.

Unit III: Partial Differential equations of First order: Partial differential equations – Formation of PDE’s by the elimination of arbitrary constants – Formation of PDE’s by eliminating the arbitrary functions – General, Particular, Singular and complete integrals of PDE’s – Solution of PDE’s by direct integration – Lagranges’ linear PDE’s – Method of grouping and method of Lagrangian multipliers - Solving first order nonlinear PDE’s – Standard forms.

Unit IV: Second order Homogeneous and nonhomogeneous PDE’s: Solving second and higher order Homogeneous PDE’s with constant coefficients – Standard forms – Solving nonhomogeneous PDE’s – Charpit’s method – Classification of PDE’s.

Unit V: Application of PDE’s: Method of Separation of variables – One dimensional Wave equations – Solutions of Wave equations – Problems – One dimensional Heat equations.

Text Books: 1. Differential Equations and Laplace Transforms by M. K. Venkataraman and Manorama Sridhar, The National Publishing Company (2004).

Chapters: 1 – 9.

2. Engineering Mathematics Volume – III, by S. Kandasamy and S. Thilagavadhy, S. Chand and Company publications (2008).

Chapter: 4 only.

Reference Books: 1. Differential equations and applications by S. Arumugam and A. T. Issac, Gamma Publishing House (2011).

2. Engineering Mathematics by T. Veerarajan, Tata McGraw - Hill publishing (2006).



PROGRAMME: B.Sc., Mathematics

COURSE CODE : 6M4(Upto 1

COURSE TITLE : Graph Theory

QN.NO : 4119

TIME : 3 Hours

MAX.MARKS :75

Unit I: Graphs and Subgraphs: Definition and examples of graphs - Degrees-Subgraphs – Isomorphism - Ramsey Numbers - Independent sets and Coverings.

Unit II: Matrices and Degree Sequences: Intersection Graphs and Line Graphs – Matrices - Operations on Graphs - Degree Sequences - Graphic Sequences.

Unit III: Connectedness and Eulerian Graphs: Walks - Trails and Paths - Connectedness and Components – Blocks – Connectivity - Eulerian Graphs.

Unit IV: Hamiltonian and Tree Graphs, Matching's: Hamiltonian Graphs - Characterization of Trees - Centre of a tree - Matching's - Matching's in Bipartite Graphs.

Unit V: Planarity and Colorability: Definition and Properties - Characterization of Planar Graphs - Chromatic Numbers and Chromatic Index - Chromatic Polynomials.

Text Book: Invitation to Graph Theory by S.Arumugam and S.Ramachandran, Reprint 2012, Scitech Publications (India) Pvt Ltd.

Chapters: 2(2.1 - 2.6, 2.7 - 2.9), 4(4.0 - 4.4), 5(5.1 & 5.2), 6(6.0 – 6.2), 7(7.0 - 7.2), 8(8.1&8.2), 9(9.1& 9.4).

Reference Books: 1. An Introduction to Graph Theory by Gary Chartrand and Ping Zhang, 4th Reprint 2008, Tata McGRAW-Hill Edition.

2. Introduction to Graph Theory by Robin J. Wilson, 4th edition, Pearson Publication (2012).

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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME: B.Sc., Mathematics

COURSE CODE : 6SM (Upto 16)

**COURSE TITLE : Quantitative Aptitude
Mathematics**

QN.NO : 4125

TIME : 3 Hours

MAX.MARKS :75

Unit I: Problems on Ages - Percentage.

Unit II: Profit & Loss - Ratio & Proportion.

Unit III: Time & Distance – Problems on Trains.

Unit IV: Calendar – Stocks & Areas.

Unit V: True Discount – Banker’s Discount.

Text Book: Quantitative Aptitude (Fully solved) by R. S. Aggarwal, 7th Fully Revised Edition 2008, S. Chand.

Chapters: 8, 10, 11, 12, 17, 18, 27, 29, 32, 33.

Reference Books: 1. Quantitative Aptitude and Reasoning by R.V.Praveen, 2nd Revised Edition 2013, Prentice-Hall of India Pvt.Ltd.

2. A text Book of business Mathematics by G. K. Ranganath, C. S. Sampangiram and Y. Rajaram, Himalaya Publishing House (2008).

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 6AS Upto 16)

COURSE TITLE : Programming with C++ QN.NO : 4127

TIME : 3 Hours

MAX.MARKS :75

Unit I: Introduction - Components of OOPs - Classes and Objects - Difference between Classes and Objects- Simple Programmes.

Unit II: Constructors and Destructors - Types of Constructors - Purpose of Destructors - Simple Programmes.

Unit III: Overloading- Function Overloading - Some Simple Programmes for the usage of Overloading.

Unit IV: Inheritance- Properties - Types of Inheritance - Application of Inheritance - Simple Programmes.

Unit V: Polymorphisms- Simple Programmes -Virtual function.

Text book: Object-Oriented Programming with C++ by E. Balagurusamy, 2nd Edition 2001, Tata McGraw-Hill Publishing Company limited.

Chapters: 1, 5, 6, 7, 8, 9.

Reference Books: 1. Programming with C++ by D. Ravichandran, Tata McGraw-Hill Publishing Company limited (1996).

2. Let us C++ by Yashvant Kanetkar, BPB publication (2006).

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PROGRAMME : B.Sc., Mathematics

COURSE CODE : 17U1MMC1

COURSE TITLE : Calculus

QN.NO : 8101

TIME : 3 Hours

MAX.MARKS :75

Unit I Successive and Partial Differentiation

Higher derivatives - n^{th} derivatives - Leibnitz's theorem (without proof) – Partial differentiation – Problems.

Unit II Application of Differentiation

p-r equation-Curvature – Radius of curvature – Evolutes – Envelopes – Maxima and minima for functions of two variables.

Unit III Evaluation of Integrals

Evaluation of definite integrals - Properties– Integration by parts - Reduction formulae – Problems.

Unit IV Double and Triple Integrals

Double integrals - Evaluation of double integral – Triple integrals – Change of variables.

Unit V Beta and Gamma functions

Definition – Properties of Beta and Gamma functions – Problems.

Text Book(s)

1. S. Arumugam, Calculus, 2011 Edition, New Gamma Publishing House

Reference(s)

1. T. K. Manicavachagom Pillay Differential Calculus, 2003 Edition, S. Viswanathan (Printers & Publishers) Pvt. Ltd.
2. T. K. Manicavachagom Pillay, Integral Calculus 2000 Edition, S. Viswanathan (Printers & Publishers) Pvt. Ltd.



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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME : B.Sc., Mathematics
COURSE TITLE : Trigonometry and
Theory of Equations

COURSE CODE : 17U1MMC2
QN.NO : 8102

TIME : 3 Hours

MAX.MARKS :75

Unit I Trigonometry

Hyperbolic function – Relation between hyperbolic function and circular trigonometric functions – Inverse hyperbolic functions.

Unit II Trigonometric series

Logarithm of a complex number – Summation of trigonometric series – Difference method – C+iS method – Gregory’s series (Excluding the method angles in arithmetic progression).

Unit III Roots and Coefficients

Equations with real coefficients and imaginary roots-equations with rational coefficients and irrational roots- Relation between roots and coefficients – Symmetric functions of the roots – Sum of the power of the roots.

Unit IV Reciprocal equations and Transformations of equations

Reciprocal equations –solution of standard reciprocal equation- Solving reciprocal equations by reducing to standard form – Transformation of equations- Roots with signs changed- Roots multiplied by a given number – Increasing and decreasing the roots-Removal of terms- Descartes’s rule of sign- Rolle’s theorem(without proof).

Unit V Cubic and Biquadratic equation

Horner’s method– Cardon’s method – Trigonometrical method- Ferrari’s method of solving biquadratic equations.

Text Book(s):

1.T. K. Manicavachagom Pillay, Algebra Vol. I, 2003 Edition, S. Viswanathan (Printers & Publishers) Pvt. Ltd.

Chapters: 6 (6.9-6.11, 6.13, 6.15- 6.18, 6.24, 6.25, 6.30, 6.34 &6.35).

2. Dr. S. Arumugam, Trigonometry and Fourier series, 1999 Edition, New Gamma Publishing House.

Chapters: 2, 3, 4.

Reference Books:

1. M. K. Venkatraman, Manorama Sridhar, Classical Algebra & Trigonometry, 1st Edition 2002, The National Publishing Company.

2. T. K. Manicavachagom Pillai, Trigonometry, 1997 Edition, S. Viswanathan (Printers & Publishers) Pvt.Ltd.

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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME : B.Sc., Mathematics

COURSE CODE : 17U1MSM1

COURSE TITLE : Switching Theory

QN.NO : 8103

TIME : 3 Hours

MAX.MARKS :75

Unit I Number system and Codes

Number representation- Conversion of bases - Binary arithmetic - Binary codes weighted and non-weighted codes.

Unit II Switching Algebra

Fundamental postulates – Basic properties – Switching expressions and their manipulation – De’ Morgan’s theorem.

Unit III: Switching Function

Definition - Simplification of expression – Canonical forms-functional properties-exclusive-OR operation-functionally complete operations.

Unit IV:Isomorphic System

Series – Parallel switching circuits –Propositional calculus-Electronic gate networks – Boolean algebras.

Unit V: Minimization of Switching Function

Introduction – The map method – Simplification and minimizing of functions – Determination of the minimal product of the sums – Don’t care combination-The five-variable map.

Text Book:

1. Zvikhovian and Niraj K. Jha, Switching and Finite Automata Theory , 3rd Edition 2010, Cambridge University Press.

Chapters: 1(1.1,1.2), 3 & 4 (4.1, 4.2).

Reference Books:

1. Anita Goel and Ajay Mittal, Computer Fundamentals and Programming in C, Second Impression (2014), by Pearson (India).
2. A.P. Godse and D. A. Godse, Switching Theory and Logic Design by, 1st Edition 2009, Technical Publications.

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PROGRAMME : B.Sc.,

COURSE CODE : 17UIMAC1

COURSE TITLE : Mathematics-I

QN.NO : 8104

TIME : 3 Hours

MAX.MARKS :75

Unit I Theory of Equations

Formation of Equations – Relation between roots and Coefficients- Reciprocal equation – Transformation of Equation – Approximate solutions of Numerical Equations – Newton’s Methods – Horner’s Method.

Unit II Differential Calculus

Curvature – Radius of Curvature – p-r equation – Evolutes.

Unit III Integral Calculus

Integration – Evaluation of definite integrals – Integration by parts – Reduction Formulae – Evaluation of Double and Triple Integrals.

Unit IV Trigonometry

Applications of Demoivre’s Theorem – Expression for $\sin n\theta$, $\cos n\theta$ and $\tan n\theta$ – Expression for $\sin^n \theta$, $\cos^n \theta$ and $\sin^m \theta \cos^n \theta$ - Problems - Expansion of $\sin \theta$, $\cos \theta$, $\tan \theta$ in powers in θ – Hyperbolic functions – Inverse Hyperbolic functions.

Unit V Trigonometric series

Logarithm of a complex number – Summation of Trigonometric Series – Difference Method – Angles in arithmetic progression method – C+iS method (Excluding Gregory’s series).

Text Book:

1. S. Arumugam and A. Thangapandi Isaac, Allied Mathematics Paper – I, Edition 2014, New Gamma Publishing House.

Chapters: Part I, Part II & Part III.

Reference Books:

1. M. K. Venkataraman and Manorama Sridhar, Allied Mathematics Vol. I by 1st Edition 2005, Agasthiar Publications.
2. P. R. Vital, Allied Mathematics, Margam Publications (2009).

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PROGRAMME : B.Sc., Mathematics

COURSE CODE : 17U2MMC3

**COURSE TITLE : Analytical Geometry of
three dimension and Vector Calculus**

QN.NO : 8105

TIME : 3 Hours

MAX.MARKS :75

Unit I Planes

Equation of a plane - Angle between two planes - Angle bisectors of two planes.

Unit II Straight Lines

Equation of a straight line - A plane and a straight line -Equation of two skew lines in a simple form.

Unit III The Sphere

Equation of a sphere - Tangent line and tangent plane – Section of a sphere.

Unit IV Vector Differentiation

Differentiation of vectors - Gradient - Divergence and curl.

Unit V Vector Integration

Line integrals - Surface integrals - Green's, Gauss and Stoke's theorems (without proof) - Problems.

Text Book:

1. S. Arumugam&A.ThangapandiIssac, Analytical Geometry (3D) and Vector Calculus, Edition 2011, New Gamma Publishing House.

Chapters: 2 (2.1 - 2.3), 3 (3.1 - 3.3), 4 (4.1 - 4.3), 5 (5.2 - 5.4), 7 (7.1 - 7.3).

Reference Books:

1. T. K. ManickavachagomPillai and T. Natarajan, Analytical Geometry (3D), Edition 2011, S. Viswanathan (Printers & Publishers) Pvt. Ltd.
2. M. K.Venkataraman and Manorama Sridhar, Vector calculus and Fourier series, 2002 Edition, The National Publishing Company.

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PROGRAMME : B.Sc., Mathematics

COURSE CODE : 17U2MMC4

COURSE TITLE : Discrete Mathematics

QN.NO : 8106

TIME : 3 Hours

MAX.MARKS :75

Unit I Set Theory

Introduction – Sets and Elements – Universal Set and Empty Set – Subsets – Venn Diagrams – Set Operations – Algebra of Sets and Duality – Finite, Infinite Sets and Counting Principle – The Inclusion – Exclusion Principle – Classes of Sets, Power Sets, Partitions – Mathematical Induction – Multi Sets – Solved Problems.

Unit II Relations and Functions

Introduction – Product Sets – Relations – Pictorial Representations of Relations – Composition of Relations – Types of Relations – Closure Properties – Equivalence Relations – Partial Ordering Relations – n-ARY relations – Solved Problems.

Functions: Introduction – Functions – One-to-One, Onto, Invertible Functions – Mathematical, Exponential and Logarithmic Functions – Solved Problems

Unit III Logic and Propositional Calculus

Introduction – Propositions and Compound Propositions – Basic Logical Operators – Propositions and Truth Tables – Tautologies and Contradictions – Logical Equivalence – Algebra of Propositions – Conditional and Biconditional Statements – Arguments – Logical Implication – Propositional Functions, Quantifiers – Negation of Quantified Statements – Normal Forms – Solved Problems.

Unit IV Matrix Theory

Introduction – Algebra of Matrices – Types of Matrices – Inverse of a Matrix- Elementary transformation-Rank of a matrix – Consistency and Inconsistency of simultaneous linear equations using Matrices – Problems

Unit V Characteristic Equation of Matrices

Characteristic Equation of a Matrix – Cayley Hamilton theorem – Finding Powers and Inverse of a Matrix using Cayley Hamilton Theorem – Eigen Values and Eigen Vectors – Properties of Eigen Values and Eigen Vectors – Determination of Eigen Values and Eigen Vectors.

Text Book(s):

1. Seymour Lipschutz and Marc Lars Lipson, Discrete Mathematics, 3rd Revised Edition (2013), Schaum's Outlines Tata McGraw Hill Education (India) Private Limited.
Chapters : 1, 2(2.1-2.10), 3 (3.1-3.4) and 4 (For Units – I, II and III)
2. S. Arumugam and A. T. Issac, Modern Algebra, Reprint 2011, Scitech Publications.
Chapter: 7 only (For Units – IV & V)

Reference Books:

1. J. P. Tremblay and Manohar Discrete Mathematical Structures with Applications to Computer Science, 28th Reprint 2007, Tata McGraw – Hill Publications.
 2. M. K. Venkatraman, N. Sridharan and N. Chandrasekaran, Discrete Mathematics, The National Publishing Company (2000).
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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME : B.Sc., Mathematics

COURSE CODE: 17U2MSM2

COURSE TITLE : Fourier series and Z Transforms

QN.NO: 8107

TIME : 3Hrs

Max. Marks: 75

Unit I Fourier Series

Definition - Euler's formula (Statement only) - Fourier coefficients-Fourier Series Simple Problems.

Unit II Half Range Fourier Series

Half Range Sine Series, Half Range Cosine Series - Problems.

Unit III Harmonic Analysis

Definitions - First Harmonic - Second Harmonic Coefficients.

Unit IV Z-Transforms

Introduction -Definition - Damping Rule, Shifting Theorem - Initial value theorem - Final value theorem - Convolution theorem (Statement only) - Simple Problems.

Unit V Inverse Z-Transform and its Application

Definition - Inverse Z-transform - Applications of Z-transform - Problems.

Text Book:

1. S. Arumugam A. Thangapandi Isaac and A. Somasundaram, Higher Engineering Mathematics Volume-II, Edition 2010, Scietech Publications.

Chapters: 13(13.3,13.5,13.8),16(16.1-16.4).

Reference Books:

1. B.S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publishers.
2. T.Veerarajan, Engineering Mathematics, 4th Edition 2005, Tata McGraw Hill Publishers.

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PROGRAMME : B.Sc.,

COURSE CODE: 17U2MAC2

COURSE TITLE : Allied Mathematics - II

QN.NO: 8108

TIME : 3Hrs

Max. Marks: 75

Unit I Vector Calculus

Vector differentiation – Vector differential operator – Gradient – Divergence – Curl & their simple properties – Directional Derivatives – Solenoidal and irrotational Vectors – Line integrals.

Unit II Matrix Theory

Types of Matrices – Rank of a Matrix – Consistency of equations – Cayley Hamilton theorem – Eigen Values and Eigen Vectors.

Unit III Correlation & Regression

Correlation – Rank Correlation – Spearman’s formula – Regression.

Unit IV Interpolation

Finite differences – Newton’s Formula – Lagrange’s Formula.

Unit V Index Numbers

Simple index number– Weighted index number – Weighted aggregative method – Weighted average of price relative method – Consumer price index numbers – Conversion of chain base index number into fixed base index and conversely.

Text Book:

1. S. Arumugam and A.Thangapandi Isaac, Allied Mathematics Paper II (MKU) by Edition 2011, New Gamma Publishing House.

Chapters: 1, 2, 3,6,7,9.

Reference Books:

1. S. P. Gupta, Statistical Methods, Revised edition 2011, S.Chand Publishing.
2. P. R. Vital, Allied Mathematics, Margam Publications (2009).

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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME : B.Sc., Mathematics

COURSE CODE: 17U3MMC5

COURSE TITLE : Groups and Rings

QN.NO: 8109

TIME : 3Hrs

Max. Marks: 75

LEARNING OBJECTIVES

- To enrich the students with the knowledge of Abstract Algebra.
- To have a good foundation in Groups and Rings.
-

LEARNING OUTCOMES

On satisfying the requirement of this course, students will have the knowledge and skills to

- Explain the fundamental concepts of Groups & Rings and their role in modern mathematics and applied contexts.
- Demonstrate accurate and efficient use of advanced algebraic techniques.

Unit I Groups

Definition and examples – Elementary properties of a group – Permutation groups.

Unit II Subgroups

Definition and examples of subgroups – Cyclic groups – Order of an element – Cosets and Lagrange's theorem.

Unit III Normal subgroups and Homomorphisms

Definition and examples of Normal subgroups – Quotient groups – Isomorphism – Homomorphism.

Unit IV Rings

Definition and examples of rings – Elementary properties of rings – Isomorphism – Types of rings – Characteristic of a ring – Sub rings.

Unit V Ideals

Definition and examples of ideals – Quotient rings – Maximal and Prime ideals -Homomorphism of rings – Field of quotients of an integral domain.

Text Book:

1. S. Arumugam and A. Thangapandi Issac, Modern Algebra, 2011, Scitech Publications (India) Pvt. Ltd.
- 2.

Chapters: 3 (3.1 – 3.2, 3.4 – 3.11), 4 (4.1 – 4.11)

Reference Books:

1. Vijay K. Khanna and S. K. Bhambri, A Course in Abstract Algebra, 3rd Edition, Vikas Publishing House Pvt. Ltd.
2. Surjeet Singh and Quazi Zameeruddin, Modern Algebra, 2nd Reprint 2009, Vikas Publishing House Pvt. Ltd.



PROGRAMME : B.Sc.,

COURSE CODE: 17U3MAC1

COURSE TITLE : Office Automation

QN.NO: 8110

TIME : 3Hrs

Max. Marks: 75

LEARNING OBJECTIVES

- To enable the students to study MS Office and to enrich the practical knowledge in MS Office.

LEARNING OUTCOMES

After successful completion of this course, students will be

- Able to perform documentation and presenting skills.
- Proficient in using Windows, Word Processing Applications, Spreadsheet Applications, Database Applications and Presentation Graphics Applications.

Unit I MS Word

Introduction to MS Word, Starting word – Creating a Document – Saving and Printing a document – Move and Copy Text – Smart Cut and Paste – Quickly Opening Recently Used Files – Copying Text to Another File – Formatting Text – Using Bullets and Numbering in Paragraphs – Finding Text – Replace Command – Checking Spelling and Grammar – Using Auto Correct to Automatically Fix Typing Errors .

Unit II MS Word (Continued)

Enhancing a Document – Page Setup – Inserting Page Breaks – Looking at a Document in Different Views – Adding Borders and Shading to Paragraphs – Using Headers and Footers in the Document – Print Preview – Print Options – Creating Tables – Formatting a Table – Using Table Autoformat to Format a Table – Calculations in a Table – Using Mail Merge.

Unit III MS Excel

Introduction to Worksheet and MS Excel – Getting Started with Excel – Editing Cells and using Commands and Functions – Excel Functions – Range – Moving and Copying, Inserting and Deleting Rows and Columns – Formatting a Worksheet – Formatting Numbers.

Unit IV MS Excel (Continued)

Creating Charts – Resizing and Moving the Chart – Changing the Chart Type – Controlling the Appearance of a Chart – Updating, Modifying and Deleting a Chart – Previewing and Printing Charts – Using Date and Time in a Worksheet – Naming Ranges and Using Statistical, Math Functions.

UnitV Power Point

Power Point – Creating a Presentation – Power Point Views – Running a Slide Show – Printing a Presentation.

Text Book:

1. R K Taxali, PC Software for Windows 98 Made Simple, 2015, McGraw Hill Education Pvt. Ltd.

Chapters : 9(9.4 – 9.7), 11(11.1 – 11.5),12(12.1, 12.4), 13(13.2-13.4,13.7),15(15.1-15.4, 15.6,15.7,15.9),16(16.1-16.4),18, 20, 21, 22(22.1-22.5), 23, 24(24.2-24.4), 26, 27(27.2 – 27.5, 27.7,27.8), 28(28.1-28.6), Annexure B

Reference Books:

1. Jodi Davenport, Critch Greaves, Michael Groh and Eruce Hall berg, Inside Microsoft Office Professional , 1994, New Riders Publications.
2. CloriaMadumere, 3 – IN – 1 Microsoft Word, Powerpoint and Excel 2010, First Edition 2016, Create space Independent Publishing Platform.



PROGRAMME : B.Sc.,

COURSE CODE: 17U3MAC3

COURSE TITLE : Ancillary Mathematics – III

QN.NO: 8112

TIME : 3Hrs

Max. Marks: 75

LEARNING OBJECTIVES

- Enable the students to have a good foundation on Differential Equations and to understand the fundamental ideas of Partial differential equations.
- Enable the students to know the concepts of analytic functions and bilinear transformations.

LEARNING OUTCOMES

After successfully completing this course, students will be able to

- Explain the concepts of Differential Equation and Classify the Differential Equation with respect to their order and linearity.
- Solve First order Ordinary Differential Equation and Exact Differential equations.
- Classify Partial Differential Equation and solve the first order Partial Differential Equation.
- Find the function whether it is analytic or not and solving the bilinear transformation.

Unit I Exact differential Equations

Equations of first order and first degree – Variable separable – Homogenous equations – Non-homogeneous equations – Exact Differential Equations – Integrating factors.

Unit II Linear equations of Higher Order

Linear equations with constant coefficients – Methods of finding complementary functions – Methods of finding particular Integrals – Problems.

Unit III Partial differential Equations

Formation of partial differential equations – First order partial differential equations – Methods of solving First order partial differential equations – some standard forms – Charpit’s method.

Unit IV Analytic Functions

Limits – Analytic functions– Cauchy Riemann Equations (C-R equations) – Alternate forms of C-R equations.

Unit V Bilinear Transformations

Elementary Transformations – Problems – Bilinear Transformations – Cross Ratio – Fixed points of a bilinear Transformation.

Text Book:

1. S. Arumugam and A. T. Isaac, Allied Mathematics Paper III, Edition 2012, New Gamma Publishing House.

Chapters: 1(1.2 - 1.4), 2, 4, 6, 7.

Reference Books:

1. S. Arumugam, A.T.Issac, A.Somasundaram, Complex Analysis, Reprint 2010, Scitech Publications (India) Pvt. Ltd.
2. P. R. Vital, Allied Mathematics,2009, Margam Publications.



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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME : B.Sc., Mathematics

COURSE CODE: 17U3MSA1

COURSE TITLE : Laplace Transforms

QN.NO: 8113

TIME : 3Hrs

Max. Marks: 75

Learning Objectives

- To enable the students to study the Laplace Transforms, properties of Laplace Transform, inverse Laplace Transform and some applications to solve the differential equations and integral equations.

Learning Outcomes

After successfully completing this course, students will be able to

- Find the Laplace transform of a function and Inverse Laplace transform of a function using definition.
- Find the Laplace transform of derivatives, integrals and periodic functions.
- Use the Method of Laplace transforms to solve initial-value problems for linear differential equations with constant coefficients.

Unit I Laplace Transforms

Definition – Laplace Transform of some standard functions – Properties of Laplace transforms – Problems based on these properties – Some theorems on Laplace transforms – Problems based on these theorems.

Unit II Inverse Laplace transforms

Definition – Some theorems on Inverse Laplace transforms (without proof) – Simple problems – Method of finding Laplace transforms by partial fraction method – First shifting theorems – Problems.

Unit III Inverse Laplace transforms (Continued)

Finding inverse Laplace transforms of the types $\text{Log}(F(s))$, $sF(s)$, $F(s)/s$, $\tan^{-1}(F(s))$, $\cot^{-1}(F(s))$, - Problems based on these types – Laplace transforms of derivatives.

Unit IV Application of Laplace transforms

Solving first order differential equations with constant coefficients- Solving second order differential equations with constant coefficients.

Unit V Application of Laplace transforms (continued)

Solving integral equations using the method of Laplace transforms – Evaluation of definite integrals using Laplace transforms - Finding Laplace transform of periodic functions.

Text Book:

1. P. Kandasamy and K. Thilagavathy, Allied Mathematics Paper – II (Second semester), Reprint 2013, S. Chand & Company private Ltd.

Chapter: 1 (Laplace Transforms).

Reference Books:

1. S. Arumugam, A.ThangapandiIssac and A. Somasundaram, Higher Engineering Mathematics Vol. II , Edition 2010, Scitech Publications.
2. T. K. ManikkavachagamPillai and S. Narayanan, Calculus Vol. III, Edition 2002, S. Viswanathan (Printers & Publishers) Pvt. Ltd.



PROGRAMME : UG NME - Mathematics

COURSE CODE: 17U3MNM1

COURSE TITLE : Mathematics for Competitive Examinations

QN.NO: 8114

TIME : 3 Hrs

Max. Marks: 75

Learning Objectives

- The main aim of introducing “MATHEMATICS FOR COMPETITIVE EXAMS” for non-mathematics students is to develop skill to meet the competitive examinations for better job opportunity.
- To lay the foundation in the basic principles of Mathematics for other Major Students.

Learning Outcomes

After successful completion of this course, students will be able to

- Understand the basic concepts which will be helpful to them to clear the competitive exams for better job opportunity.
- Solve the problems easily by using Short-cut method with time management.

Unit I Highest Common factor (H.C.F) and Least Common factor (L.C.M) of Numbers.

Unit II Square roots and Cube roots – Average.

Unit III Profit & Loss.

Unit IV Ratio and Proportion.

Unit V Simple Interest and Compound Interest.

Text Book:

1. R. S. Aggarwal, Quantitative Aptitude, Reprint 2016, S. Chand & Company Pvt. Ltd.

Sections: 2, 5, 6, 11, 12, 21, 22

Reference Books:

1. G. K. Ranganath, C. S. Sampangiram and Y. Rajaram, A text Book of business Mathematics, 2008, Himalaya Publishing House.
2. R.V. Praveen, Quantitative Aptitude and Reasoning , 2nd Revised Edition 2013, Prentice-Hall of India Pvt. Ltd.

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PROGRAMME : B.Sc., Mathematics

COURSE CODE : 17U4MMC6

COURSE TITLE : Sequence and Series

QN.NO: 8115

TIME : 3Hrs

Max. Marks: 75

Learning Objectives

- To impart the knowledge of sequences and summation of series.
- To have a good foundation in Sequences of Bounded, Monotonic, Cauchy etc., and Summation of infinite series of positive terms and arbitrary terms.
- To develop the skill of computation with real sequences and series.

Learning Outcomes

On satisfying the requirement of this course, students will have the knowledge and skills to

- Determine if an infinite sequence is bounded, monotonic or oscillating.
- Determine the sequence whether it is convergent or divergent by using the appropriate tests.
- Find the sequence of partial sum for an infinite series.
- Determine if an infinite series is convergent or divergent by selecting the appropriate tests such as D’Alembert’s ratio test, Raabe’s test, Bertrand test, Kummer’s test, Gauss test, Cauchy condensation test, Cauchy nth root test, etc.

Unit I Sequences

Definition and examples of sequences – Bounded sequences – Monotonic sequences – Convergent sequences – Definition and examples of divergent and oscillating sequences – Problems.

Unit II Sequences (Continued)

Algebra of Limits – Properties – Problems.

Unit III Monotonic sequences

Behavior of monotonic sequences – Some theorems on Limits — Problems.

Unit IV Series of Positive terms

Infinite series - Problems – Comparison test (without proof) – Problems – Harmonic series.

Unit V Series of positive terms (Continued)

Kummer’s test (without proof), Gauss’s test (without proof) – Problems based on these tests – Cauchy’s nth root test (without proof) – Problems.

Text Book:

1. S. Arumugam and A. Thangapandi Issac, Sequences and Series, Edition 2012, New Gamma Publishing House.

Chapters : 3 (3.1 – 3.8), 4 (4.1 – 4.4)

Reference Books:

1. K. Chandra Sekhara Rao and K. S. Narayanan, Real Analysis Volume – I, Edition 2008, S. Viswanadhan Printers and Publishing Pvt. Ltd.
2. M. K. Venkatraman and Manorama Sridhar, Sequence and Series, Edition 2002, The National Publishing Company.

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THE MADURA COLLEGE (Autonomous), MADURAI – 625 011

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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME : B.Sc., Mathematics

COURSE CODE: 17U4MMC7

COURSE TITLE : Mathematical Statistics

QN.NO: 8116

TIME : 3Hrs

Max. Marks: 75

Learning Objectives

- This course is to enable the students to understand the various statistical techniques and apply them in real life problems.

Learning Outcomes

On satisfying the requirement of this course, students will have the knowledge and skills to

- Calculate Measures of Central Tendency and Measures of dispersion for both grouped and ungrouped data.
- Find the Moments, Skewness and Kurtosis.
- Compute and interpret the results of Correlation & Regression analysis.

Unit I Measures of Central Tendency

Arithmetic Mean - Change of Origin and Scale – Properties of Mean – Geometric Mean – Harmonic Mean – Median – Quartiles – Partition values and their Graphical Location – Mode – Requisites for an Ideal Measure of Central Tendency.

Unit II Measures of Dispersion

Dispersion – Characteristics of an Ideal Measure or Dispersion – Measures of Dispersion – Range – Mean Deviation – Variance – Standard Deviation – Coefficient of Variation – Relation between Standard and Root – Mean Square Deviation – Effect of change of origin and scale on S.D – Problems.

Unit III Moments and Skewness

Moments – Moments about the Mean in terms of Moments about any Point and Conversely – Effect of change of origin and scale on Moments - Sheppard's Correction to Moments of Grouped Frequency Distribution – Skewness – Kurtosis - Pearson's β and γ Coefficients – Factorial Moments-Absolute Moments Problem.

Unit IV Correlation

Bivariate distribution – Correlation Coefficient – Effect of Change of Origin and Scale - Theorem Cauchy-Schwartz Inequality – Limits for Coefficient of Correlation – Rank Correlation Coefficient Problems.

Unit V Regression

Linear Regression, Curvilinear, Regression – Equations of the Lines of Regression, Regression Coefficients – Standard Error of Estimate –Theorem – Regression Curves- Problems.

Text Book:

1. J.N. Kapur, H.C. Saxena, Mathematical Statistics, Reprint 2005, S. Chand and Company.

Chapters:2(2.5.1 – 2.5.5, 2.6),3,10

Reference Books:

1. D.C.Sanchetti and V.K.Kapoor, Statistics (Theory, Method and Application), Reprint 2010, Seventh thoroughly Revised Edition, Sultan Chand and sons.
2. S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematical Statistics, Reprint 2000, 9th revised edition, Sultan Chand and sons.

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PROGRAMME : B.Sc., Mathematics

COURSE CODE: 17U4MSM3

COURSE TITLE : Fourier Transforms

QN.NO: 8117

TIME : 3Hrs

Max. Marks: 75

Learning Objectives

- To enable the students to study Fourier Transforms and some concepts of infinite Fourier Sine and Cosine transforms, finite Fourier Sine and Cosine transforms and applications to solve some infinite and boundary value problems using finite and infinite transforms.

Learning Outcomes

On satisfying the requirement of this course, students will have the knowledge and skills to

- Calculate the Infinite Fourier transform, Fourier Sine and Cosine transform of elementary functions from the definition.
- Demonstrate their understanding of the shifting theorems, Fourier integral theorems, Inverse Fourier sine and cosine transforms by applying them to appropriate examples.
- Calculate the Finite Fourier cosine and sine transform and apply it in solving boundary value problems.
- Approach more advanced aspects of transform methods.

Unit I Infinite Fourier Transforms

Definition of Infinite Fourier transform – Fourier integral theorem – Inversion theorem for Infinite Fourier transform – Properties of Infinite Fourier transforms – Problems based on these properties – Convolution theorem – Parseval’s identity – Problems.

Unit II Infinite Fourier Sine and Cosine transforms

Definition of Infinite Fourier sine and cosine transforms – Inversion formula for Inverse Fourier sine and cosine transforms – Properties – Problems.

Unit III Application of Infinite Fourier transforms

Fourier transform of derivatives – Relation between Fourier transforms and Laplace transforms – Solving Boundary value problems using infinite Fourier Transforms – Problems.

Unit IV Finite Fourier Sine and Cosine Transforms

Definition of finite Fourier Sine and Cosine transforms – Inversion formula for Sine and Cosine transforms – Problems.

Unit V Application of Finite Fourier transforms

Finite Fourier Sine and Cosine transform of derivatives - Solving boundary value problems using Finite Fourier Sine and Cosine transforms – Problems.

Text Book:

1. P. Kandasamy and K. Thilagavathy, Engineering Mathematics Vol. III (Transforms and Partial Differential Equations), Edition 2009, S. Chand & Company Ltd.

Chapter: 4 only.

Reference Books:

1. S. Arumugam, A.ThangapandiIssac and A. Somasundaram, Higher Engineering Mathematics Vol. II , Edition 2010, Scitech Publications.
2. T. Veerarajan, Transforms and Partial Differential Equations (Updated Edition), Third Reprint 2013, McGraw Hill Education (India) Private Ltd.



PROGRAMME : B.Sc.,

COURSE CODE: 17U4MAC2

COURSE TITLE : PROGRAMMING IN C

QN.NO: 8118

TIME : 3Hrs

Max. Marks: 75

Learning Objectives

- Enrich the students to have a good foundation and practical knowledge on Programming in C.

Learning Outcomes

On satisfying the requirement of this course, students will have the knowledge and skills to

- Write a C program for simple applications of real life using Structures and files.
- Implement Programs with Pointer arrays.
- Design an algorithmic solution for a given problem.

Unit I Fundamentals

C Fundamentals - The C Character Set - Identifiers and Keywords - Data Types - Constants - Variables and Arrays- Declarations - Expressions - Statements - Symbolic Constants - Arithmetic Operators - Unary Operators - Relational and Logical Operators - Assignment Operators - The Conditional Operator - Library Functions.

Unit II Data Input and Output

The getchar Function - The putchar Function - The Scan f Function - The Print f Function - Writing a C Program - Compiling and Executing the Program.

Unit III Control Flow

The if else Statement - The while Statement - The do while Statement - The for Statement - Nested Control Structures - The switch Statement - The break Statement - The Comma Operator - The go to Statement.

Unit IV Functions

Accessing a Function - Function Prototypes - Passing Arguments to a Function - Recursion - Storage Classes - Automatic Variables - External (Global) Variables - Static Variables.

Unit V Arrays and Structures

Defining an Array - Processing an Array - Passing Arrays to Functions -Multidimensional Arrays - Arrays and Strings - Structures and Unions - Defining a Structure - Processing a Structure - Structures and Pointers- Unions.

Text Book:

1. Byron S. Gottfried, Programming with C, 2nd edition Thirteenth Reprint 2001, Schaum’s Outline Series, Tata McGraw – Hill Publication.

Chapters: 2, 3, 4(4.2- 4.6), 5(5.2- 5.4), 6(6.2- 6.11), 7(7.2- 7.6), 8(8.1- 8.4), 9(9.1- 9.5), 11(11.1, 11.2, 11.4, 11.7).

Reference Books:

1. E. Balagurusamy, Programming in ANSI C, 2nd Edition, 2000, Tata McGraw-Hill.
2. YashavantKanetkar, Let us C, 7th Edition 2007, BPB Publications.

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PROGRAMME : B.Sc.,

COURSE CODE: 17U4MAC4

COURSE TITLE : Ancillary Mathematics -IV

QN.NO: 8120

TIME : 3Hrs

Max. Marks: 75

Learning Objectives

- To impart Optimization Techniques.
- To make the Students become familiar with the basic Principle of LPP and enrich knowledge to formulate and solve an LPP using various methods.

Learning Outcomes

On satisfying the requirement of this course, students will have the knowledge and skills to

- Formulate the LPP for a real life Problems and give the solution for the problem using suitable optimization techniques.
- Solve LPP by using Graphical, Simplex and Big-M method.
- Find the IBFS of TP using North-west Corner Rule, Row Minima, Column Minima, Least cost Method and VAM.
- Find Optimal Solution of T Pusing Modi Method.
- Solve the Assignment and Travelling Salesman Problem using Hungarian Algorithm.
- Apply LPP in Various fields such as Science, Engineering, Industry, Business, etc.

Unit I Linear Programming Problems

Formulation of Linear Programming Problem – Mathematical Formulation of a Linear Programming Problem - Linear Programming Problem in summation Notation - Linear Programming Problem in Matrix Form – Canonical Form of a Linear Programming Problem – Standard Form of a Linear Programming Problem – Problems.

Unit II Linear Programming Problems (Continued)

Solution of Linear Programming Problem – Feasible Solution – Optimal Solution – Basic solution – Basic Feasible Solution – Graphical Method – Non Negativity Constraint – Constraint of the form $ax_1 + bx_2 (\leq, \geq) c$ where a, b are not both zero – Optimizing Objective Function – Problems.

Unit III Linear Programming Problems (Continued)

Simplex Method – Big-M Method – Problems.

Unit IV Transportation Problems

Mathematical Formulation of Transportation Problems – North-west Corner Rule- Row Minima Method- Column Minima Method- Least Cost Method – Vogel Approximation Method – MODI Method.

Unit V Assignment Problems

Mathematical Formulation of Assignment Problems – Solution to Assignment Problems (Minimization & Maximization) – Travelling Salesman Problem.

Text Book:

1. S. Arumugam and A. T. Isaac, Topics in Operations Research Linear Programming , Edition 2015, New Gamma Publishing House.

Chapters: 3(3.1 – 3.6), 4, 5.

Reference Books:

1. KantiSwarup, P.K. Gupta and Man Mohan, Operations Research, 9th Edition 2001, Sultand Chand Publication.
2. V. Sundaresen, K.S.G. Subramanian and K. Ganesan, Resource Management Techniques (Operations Research) ,New Revised Edition 2000, A.R Publications.



PROGRAMME : UG NME - Mathematics

COURSE CODE: 17U4MNM2

COURSE TITLE : Quantitative Aptitude

QN.NO: 8121

TIME : 3Hrs

Max. Marks: 75

Learning Objectives

- The main aim of introducing “Quantitative Aptitude” for non-mathematics students is to develop skill to meet the competitive examinations for better job opportunity.
- Effort has been made to accommodate fundamental, mathematical aspects to instill confidence among Non-major students.
- Enrich their knowledge and to develop their logical reasoning thinking ability.

Learning Outcomes

After successful completion of this course, students will have the knowledge and skills to

- Solve the problems easily by using Short-cut method with time management which will be helpful to them to clear the competitive exams for better job opportunity.
- Analyze the Problems logically and approach the problems in a different manner.

Unit I Time & Distance – Problems on Trains.

Unit II Logarithms – Properties of Logarithms – Common Logarithms.

Unit III Calendar and Clocks.

Unit IV Permutations & Combinations and Probability.

Unit V True Discount - Banker’s Discount.

Text Book:

1. R.S. Aggarwal, Quantitative Aptitude, Reprint 2016, S. Chand & Company Pvt. Ltd.

Sections: 17, 18, 23, 27, 28, 30, 31, 32, 33

Reference Books:

1. R.V. Praveen, Quantitative Aptitude and Reasoning, 2nd Revised Edition 2013, Prentice-Hall of India Pvt. Ltd.
 2. G. K. Ranganath, C. S. Sampangiram and Y. Rajaram, A text Book of business Mathematics, 2008, Himalaya Publishing House.
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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME : B.Sc., Mathematics

COURSE CODE: 17U5MMC8

COURSE TITLE : Real Analysis

QN.NO : 8122

TIME : 3Hrs

Max. Marks: 75

Learning Objectives

- To provide a strong foundation in basic concepts of Real Analysis which will enrich them to have a good knowledge in Pure Mathematics.
- To impart the knowledge of Metric space, Continuity, Connectedness and Compactness.

Learning Outcomes

On satisfying the requirement of this course, students will

- Have good knowledge of the fundamental mathematical concepts in Real analysis which is very essential for Higher Mathematics.
- Be familiar with Geometric behavior of continuous and discontinuous functions and able to point out the discontinuities on the graph of a function.
- Be able to prove statements and to formulate precise mathematical arguments.
- Demonstrate the ability to solve mathematical problems in Real analysis.

Unit I Metric Spaces

Introduction – Countable sets – Uncountable sets – Inequalities of Holder and Minkowski – Definitions and examples of metric space – Bounded sets in a metric space – Open ball in a metric space – Open sets.

Unit II Metric Spaces (Continued) and Complete Metric Space

Subspaces – Interior of a set – Closed sets – Closure – Limit point – Dense sets – Completeness – Baire’s category theorem.

Unit III Continuity

Continuity – Homeomorphism – Uniform continuity – Discontinuous functions on \mathbb{R} .

Unit IV Connectedness

Definition and examples – Connected subsets of \mathbb{R} – Connectedness and continuity.

Unit V Compactness

Compact space – Compact subsets of \mathbb{R} – Compactness and continuity.

Text Book:

S. Arumugam and A. Thangapandi Issac, Modern Analysis, 2012, New Gamma Publishing House.

Chapters: 1 (1.1 – 1.14), 2 (2.1 – 2.4, 2.5 – 2.10), 3 (3.1, 3.2), 4 (4.1 – 4.4), 5 (5.1 – 5.3), 6 (6.1, 6.2, 6.4).

Reference Books:

1. Dr. K. Chandrasekara Rao, Dr. K. Narayanan, Real Analysis, Vol. I & Vol. II, 2008, S. Viswanathan (Printers & Publishers) Pvt. Ltd.
2. M.K. Singal and Asha Rani Singal, A First Course in Real Analysis, 2010 Edition, R. Chand & Co Publication.



PROGRAMME : B.Sc., Mathematics

COURSE CODE: 17U5MMC9

COURSE TITLE : Differential Equations

QN.NO : 8123

TIME : 3 Hrs

Max. Marks: 75

Learning Objectives

- To enable the students to understand the concepts of Ordinary Differential Equations & Partial Differential Equations and its applications.
- To provide the basic knowledge of solving Ordinary Differential Equations using Laplace Transforms.

Learning Outcomes

After successful completion of this course, students will be able to

- Explain the concepts of Differential Equation and Classify the Differential Equation with respect to their order and linearity.
- Solve Ordinary Differential Equation and Partial Differential Equation using various methods.
- Apply the concepts of Ordinary Differential Equation and Partial Differential Equation in real life problems.

Unit I Ordinary differential equations of the first order

Preliminaries (not included for the examination) – Exact differential equations – Conditions for the equation to be exact – Working rule for solving it – Integrating factors– Equations of the first order and of a degree higher than the first – Equations solvable for p – Solvable for x – Solvable for y – Clairaut's equations.

Unit II Ordinary linear differential equations of second and higher orders

Second and higher order linear differential equations with constant coefficients – Homogeneous linear equation with variable coefficients – Cauchy's Euler Homogeneous equations – Method of reduction of order – Transformation of the equation by change of the dependent variable – Method of variation of parameters – Simultaneous linear differential equations with constant coefficients.

Unit III Partial differential equations of first order

Partial differential equations – Formation of PDE's by the elimination of arbitrary constants – Formation of PDE's by eliminating the arbitrary functions – Lagranges' linear PDE's –Method of grouping and method of Lagrangian multipliers – Solving first order nonlinear PDE's – Standard forms.

Unit IV Higher order homogeneous and non-homogeneous PDE's

Solving second and higher order homogeneous PDE's with constant coefficients – Standard forms – Solving non-homogeneous PDE's.

Unit V Laplace transforms

Definition – Properties of Laplace transforms – Laplace transforms of some standard functions – Inverse Laplace transforms – Transform of derivatives and integrals – Laplace transform of periodic functions – Application of Laplace transforms to solve differential equations with constant coefficients and integral equations only.

Text Book:

M. K. Venkataraman and Mrs. Manorama Sridhar, Differential Equations and Laplace Transforms, 2004, The National Publishing Company.

Chapters:

Section A:2 (2.6, 2.7), 3, 4, 5, 6, 7 (7.1 – 7.4, 7.7), 9 (9.1 – 9.8, 9.13 –9.20).

Section B: 1 (1.1 – 1.18, 1.20).

Reference Books:

1. S.Arumugam and A. ThangapandiIssac, Differential equations and applications, Gamma Publishing House.
2. S.Narayanan and T. K. ManicavachagomPillay, Calculus – Vol. III (Differential equations and Fourier series), Reprint 2002, S. Viswanathan Printers and Publishers Private Ltd.

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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME: B.Sc., Mathematics

COURSE CODE : 17U5MMC10

COURSE TITLE : Mechanics

QN.NO : 8124

TIME : 3 Hours

MAX.MARKS :75

Learning Objectives

To acquire the knowledge of fundamental concepts of Statics and Dynamics and its applications.

Learning Outcomes

On satisfying the requirement of this course, students will

- Understand projectile motion in the earth's gravity & the basic equations describing it.
- Apply Newton's Laws of Motion and principle of conservation of momentum.
- Understand simple harmonic motion & the simple harmonic oscillator. Understand displacement, frequency, & period for simple harmonic motion. Apply these concepts, along with Newton's 2nd Law to simple mass-spring problems.
- Understand frictional forces. Apply Newton's 2nd Law to problems with objects moving in the presence of friction. Understand the basics of motion on an inclined plane.
- Apply theorems of mechanics and interpret their results.
- Analyse mechanics as a systematic tool for problem solving.

Unit I Projectiles

Path of the projectile – Motion of the projectile – Velocity of the projectile – Range on the inclined plane.

Unit II Collision of elastic bodies

Newton's experimental law – Principle of conservation of momentum – Direct impact of two smooth spheres – Loss of kinetic energy due to direct impact – Oblique impact – Loss of kinetic energy due to oblique impact.

Unit III Simple Harmonic Motions

Composition of the Simple Harmonic Motion of the same period and in the same straight line and in two perpendicular direction – Motion of the particle suspended by a spiral spring – Simple pendulum – Motion under the action of central forces – Velocities and acceleration in polar coordinates – Differential equation of central orbits – Pedal equation – Velocities in a central orbit.

Unit IV Forces acting at a point

Parallelogram of forces – Triangle of forces – Lami's theorem – Resultant of any number of coplanar forces acting at a point – Parallel forces and momentum – Varignon's theorem on moments.

Unit V Friction

Laws of friction – Equilibrium of a body on a range inclined plane under a force parallel to the plane – Equilibrium of a body on a rough inclined plane under any force – Problems.

Text books:

1. M.K. Venkatraman, Dynamics, 13th Edition 2009, Agasthiar Publications.
Chapters: 6(6.1 – 6.16), 8(8.1 – 8.9), 10(10.1 – 10.13), 11(11.1 – 11.11).
2. M.K. Venkatraman, Statics, 13th Edition 2010, Agasthiar Publications.
Chapters: 2(1 – 15), 3(1 – 12), 7(1 – 13).

Reference Books:

1. P. Duraipandian, LaxmiDuraipandian, Mechanics, 2005 Edition, S. Chand.
2. N. P. Bali, Dynamics, Golden series, 2011, Firewall Media Publisher.

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PROGRAMME: B.Sc., Maths

COURSE CODE : 17U5MME1

COURSE TITLE : Probability Theory

QN.NO : 8125

TIME : 3 Hours

MAX.MARKS :75

Learning Objectives

- To impart the knowledge of fundamental concepts in Probability & Statistics to solve applied problems.
- To acquire the knowledge of various distributions and its applications.
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Learning Outcomes

On satisfying the requirement of this course, students will be able to

- Extend and formalise knowledge of the theory of probability and random variables.
- Compute conditional probabilities directly and using Baye’s theorem and check for independence of events.
- Perform probability calculations relating to probability distributions for discrete random variables.
- Perform probability calculations relating to probability density functions for continuous random variables.
- Compute Mathematical Expectation and variance.
- Apply various distributions to solve real life problems.

Unit I Probability

Introduction– Sample space – Events– The probability of an event– Some rules of probability – Conditional probability– Independent events–Baye’s theorem – Problems.

Unit II Probability distribution & Probability density function

Introduction– Probability distribution – Continuous random variables – Probability density functions – Multivariate distribution – Marginal distributions – Conditional distributions.

Unit III Mathematical Expectations

Introduction – Expected value of random variable– Moments –Chebychev’s theorem – Moment generating functions – Product moments – Moments of linear combination of random variables – Conditional expectations.

Unit IV Special Probability Distribution

Introduction – Discrete uniform distributions, Bernoulli’s distribution –Binomial distribution – Negative binomial and Geometric distribution– Hyper geometric distribution– Poisson distribution – Multinomial distribution – The Multivariate Hyper geometric distribution.

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Unit V Special Probability Densities

Introduction – Uniform distribution – Gamma, Exponential and Chi-square distribution – Beta distribution– Normal distribution – Normal approximation to Binomial distribution.

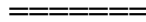
Text book:

John E. Freund's, Irwin miller, and Marylees Miller, Mathematical statistics with applications, 7th Edition 2007, Pearson.

Chapters: 2(2.1– 2.8), 3(3.1– 3.7), 4(4.2– 4.8), 5(5.2– 5.7), 6(6.2– 6.6).

Reference Books:

1. T. Veerarajan, Probability and Random Processes, 11th Reprint 2007, Tata McGraw – Hill Publishing Company limited.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical statistics, 1996, S. Chand & Sons.





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PROGRAMME: B.Sc., Maths

COURSE CODE : 17U5MSA2

COURSE TITLE : Combinatorics

QN.NO : 8128

TIME : 3 Hours

MAX.MARKS :75

Learning Objectives

- To impart the knowledge of counting principles which is essential for the students to think critically and apply it in real-world problems.
- To acquire the knowledge of Lattices and its applications.

Learning Outcomes

After successful completion of this course, the students will be able to

- Solve counting problems by applying elementary counting techniques using the sum and product rules, permutations, combinations and pigeonhole principle.
- Apply the ideas of Permutations and Combinations, Combinatorial number theory in various real life situations.

Unit I Counting

Basic Counting Principles – Sum rule principle and product rule principle – Factorial notation – Binomial coefficient – Permutations – Problems.

Unit II Combinations

Combinations with repetitions – The Pigeonhole principle –Problems.

Unit III Ordered partitions

Ordered partitions and Unordered partitions – The inclusion – Exclusion principle – Generation of Permutations& Combinations –Tree diagrams – Problems.

Unit IV Ordered sets

Ordered sets – Hasse Diagrams of partially ordered sets – Consistent enumeration – Supremum and infimum –Isomorphic ordered sets – Well-ordered sets – Problems.

Unit V Lattices

Lattices – Bounded Lattices – Distributive Lattices – Complements and complemented Lattices – Problems.

Text Book:

Seymour Lipschutz and Marc Lars Lipson, Discrete Mathematics (Schaum’s Outlines), 3rd Edition, 3rd Reprint 2010, Tata McGraw Hill.

Chapters: 6, 14.

Reference Books:

1. V.K. Balakrishnan, Combinatorics, Schaum’s Outlines, 1995.
2. Dr. M. K. Venkataraman, Dr. N. Sridharan and N. Chandrasekaran, Discrete Mathematics, Reprint September 2007, The National Publishing Company.

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 17U5MAC3

COURSE TITLE : Programming with C++ QN.NO : 8129

TIME : 3 Hours

MAX.MARKS :75

Learning Objectives

- To enable the students to have a good foundation and practical knowledge on Programming with C++.
- To enable the students to understand C++ language which improves C with Object – Oriented features.
- To learn the syntax and semantics of C++ programming language.

Learning Outcomes

On satisfying the requirement of this course, students will

- Have an ability to design C++ classes for code reuse.
- Able to design & implement programs using classes and objects.
- Acquire knowledge of writing inline functions for efficiency and performance.

Unit I Data Types and Functions

Basic Concepts of Object-Oriented Programming – Benefits of OOP – Identifiers and Constants – Basic Data Types– The Main Function – Function Prototyping – Call by Reference – Return by reference.

Unit II Classes and Objects

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 – Arrays of Objects – Objects as Function Arguments – Friendly Functions – Returning Objects.

Unit III Constructors and Destructors

Introduction – Constructors – Parameterized Constructors – Multiple Constructors in a Class – Constructors with Default Arguments – Copy Constructor – Dynamic Constructors – Destructors.

Unit IV Operator Overloading

Introduction – Defining Operator Overloading –Overloading Unary Operators – Overloading Binary Operators – Overloading Binary Operators using Friends.

Unit V Inheritance

Introduction – Defining Derived Classes – Single Inheritance – Making a Private Member Inheritable – Multilevel Inheritance – Multiple Inheritance.

Text book:

E. Balagurusamy, Object-Oriented Programming with C++, 2nd Edition 2001, Tata McGraw-Hill Publishing Company Limited.

Chapters:1(1.5,1.6),3(3.4,3.5),4(4.2 – 4.5),5(5.3,5.4,5.6–5.9,5.13–5.16),6(6.1 – 6.5,6.7,6.8,6.11), 7(7.1–7.5), 8(8.1–8.6).

Reference Books:

1. D. Ravichandran, Programming with C++, 1996, Tata McGraw-Hill Publishing Company Limited.
 2. Yashvant Kanetkar, Let us C++, 2006, BPB publication.
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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME: B.Sc., Mathematics

COURSE CODE : 17U6MMC11

COURSE TITLE : Complex Analysis

QN.NO : 8131

TIME : 3 Hours

MAX.MARKS :75

Learning Objectives

To provide a strong foundation in fundamental concepts of Complex Analysis which will enrich them to have a good knowledge to apply in real life problems.

Learning Outcomes

On satisfying the requirement of this course, students will

Determine whether the given function is Continuous / differentiable / analytic, and find the derivative of a function.

- Use Cauchy's integral theorem and formula to compute line integrals.
- Find the Taylor's series of a function and determine its circle or annulus of convergence.
- Classify singularities, examine the theory, compute the residue of a function and able to apply the concepts of the calculus of residues in the evaluation of integrals.

Unit I Analytic Functions

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

Unit II Bilinear Transformations

Elementary transformations – Bilinear transformations – Cross ratio – Fixed points of bilinear transformations.

Unit III Complex Integration

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

Unit IV Series Expansions

Taylor's series – Laurent's series – Zeros of an analytic function – Singularities.

Unit V Calculus of Residues

Residues – Cauchy's residue theorem – Argument theorem – Rouché's theorem – Fundamental theorem of Algebra.

Text Book:

S. Arumugam, A. T. Issac and A. Somasundaram, Complex Analysis, Reprint 2010, Scitech Publications (India) Pvt. Ltd.

Chapters: 2 (2.1 – 2.8), 3 (3.1 – 3.4), 6 (6.1 – 6.4), 7 (7.1 – 7.4), 8 (8.1, 8.2).

Reference Books:

1. T. K. Manickavachagom Pillay, S. P. Rajagopalan and R. Sattanatham, Complex Analysis, 2007 Edition, S. Viswanatham Printers & Publishers.
2. Narayanan and T. K. Manickavachagom Pillay, Complex Analysis, 1997 Edition, S. Viswanatham Printers & Publishers.

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THE MADURA COLLEGE (Autonomous), MADURAI – 625 011

(AFFILIATED TO MADURAI KAMARAJ UNIVERSITY)

RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME: B.Sc., Mathematics

COURSE CODE : 17U6MMC12

COURSE TITLE : Linear Algebra

QN.NO : 8132

TIME : 3 Hours

MAX.MARKS :75

Learning Objectives

- This course is to provide a strong foundation in fundamental concepts of Linear Algebra culminating in abstract vector spaces and linear transformations.
- To understand the use of basic concepts of vector algebra including linear dependence / independence, basis and dimension of a subspace, rank and nullity for analysis of matrices and system of linear equations.

Learning Outcomes

After successful completion of this course, students will be able to

- Understand vector spaces and subspaces and apply their properties.
- Characterize a set of vectors in terms of linear combinations, their span and how they are related geometrically.
- Find a basis for the row space, column space and null space of a matrix and understand the change of basis.
- Compute inner product spaces on a real vector space and compute angle and orthogonality in inner product spaces.
- Create orthogonal and orthonormal bases using Gram Schmidt orthogonalization process and use bases and orthonormal bases to solve application problems.
- Identify linear transformations of finite dimensional vector spaces and compose their matrices in specific bases.
- Compute linear transformations, kernel, range and invertible linear transformations.
- Apply linear algebra concepts to model, solve and analyse real-world situations.

Unit I Vector Spaces

Vector Space – Definition and examples – Subspaces – Sum of Subspaces – Quotient Spaces – Homomorphism or Linear transformation.

Unit II Vector Spaces (Continuation)

Linear span – Linearly independence and linearly dependence– Finite dimensional vector space – Dimension of a vector space.

Unit III Inner Product Spaces

Inner Product Space – Definition – Examples – Norm of a Vector – Orthogonality –Orthonormal set – Bessel’s inequality – Gram Schmidt’s Orthogonalization Process.

Unit IV Linear Transformations

Linear Transformations – Algebra of Linear Transformations.

Unit V Linear Transformations (Continuation)

Invertible Linear Transformations – Matrixof Linear Transformations.

P.T.O

Text Book:

- Vijay K. Khanna and S. K. Bhambiri, A Course in Abstract Algebra, 5th Edition (3rd Reprint 2018), Vikas Publishing House Private Limited.
- **Chapters:** 10, 11 (Upto Matrix of a Linear transformation), 13 (Excluding operators on Inner product space)

Reference Books:

1. Surjeet Singh and QaziZameeruddin, Modern Algebra, 8th Edition, Vikas Publishing House Private Limited.
2. S.Arumugam and A. ThangapandiIssac, Modern Algebra, July 2006, Scitech Publications Private Limited, India.

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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME: B.Sc., Mathematics

COURSE CODE : 17U6MMC13

COURSE TITLE : Graph Theory

QN.NO : 8133

TIME : 3 Hours

MAX.MARKS :75

Learning Objectives

This course is to provide a strong foundation in Graph Theory which has diverse applications in many areas.

Learning Outcomes

On satisfying the requirement of this course, students will have the knowledge and skills to

- Explain the basic concepts of graph theory.
- Develop a graph theoretical model for a real life situations.
- Describe and solve some real time problems using the concepts of graph theory.

Unit I Graphs and Subgraphs

Definition and examples of graphs – Degrees–Subgraphs – Isomorphism – Ramsey Numbers.

Unit II Matrices and Degree Sequences

Independent sets and Coverings– Matrices – Operation on Graphs – Degree Sequences – Graphic Sequences.

Unit III Connectedness and Eulerian Graphs

Walks – Trails and Paths – Connectedness and Components – Blocks – Connectivity – Eulerian Graphs.

Unit IV Hamiltonian and Tree Graphs, Matching's

Hamiltonian Graphs – Characterization of Trees – Centre of a tree – Matching's.

Unit V Planarity and Colourability

Definition and Properties– Chromatic Numbers and Chromatic Index – Chromatic Polynomials.

Text Book:

S.Arumugam and S.Ramachandran, Invitation to Graph Theory, Reprint 2017, Scitech Publications (India) Pvt Ltd.

Chapters: 2(2.1 – 2.6, 2.8– 2.9), 4(4.0 – 4.4), 5(5.1, 5.2), 6(6.0 – 6.2), 7(7.0, 7.1), 8(8.1), 9(9.1& 9.4).

Reference Books:

1. Gary Chartrand and Ping Zhang, An Introduction to Graph Theory, 4th Reprint 2008, Tata McGraw-Hill Edition.
2. Robin J. Wilson, Introduction to Graph Theory, 4th Edition 2012, Pearson Publication.

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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME: B.Sc., Mathematics

COURSE CODE : 17U6MME2(D)

COURSE TITLE : Optimization Techniques

QN.NO : 8134

TIME : 3 Hours

MAX.MARKS :75

Learning Objectives

- To impart Optimization Techniques.
- To make the Students become familiar with the basic Principle of LPP and enrich knowledge to formulate and solve an LPP using various methods.
- To make the Students become familiar with Network scheduling by PERT/CPM.

Learning Outcomes

On satisfying the requirement of this course, students will have the knowledge and skills to.

- Formulate the LPP for a real life Problems and give the solution for the problem using suitable optimization techniques.
- Solve Transportation Problems by using various methods and solve the Assignment & Travelling Salesman Problem using Hungarian Algorithm.
- Do network scheduling by PERT/CPM.
- Apply Optimization Techniques in Various fields such as Science, Engineering, Industry, Business, etc.

Unit I

Linear programming problem (LPP)

Introduction – Mathematical formulation of the problem – Graphical solution method – Some exceptional cases – General LPP – Canonical & standard form of LPP.

Unit II

Simplex method

Introduction – Fundamental properties of solutions –The Computational procedure (Simplex Method) – Use of artificial variables (Two-Phase method & Big-M method).

Unit III

Duality in LPP

Introduction – General primal – Dual pair – Formulating a dual problem – Primal – Dual pair in matrix form – Duality theorems – Duality & simplex method – Dual simplex method.

Unit IV

Transportation problem and Assignment problem

Introduction – Solutions of transportation problem for finding an initial basic feasible solution & test for optimality (MODI method) – Degeneracy in transportation problem – Introduction to assignment problem – Mathematical formulation and solution – Travelling salesman problem.

P.T.O

Unit V

Network scheduling by PERT/CPM

Introduction – Network and basic components – Time calculation in network – Floats – CPM - PERT calculations – Distinction between PERT and CPM.

Text Book:

KantiSwarup, P.K. Gupta and Man Mohan, Operations Research, 9th Edition 2001, Sultan Chand Publication.

Chapters: 2, 3(3:1 – 3:5), 4(4:1 – 4:4), 5(5:1 – 5:5, 5:7, 5:9), 10(10:1 – 10:13), 11(11:1 – 11:6), 21(21:1 – 21:8).

Reference Books:

1. V. Sundaresan, K.S. Ganapathy Subramanian and K. Ganesan, Resource Management Techniques (Operations Research), 2000, A.R Publications.
Harvey M. Wagner, Principles of Operations Research, 2nd Edition, 1975, PHI Publications.

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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME: B.Sc., Mathematics

COURSE CODE : 17U6MME2

COURSE TITLE : Astronomy

QN.NO : 8135

TIME : 3 Hours

MAX.MARKS :75

Learning Objectives

- To enable the students to understand basic physical principles of astronomical concepts.
- To recognize and understand the interdisciplinary aspects of planetary science.

Learning Outcomes

After successful completion of this course, students will

- Become familiar with the appearance of a range of common astronomical objects such as asteroids, comets, satellites, planets, stars and galaxies.
- Be able to utilize the scientific method to explore and to solve problems.
- Demonstrate an understanding of the basic principles of the sun and stars.

Unit I Celestial sphere

Introduction – Duration of motion – Celestial co-ordinates – Conversion of co-ordinates – Relation between Right ascension and longitude of the sun – Longitude of the sun on any day.

Unit II Sidereal times

Introduction – Western hour angle – Latitude of a place – Duration of day time – Azimuth of a star at rising – Morning and evening stars – Circumpolar stars.

Unit III Earth

Zones of earth – Trace the variation in the duration of day and night – Problems – Terrestrial latitudes and longitudes – Radius of earth – Dip of horizon – Twilight – Problems.

Unit IV Refraction

Introduction – Laws of refraction – Horizontal refraction – Geocentric Parallax – Problems.

Unit V Kepler’s Laws

Laws of planetary motion – Longitude of perigee – Verification of Kepler’s Laws – Mass of a planet – Problems – Equation of time.

Text Book:

S. Kumaravelu and SusheelaKumaravelu, Astronomy, Reprint: 2009, S. Chand.

Chapters: 2 (page no.41 – 55), 2 (59 – 67,77), 3(98 – 111,113,126,135 – 137,144–152), 4(154– 167),5(175 – 186), 6(191 – 216),7(220 – 230).

Reference Books:

1. S. BalachandraRao, Indian Astronomy and Introduction, 1999, University Press.
2. G.V. Ramachandran, A Text Book of Astronomy, 3rd Edition 2007, De Nobili Press.

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 17U6MME(G)

COURSE TITLE : Numerical Methods

QN.NO : 8137

TIME : 3 Hours

MAX.MARKS :75

Learning Objectives

- To acquire a good knowledge in fundamental concepts of theoretical and practical aspects of the use of numerical methods.
- To enable the students to understand the implications of approximations.

Learning Outcomes

On satisfying the requirement of this course, students will have the knowledge and skills to

- Develop efficient algorithms for solving equations using various techniques.
- Implement Numerical Methods for variety of Multi-disciplinary applications.

Unit I Solutions of Linear equations

Bisection method – Iteration method – Regula falsi method – Newton Raphson’s method.

Unit II Simultaneous linear equations

Gauss elimination method – Inversion of matrix using Gauss elimination – Method of triangularization – Crout’s method – Iterative methods – Gauss Jacobi method – Gauss seidal method.

Unit III Finite differences

First difference – Differences of a polynomial – Factorial polynomial – Interpolation for equal interval – Newton’s forward interpolation formula – Newton’s backward interpolation formula.

Unit IV Interpolation

Interpolation with unequal intervals – Divided differences – Lagrange’s interpolation formula – Lagrange’s inverse interpolation formula – Numerical differentiation – Newton’s forward difference formula to get the derivative – Newton’s backward difference formula to compute the derivative – Stirling’s formula – problems.

Unit V Numerical integration

Trapezoidal rule – Simpson’s one third rule – Simpson’s three - eight rule – Romberg’s integral – Numerical solution of ODE – Taylor series method – Euler method – Runge-kutta method.

Text Book:

P.Kandasamy, K.Thilagavathy and K.Gunavathi, Numerical Methods, Reprint 2016, S. Chand & Company Ltd.

Chapters:3(3.1 – 3.4), 4(4.1 – 4.5, 4.7 – 4.9), 5(5.1 – 5.4), 6(6.1 – 6.6), 8(8.1,8.2,8.5 – 8.7), 9(9.1 – 9.14), 11(11.1 – 11.5, 11.9 – 11.12).

Reference Books:

1. S. Arumugam, A.T. Isaac & Somasundaram, Numerical Analysis with Programming in C, 2007, New Gamma Publishing House.
2. M. K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Science and Engineering Computation, 6th Edition 2012, New Age International Publishers.

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 17U6MSM4

COURSE TITLE : Quantitative Aptitude

QN.NO : 8140

TIME : 3 Hours

MAX.MARKS :75

Learning Objectives

- The main aim of introducing “Quantitative Aptitude” for mathematics students is to develop skill to meet the competitive examinations for better job opportunity.
- Effort has been made to accommodate fundamental, mathematical aspects to instill confidence among students.
- Enrich their knowledge and to develop their logical reasoning thinking ability.

Learning Outcomes

After successful completion of this course, students will have the knowledge and skills to

- Solve the problems easily by using Short-cut method with time management which will be helpful to them to clear the competitive exams for better job opportunity.
- Analyze the Problems logically and approach the problems in a different manner.

Unit I Problems on Ages – Percentage.

Unit II Profit & Loss – Ratio & Proportion.

Unit III Time & Distance – Problems on Trains.

Unit IV Calendar – Stocks & Areas.

Unit V True Discount – Banker’s Discount.

Text Book:

R. S. Aggarwal, Quantitative Aptitude (Fully solved), Reprint 2016, S. Chand.

Chapters: 8, 10, 11, 12, 17, 18, 27, 29, 32, 33.

Reference Books:

1. R.V.Praveen, Quantitative Aptitude and Reasoning, 2nd Revised Edition 2013, Prentice-Hall of India Pvt.Ltd.
2. G. K. Ranganath, C. S. Sampangiram and Y. Rajaram, A text Book of business Mathematics, 2008, Himalaya Publishing House

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RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME: B.Sc.,

COURSE CODE : 17U6MAC4

**COURSE TITLE : Fundamentals of Java
Programming**

QN.NO : 8141

TIME : 3 Hours

MAX.MARKS :75

Learning Objectives

- To enable the students to have a good foundation and practical knowledge on Programming with JAVA.
- To understand the basics of OOP & Object oriented approach to design software.

Learning Outcomes

On satisfying the requirement of this course, students will be

- Able to understand basic concepts of Java such as objects, classes, operators, packages & various keywords.
- Able to design the applications of Java.

Unit I Java evolution

Java history – Java features – Java and internet – Web browsers –Java environment – Overview of Java language: Java program structure – Java statements – Implementing a Java program – Java virtual machine – Command line arguments.

Unit II Java fundamentals

Constants, variables and data types – Operations and expressions – Decision making and branching – Decision making and looping.

Unit III Classes, objects and methods

Defining a class, adding variables – Adding methods – Constructors – Method overloading inheritance – Overriding methods, arrays, strings and vectors – Creating arrays – Strings – vectors – Wrapper classes.

Unit IV Interfaces

Defining interfaces – External interfaces – Implementing interfaces, packages: creating packages – Using a package – Adding a class to a package.

Unit V Multithreaded programming

Multithreaded programming – Creating threads – Extending the thread – Stopping and blocking a thread – Life cycle of a thread.

Text Book:

E. Balagurusamy, Programming with JAVA – A Primer, 2nd Edition 2000, Tata McGraw – Hill Publication.

Chapters: 2(2.1,2.2,2.4,2.9), 3(3.5,3.7,3.8,3.9,3.10),4(4.2–4.4),5(5.2–5.9),6(6.2 –6.8),7(7.2–7.4),8(8.2–8.4,8.7, 8.8, 8.11,8.12),9(9.2–9.7),10(10.2–10.4),11(11.5 –11.8),12(12.2–12.5).

Reference Books:

1. C. Xavier, JAVA Programming with JAVA 2, 2ndReprint 2003, Scitech Publication.
2. Patrick Naughton, Herbert Schildt, The complete reference, 3rd Edition1997, Osborne Publishing.

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 20U1MMC1

COURSE TITLE : Calculus

QN.NO : 10601

TIME : 3 Hours

MAX.MARKS :75

Course Objectives:

1. To obtain the knowledge of differential calculus.
2. To gain knowledge about solving double and triple integration.
3. To acquire idea to solve integration using beta and gamma functions.

Unit-I:

p-r(Pedal) equation-Curvature – Radius of curvature in Cartesian and Polar coordinates-involutes– Evolutes, Envelope.

Unit-II:

Asymptotes – singular points- multiple points(node, cusp and conjugate points)- Tracing of curves-Folium of Descartes- cycloid-cardioid and Lemniscate of Bernoulli.

Unit-III:

Integration by parts-Bernoulli’s formula - Reduction formulae – Problems.

Unit-IV:

Double integrals - Evaluation of double integral – Triple integrals – Change of variables.

Unit-V:

Definition – Properties of Beta and Gamma functions – Problems.

Text Book

1. S. Arumugam, Calculus, 2014, Edition, New Gamma Publishing House

Part I - Chapters:2(2.7,2.8), 3,4.

Part I - Chapters: 3(3.3-3.6, 3.10-3.13),

Book References:

1. T. K. ManicavachagomPillay, Differential Calculus, 2003 Edition, S. Viswanathan (Printers & Publishers) Pvt. Ltd.
2. T. K. ManicavachagomPillay, Integral Calculus 2000 Edition, S. Viswanathan (Printers & Publishers) Pvt. Ltd.

Web References:

1. <https://nptel.ac.in/courses/111/104/111104092/>
2. <http://www.freebookcentre.net/SpecialCat/Free-Mathematics-Books-Download.html>

Course Learning Outcomes

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

Number	Course Learning Outcome	Knowledge Level
CLO1	recall the basic concepts in differentiation and get the knowledge of p-r equation, Curvature, Radius of curvature, involutes, Evolutes, Envelope and apply it in problems	Upto K3
CLO2	Understand the idea of Asymptotes, Tracing of curves-Folium of Descartes- cycloid-cardioid and Lemniscate and its related problems	Upto K3
CLO3	Recall integration of by parts. Derive reduction formulae for trigonometric functions in integration process	Upto K3
CLO4	Use the knowledge of double and triple integrals for finding area and volume	Upto K4
CLO5	Acquire the information about beta, gamma function and evaluate it in various problems	Upto K3

K1- Recall, K2 – Understanding, K3 – Applying, K4- Examining
Mapping with Courses Learning Outcomes (CLOs)

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO1	3	2	-	2	1	3	1	3	1	3	-	-
CLO2	2	1	-	-	2	3	2	3	1	3	-	-
CLO3	2	-	-	-	1	2	3	2	1	1	-	-
CLO4	2	1	-	1	2	3	3	3	3	2	1	-
CLO5	2	-	-	-	2	1	1	2	3	2	3	-

1. Basic level

2. Intermediate level

3. Advanced level

Pedagogy

Lecture, Seminar, Quiz, Problem Solving, Tutorial, Group Discussion and Power point presentation.

BLUE PRINT – External Exam Mapping with Course Learning Outcomes (CLOs)

S. No.	CLOs	K-level	Section A		Section B		Section C	Section D
			MCQs		Short Answers			
			No. of Questions	K-Level	No. of Questions	K-Level	(Either/or Choice)	(Open Choice)
1	CLO 1	Up to K3	2	K1 & K2	1	K1	2(K2 & K2)	1(K3)
2	CLO 2	Up to K3	2	K1 & K2	1	K2	2(K3 & K3)	1(K3)
3	CLO 3	Up to K3	2	K1 & K2	1	K1	2(K1 & K1)	1(K2)
4	CLO 4	Up to K4	2	K1 & K2	1	K2	2(K4 & K4)	1(K4)
5	CLO 5	Up to K3	2	K1 & K2	1	K2	2(K3 & K3)	1(K3)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each Section			10		10		25	30

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	5	4	10	-	19	15.83	42%
K2	5	6	10	10	31	25.83	
K3	-		20	30	50	41.67	42%
K4	-		10	10	20	16.67	16%
Total marks	10	10	50	50	120	100	100%

Contd.,

BLUE PRINT – CIA – 1

S. No.	CLOs	K-level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K-Level	No. of Questions	K- Level		
1	CLO 1	Up to K3	2	K1 & K2	1	K1	2(K2 & K2)	1(K3)
2	CLO 2	Up to K3	2	K1 & K2	2	K2 &K2	2(K3 & K3)	2(K2&K3)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each Section			4		6		10	20

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	2	2	-	-	4	6.67	50%
K2	2	4	10	10	26	43.33	
K3	-	-	10	20	30	50.00	50%
K4	-	-	-	-	-	-	-
Total marks	4	6	20	30	60	100	100%

BLUE PRINT – CIA -2

S. No.	CLOs	K-Level	Section A		Section B		Section C	Section D
			MCQs		Short Answers			
			No. of Questions	K-Level	No. of Questions	K-Level	(Either/or Choice)	(Open Choice)
1	CLO 3	Up to K3	2	K1 & K2	1	K2	2(K3 & K3)	2(K3&K2)
2	CLO 4	Up to K3	2	K1 & K2	2	K1&K2	2(K2 & K2)	1(K4)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each Section			4		6		10	20

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	2	2	-	-	4	6.67	50%
K2	2	4	10	10	26	43.33	
K3	-	-	10	10	20	33.33	33.33%
K4	-	-	-	10	10	16.67	16.67%
Total marks	4	6	20	30	60	100	100%

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 20U1MMC2

**COURSE TITLE : Classical Algebra And
Trigonometry**

QN.NO : 10602

TIME : 3 Hours

MAX.MARKS :75

Course Objectives:

1. To get information about nature of equations and nature and position of roots.
2. To acquire idea to find the roots polynomial and transcendental equations using different methods.
3. To obtain the knowledge of expression for trigonometric functions & hyperbolic functions.

Unit-I:

Formation of Equations-Equations with real coefficients, imaginary roots-Equations with rational coefficients irrational roots- Relation between roots and coefficients-sum of the power of the roots-Newton's theorem (without proof).

Unit-II:

Transformations of equations-Reciprocal equations – Form of the quotient and remainder when a polynomial is divided by a binomial – Removal of terms—Descartes' Rule of Signs - Rolles' theorem - multiple roots.

Unit-III:

Horner's method -Cardon's method- Trigonometrical Method –Solution of biquadratic equations by Ferrari's method.

Unit-IV:

Expansion for $\sin n\theta, \cos n\theta, \tan n\theta$ - Expansion for $\sin^n \theta, \cos^n \theta$ - Expansion for $\sin \theta, \cos \theta, \tan \theta$ in powers of θ

Unit-V:

Hyperbolic function – Relation between hyperbolic function and circular trigonometric functions – Inverse hyperbolic functions-Logarithm of a complex number

Text Books:

1. T. K. Manicavachagom Pillay, T. Natarajan, K.S. Ganapathy Algebra Vol. I, 2011 Edition, S. Viswanathan (Printers & Publishers) Pvt. Ltd.
Chapters: 6(6.1-6.11, 6.13, 6.14- 6.16, 6.18-6.19, 6.24- 6.26, 6.30, 6.34 &6.35).
2. S. Arumugam, Thangapandi Isaac, Trigonometry, 2012 Edition, New Gamma Publishing House.
Chapters: 1, 2, 3.

Reference Books:

1. M. K. Venkatraman, Manorama Sridhar, Classical Algebra & Trigonometry, 1st Edition 2002, The National Publishing Company.
2. T. K. Manicavachagom Pillai, Trigonometry, 1997 Edition, S. Viswanathan (Printers & Publishers) Pvt.Ltd.
3. T. Veerarajan, Algebra & Trigonometry, 2020 Edition, Yes Dee publishing Pvt. Ltd.

Web Resources:

1. <http://www.freebookcentre.net/maths-books-download/Lecture-Notes-on-Trigonometry.html>
2. <http://www.universityofcalicut.info/SDE/VI%20Sem.%20B.Sc%20Maths%20-%20Additional%20Course%20in%20lie%20of%20Project%20->

Pedagogy

Lecture, Seminar, Quiz, Problem Solving, Tutorial, Group Discussion, PPT.

Course Learning Outcomes

On the successful completion of the course. Students will be able to

Number	Course Learning outcome	Knowledge Level
CLO1	Find the roots from the relation between roots and coefficients of various equations.	Upto K3
CLO2	Determine the roots by studying the nature of equations, Solving Reciprocal equations and Transformations of equations.	Upto K3
CLO3	Solving the various types equation using different techniques, viz., diminishing the roots, transforming the equation to Quadratic equation.	Upto K4
CLO4	Expression for trigonometric functions of multiple of θ , powers of trigonometric functions and expansion of trigonometric functions in powers of θ .	Upto K3
CLO5	Find the relation between trigonometric functions, hyperbolic functions and inverse hyperbolic functions.	Upto K3

K1- Remembering and recalling facts with specific answers

K2 –Basic understanding of facts and stating main ideas with general answers

K3 –Application oriented – solving problems

K4- Examining, analyzing, presentation and make inference with evidences.

Mapping of Course Learning Outcomes (CLOs) with Program Outcomes & Program Specified Outcomes(PSOs)

CLOs/POs & PSOs	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CLO1	3	2			2	3	2	3	1	1	3	1
CLO2	3	2			2	3	2	3	1	1	3	1
CLO3	3	2			2	3	2	3	1	1	3	1
CLO4	3	2			3	3	2	3	1	1	3	1
CLO5	3	2			3	3	2	3	1	1	3	1

1. Basic level

2. Intermediate level

3. Advance level

Blue Print

Mapping with Course Learning Outcomes (CLOs)

S. No.	CLOs	K-level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)	Total
			MCQs		Short Answers				
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Up to K 3	2	K1 & K2	1	K1	2(K2 & K2)	1(K2)	
2	CLO 2	Up to K 3	2	K1 & K2	1	K2	2(K3 & K3)	1(K3)	
3	CLO 3	Up to K 4	2	K1 & K2	1	K2	2(K4 & K4)	1(K4)	
4	CLO 4	Up to K 3	2	K1 & K2	1	K1	2(K1 & K1)	1(K3)	
5	CLO 5	Up to K 3	2	K1 & K2	1	K2	2(K3 & K3)	1(K3)	
No. of Questions to be asked			10		5		10	5	30
No. of Questions to be answered			10		5		5	3	23
Marks for each question			1		2		5	10	
Total Marks for each Section			10		10		25	30	75

- K1- Remembering and recalling facts with specific answers
 K2 – Basic understanding of facts and stating main ideas with general answers
 K3 – Application oriented – solving problems
 K4- Examining, analyzing, presentation and make inference with evidences.

Distribution of section wise marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	5	4	10	-	19	15.83	41.66%
K2	5	6	10	10	31	25.83	
K3	-	-	20	30	50	41.67	41.67%
K4	-	-	10	10	20	16.67	16.67%
Total marks	10	10	50	50	120	100	100%

Blue Print for CIA-I

S. No.	CLOs	K-level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)	Total
			MCQs		Short Answers				
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Up to K 3	2	K1 & K2	1	K1	2(K2 &K2)	2(K2/K3)	
2	CLO 2	Up to K 3	2	K1 & K2	2	K2	2(K3 &K3)	1(K3)	
No. of Questions to be asked			4		3		4	3	14
No. of Questions to be answered			4		3		2	2	11
Marks for each question			1		2		5	10	
Total Marks for each Section			4		6		10	20	40

- K1- Remembering and recalling facts with specific answers
 K2 – Basic understanding of facts and stating main ideas with general answers
 K3 – Application oriented – solving problems
 K4- Examining, analyzing, presentation and make inference with evidences.

Distribution of section wise marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	2	2		-	4	6.67	50%
K2	2	4	10	10	26	43.33	
K3	-		10	20	30	50.00	50%
K4	-						
Total marks	4	6	20	30	60	100.00	100%

Blue Print for CIA-II
Mapping with Course Learning Outcomes (CLOs)

S. No.	CLOs	K-level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)	Total
			MCQs		Short Answers				
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 3	Up to K4	2	K1 & K2	1	K2	2(K4 &K4)	1(K4)	
2	CLO 4	Up to K3	2	K1 & K2	2	K1	2(K1 &K1)	2(K2/K3)	
No. of Questions to be asked			4		3		4	3	14
No. of Questions to be answered			4		3		2	2	11
Marks for each question			1		2		5	10	
Total Marks for each Section			4		6		10	20	40

K1- Remembering and recalling facts with specific answers

K2 – Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – solving problems

K4- Examining, analyzing, presentation and make inference with evidences.

Distribution of section wise marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	2	2	10	-	14	23.33	50%
K2	2	4		10	16	26.67	
K3	-			10	10	16.67	16.67%
K4	-		10	10	20	33.33	33.33%
Total marks	4	6	20	30	60	100.00	100%

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PROGRAMME: B.Sc.,

COURSE CODE : 20U1MAC1

COURSE TITLE : Allied Mathematics - I QN.NO : 10603

TIME : 3 Hours

MAX.MARKS :75

Course Objectives

On completion of this course, the learner will

1. Be able to understand higher order differentiation and to know application of differential calculus.
2. Know the properties of definite integrals and methods of integration of higher powers of trigonometric functions.
3. Know the physical applications of derivatives of vectors especially the divergence and curl.
4. Have thorough knowledge of solving definite integrals and obtain a numerical solution.

Unit-I: (14 hrs)

Application of DeMoivre's Theorem : Expression for $\sin n\theta$, $\cos n\theta$ and $\tan n\theta$ –

Expression for $\sin^n \theta$, $\cos^n \theta$ and $\sin^m \theta \cos^n \theta$ – Problems.

Unit-II: (22 hrs)

Differentiability – Chain rule – Differentiation of Inverse trigonometric functions – Differentiation by transformation – Differentiation of logarithmic functions – Differentiation of implicit functions – Higher derivatives – n^{th} derivatives of some standard functions – Leibnitz's rule – Problems.

Unit-III: (18 hrs)

Integration by parts – Reduction formula for $\int \sin^n x \, dx$, $\int \cos^n x \, dx$ and $\int \sin^m x \cos^n x \, dx$ (Problems only) – Evaluation of double and triple integrals.

Unit-IV: (18 hrs)

Vector differentiation – Vector differential operator – Gradient, Divergence and Curl and their simple properties – Directional Derivative and its maximum value — Solenoidal and Irrotational vectors (simple problems only) – Vector integration (Line Integrals only).

Unit-V: (18 hrs)

Numerical Integration – Trapezoidal rule – Simpson's 1/3 and 3/8 rules – Romberg's Method – Weddle's rule – Problems.

Text book

1. Allied Mathematics, Dr. S. Arumugam & Isaac. Vol I, New Gamma Publishing House, Palayamkottai. (2014) (For Unit I, III) (Part – III Chapter: 1(1.1,1.2); Part – II Chapter 3(3.4-3.6))
2. Calculus, Dr. S. Arumugam & Isaac, New Gamma Publishing House, Palayamkottai. (2008)
(For Unit II) (Chapter: 2(2.4 – 2.7, 2.10 – 2.12))
3. Allied Mathematics, Dr. S. Arumugam & Isaac. Vol II, New Gamma Publishing House, Palayamkottai. (2011) (For Unit IV) (Chapter: 1,2)
4. Numerical Methods, P. Kandasamy, K. Thilagavathy, K. Gunavathi, S. Chand Publishers, 2008.

Books for Reference

1. Ancillary Mathematics, T.K Manikavasagampillai & Others Viswanathan printers and publishers Pvt. Ltd., Chennai.
2. Allied Mathematics, Volume II, P. Kandasamy, K. Thilagavathy, S. Chand& Company Pvt. Ltd.

Web Resources

1. <https://brilliant.org/wiki/expansions-of-certain-trigonometric-functions/#expanding-sintheta-costheta-tantheta-in-terms-of-theta-for-small-theta>
2. <https://www.math24.net/leibniz-formula/>
3. https://www.whitman.edu/mathematics/calculus_online/section08.02.html
4. <http://tutorial.math.lamar.edu/Classes/CalcIII/LineIntegralsVectorFields.aspx>
5. http://mathforcollege.com/nm/mws/gen/07_int/mws_gen_int_txt_gaussquadrature.pdf

Course Learning Outcomes

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

Number	Course Learning Outcome	Knowledge level
CLO 1	Apply DeMoivre's theorem to solve problems on powers of trigonometric functions.	Upto K2
CLO 2	Use the concept of differentiation to find derivatives of inverse trigonometric functions, implicit function and logarithmic functions.	Upto K3
CLO 3	Evaluate integrals using integration by parts and apply integration to compute double and triple integrals.	Upto K4
CLO 4	Use vector differentiation to evaluate gradient, divergence and curl of a vector point function and related identities and to evaluate line integrals using vector integration.	Upto K3
CLO 5	Use the concept of integration to solve numerical problems.	Upto K3

K1 - Remembering and recalling facts with specific answers

K2 - Basic understanding of facts and stating main ideas with general answers

K3 - Application oriented - Solving Problems

K4 - Examining, analyzing, presentation and make inferences with evidences

Mapping with Courses Learning Outcomes (CLOs)

CLO / PO- PSO	PO					PSO						
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CLO 1	3	2	-	-	1	2	2	2	3	3	-	-
CLO 2	3	2	-	-	1	2	1	2	3	3	-	-
CLO 3	3	2	-	-	1	2	1	2	3	3	-	-
CLO 4	3	2	-	-	1	2	1	2	3	3	-	-
CLO 5	3	2	-	-	1	2	1	2	3	3	-	-

3 – Advance Application Level

2 - Intermediate Level

1- Basic

Pedagogy

Lecture, Seminar, Quiz, Problem Solving, Tutorial, Group Discussion and Power point presentation.

Contd.,

BLUE PRINT – External Exam

S. No.	CLOs	K Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of questions	K Level	No. of questions	K level		
1	CLO	Up to	2	K1 &	1	K1	2(K2 & K2)	1(K2)
2	CLO	Up to	2	K1 &	1	K2	2(K2 & K2)	1(K3)
3	CLO	Up to	2	K1 &	1	K2	2(K4 & K4)	1(K4)
4	CLO	Up to	2	K1 &	1	K1	2(K3 & K3)	1(K3)
5	CLO	Up to	2	K1 &	1	K2	2(K3 & K3)	1(K3)
No. of Questions to be			10		5		10	5
No. of Questions to be			10		5		5	3
Marks for each			1		2		5	10
Total Marks for each			10		10		25	30

K1 - Remembering and recalling facts with specific answers

K2 - Basic understanding of facts and stating main ideas with general answers

K3 - Application oriented - Solving Problems

K4 - Examining, analyzing, presentation and make inferences with evidences

Distribution of section wise marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidate d
K1	5	4	-	-	9	7.5	42%
K2	5	6	20	10	41	34.17	
K3	-	-	20	30	50	41.67	42%
K4	-	-	10	10	20	16.67	16%
Total marks	10	10	50	50	120	100	100%

BLUE PRINT – CIA – I

Sl. No	CLOs	K Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K Level	No. of Questions	K Level		
1	CLO 1	Up to K2	2	K1 & K1	1	K1	2 (K2 & K2)	1(K2)
2	CLO 2	Up to K3	2	K1 & K1	2	K2	2 (K3 & K3)	2(K3)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each Section			4		6		10	20

Contd.,

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidate d
K1	4	2	-	-	6	10	50%
K2	-	4	10	10	24	40	
K3	-	-	10	20	30	50	50%
K4	-	-	-	-	-	-	-
Total marks	4	6	20	30	60	100	100%

BLUE PRINT – CIA – II

Sl. No	CLOs	K Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K- Level	No. of Questions	K- Level		
1	CLO 3	Up to K4	2	K1 & K2	1	K2	2(K2 & K2)	2(K2&K4)
2	CLO 4	Up to K3	2	K1 & K2	2	K1&K2	2(K3 & K3)	1(K3)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each Section			4		6		10	20

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	2	2	-	-	4	6.67	50%
K2	2	4	10	10	26	43.33	
K3	-	-	10	10	20	33.33	33%
K4	-	-	-	10	10	16.67	17%
Total marks	4	6	20	30	60	100	100%

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PROGRAMME: B.Sc., Mathematics

COURSE CODE : 20U2MMC3

COURSE TITLE : Analytical Geometry of QN.NO : 10604

Three Dimension and Vector Calculus

TIME : 3 Hours

MAX.MARKS :75

COURSE OBJECTIVES:

1. Acquire a knowledge of geometry of spheres, cone, cylinder in 3 Dimensional problems.
2. Apply analytical techniques in solving 3D problems.
3. Demonstrate an understanding in vector differentiation.
4. Knowledge of evaluating line and surface integrals by applying Green’s, Gauss and Stoke’s theorems.

Unit-I:

Equation of a Plane – passing through three points – coplanar - intercept form – Normal form - Angle between two planes – parallel planes – perpendicular planes – intersection of two planes - Angle bisectors of two planes

Unit-II:

Introduction -Equation of a sphere – centre radius form – general form – diameter form - Tangent line and tangent plane – tangent plane parallel to plane -tangent plane passes through a point- intersection of two spheres - Section of a sphere - orthogonal.

Unit-III:

Equation of a Cone - Right circular cone – Angle between line of intersection of cone and a plane - Cylinder - Right circular cylinder – circular cylinder.

Unit-IV:

Vector point function - Scalar point function - Derivative of a vector and derivative of a sum of vectors - Derivative of a product of a scalar and a vector point function - Derivative of a scalar product and vector product - The vector operator ‘del’ - Gradient of a scalar point function - Divergence of a vector - Curl of a vector - solenoidal and irrotational vectors - Laplacian operator.

Unit-V:

Line integrals - Surface integrals - Green’s, Gauss and Stoke’s theorems (without proof) - Problems.

Text Book:

1. S. Arumugam, A.Thangapandi Issac & Somasundaram, Analytical, Edition 20, Yes Dee Publishing Private Limited, Chennai.
Chapters:-10,12, 13(Analytical Geoemetry)
2. S. Arumugam &A.Thangapandi Issac, Analytical Geometry (3D) and Vector Calculus,
Edition 2017, New Gamma Publishing House.

Part B (Vector Calculus) -Chapters: 5,6,7

Reference Books:

1. T. K. Manickavachagom Pillai and T. Natarajan, Analytical Geometry (3D), Edition 2011, S. Viswanathan (Printers & Publishers) Pvt. Ltd.
2. M. K. Venkataraman and Manorama Sridhar, Vector calculus and Fourier series, 2002 Edition, The National Publishing Company.

Web References:

1. <https://nptel.ac.in/courses/111/105/111105122/>
2. <https://www.maths.ox.ac.uk/study-here/undergraduate-study/practice-problems>
3. <http://www.freebookcentre.net/SpecialCat/Free-Mathematics-Books-Download.html>

Course Learning Outcomes

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

Number	Course Learning Outcome	Knowledge level
CLO1	Understand the basic concept of plane. Compute angles between two planes and bisectors of two planes. Understand the basic concept of sphere.	Upto K3
CLO2	Know the concept of sphere – Evaluate tangent line and tangent plane and section of sphere.	Upto K4
CLO3	Obtain the geometrical knowledge of cone and Cylinder. Determine equations of cone, right cone, cylinder and right circular cylinder.	Upto K3
CLO4	Acquire the idea of gradient, divergence, curl, solenoidal and irrotational of vectors. Use vector differentiation in solving problems	Upto K2
CLO5	Discuss about green's, Stoke's, Gauss Divergence theorem and apply it in solving various problems.	Upto K4

K1- Recall, K2 – Understanding, K3 – Applying, K4- analyzing, K5-Evaluating, K6-Creating

Mapping with Courses Learning Outcomes (CLOs)

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO1	2	1	-	-	-	3	3	3	1	-	-	-
CLO2	1	2	-	-	1	3	3	3	3	1	2	1
CLO3	1	2	-	-	1	3	3	3	3	-	2	1
CLO4	3	-	-	1	-	3	2	3	2	1	-	1
CLO5	2	3	-	1	2	3	1	2	3	-	3	-

1. Basic level

2. Intermediate level

3. Advance Application

Pedagogy:

Lecture, Power point presentation, Group Discussion, Seminar, Quiz, Problem Solving and Tutorial.

BLUE PRINT – External Exam

S. No.	CLOs	K-level	Section A		Section B		Section C	Section D
			MCQs		Short Answers			
			No. of Questions	K-Level	No. of Questions	K-Level	(Either/or Choice)	(Open Choice)
1	CLO 1	Up to K3	2	K1 & K2	1	K1	2(K2 & K2)	1(K3)
2	CLO 2	Up to K3	2	K1 & K2	1	K2	2(K4 & K4)	1(K3)
3	CLO 3	Up to K3	2	K1 & K2	1	K2	2(K3 & K3)	1(K3)
4	CLO 4	Up to K2	2	K1 & K2	1	K1	2(K1 & K1)	1(K2)
5	CLO 5	Up to K4	2	K1 & K2	1	K2	2(K3 & K3)	1(K4)

No. of Questions to be asked	10		5		10	5
No. of Questions to be answered	10		5		5	3
Marks for each question	1		2		5	10
Total Marks for each Section	10		10		25	30

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	5	4	10	-	19	15.83	42%
K2	5	6	10	10	31	25.83	
K3	-		20	30	50	41.67	42%
K4	-		10	10	20	16.67	16%
Total marks	10	10	50	50	120	100	100%

BLUE PRINT – CIA – 1

S. No.	CLOs	K-level	Section A		Section B		Section C	Section D
			MCQs		Short Answers			
			No. of Questions	K-Level	No. of Questions	K-Level	(Either/or Choice)	(Open Choice)
1	CLO 1	Up to K3	2	K1 & K2	1	K1	2(K2 & K2)	1(K3)
2	CLO 2	Up to K4	2	K1 & K2	2	K2 & K2	2(K3 & K3)	2(K2&K4)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each Section			4		6		10	20

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	2	2	-	-	4	6.67	50%
K2	2	4	10	10	26	43.33	
K3	-	-	10	10	20	33.33	33.33%
K4	-	-	-	10	10	16.67	16.67%
Total marks	4	6	20	30	60	100	100%

BLUE PRINT – CIA -2

S. No.	CLOs	K-level	Section A		Section B		Section C	Section D
			MCQs		Short Answers			
			No. of Questions	K-Level	No. of Questions	K-Level	(Either/or Choice)	(Open Choice)
1	CLO 3	Up to K3	2	K1 & K2	1	K2	2(K3 & K3)	2(K3&K2)
2	CLO 4	Up to K3	2	K1 & K2	2	K1&K2	2(K2 & K2)	1(K3)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each Section			4		6		10	20

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	2	2	-	-	4	6.67	50%
K2	2	4	10	10	26	43.33	
K3	-	-	10	20	30	50.00	50%
K4	-	-	-		-	-	-
Total marks	4	6	20	30	60	100	100%

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THE MADURA COLLEGE (Autonomous), MADURAI – 625 011

(AFFILIATED TO MADURAI KAMARAJ UNIVERSITY)

RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME: B.Sc., Mathematics

COURSE CODE : 20U2MMC4

COURSE TITLE : Discrete Mathematics

QN.NO : 10605

TIME : 3 Hours

MAX.MARKS :75

COURSE OBJECTIVES:

1. To provide the students with an overview of Discrete Mathematics.
2. To learn about topics such as logic and proofs, sets and functions, recurrence relations, generating functions.
3. To give clear idea about matrix theory.

Unit-I: (SET THEORY AND MATHEMATICAL INDUCTION)

Sets – Subsets-Operation on sets–Union, intersection, symmetric difference, Cartesian product - Properties of Set Operations-Principle of Duality-Mathematical Induction.

Unit-II: (RELATIONS AND FUNCTIONS)

Relations- Representation of relation - Operation on relation- equivalence relation- Partitions and equivalence Classes- Functions - One to One and Onto Functions- Special type of functions - Invertible functions- Composition of Functions.

Unit-III: (MATHEMATICAL LOGIC)

Statements- Connectives –Wellformed formula- Truth table of a formula- Tautology- Implication and equivalence of formulae-Normal forms.

Unit-IV: (RECURRENCE RELATIONS AND GENERATING FUNCTIONS)

Recurrence relations- Solution of first order homogenous linear relations- Solution of non-homogenous relations - Finding generating functions of a recurrence relation - solving recurrence relation using generating functions.

Unit-V: (MATRIX ALGEBRA)

Basic definitions - Symmetric and skew symmetric matrices - inverse of a matrix - Elementary transformations - Rank - Test of consistency - Solving linear equations - Cayley - Hamilton theorem and the uses to find inverse and powers of the matrix - Eigen values and eigen vectors.

Text Book:

1. M.K.Venkatraman, N.Sridharan and N.Chandrasekaran, Discrete Mathematics, The National Publishing Company (2007).
Sections:1.1, 1.2, 1.4, 1.6, 1.7, 1.9, 2.1 to 2.5, 2.7, 3.1 to 3.5, 4.2, 5.1, 5.3 to 5.6, 9.2, 9.3,9.5 to 9.8, 9.11.
2. S. Arumugam and A.T. Issac, Modern Algebra, SCITECH Publications PVT Ltd.,(2011).
Sections: 7.3 to 7.8.

Books for Reference:

1. Trembly and Manohar, Discrete Mathematical structures with application to computer science, Tata McGraw Hill, New Delhi (1997).
2. Kenneth H. Rosen, “Discrete Mathematics and its Applications”, 7 th edition, Tata McGraw Hill, 2012.

Web Resources

1. <http://accounts.mts.org.in/article-list.php?page=1&search=&sortBy=>
2. https://www.tutorialspoint.com/discrete_mathematics/index.htm
3. <https://study.com/academy/course/math-108-discrete-mathematics.html>

Pedagogy: Lecture, power point Presentation, Group Discussion, Quiz, Seminar, Problem solving, Tutorial and ILM (CANVAS FLICKERS)

Course Learning Outcome

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

Number	Course Learning Outcome	Knowledge level
CLO1	Determine union, intersection, symmetric difference and Cartesian product of sets and also apply the principle of Mathematical induction to prove certain mathematical formula.	Up to K3
CLO2	Recognize equivalence relations and to categorize types of functions.	Up to K4
CLO3	Analyze the validity of a formula using mathematical logic and also to find normal forms of a formula.	Up to K4
CLO4	Construct and solve recurrence relations using generating functions.	Up to K3
CLO5	Classify types of matrices and also to solve linear equations by applying matrices.	Up to K3

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Mapping with Programme Specific Outcome

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO1	3	1	1				2
CLO2	3	1				1	
CLO3	3	2	1		1	2	1
CLO4	3		2	1	1	2	
CLO5	3	2	2		1	2	1

Pedagogy

Chalk and Talk, PPT, group discussion, seminar, interaction, problem solving, quiz, tutorial and virtual labs & Learning management systems (CANVAS)

Mapping with Programme Outcome

	PO1	PO2	PO3	PO4	PO5
CLO1	3				
CLO2	2		2		
CLO3	2	1	3		
CLO4	2				
CLO5	1		2		1

3- Advanced Applications

2- Intermediate Level

1- Basic Level

BLUE PRINT (for external exams)

Sl. No	CLOs	K-Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K- Level	No. of Questions	K- Level		
1	CLO 1	Up to K3	2	K1&K2	1	K2	2 (K2&K2)	1(K2)
2	CLO 2	Up to K4	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
3	CLO 3	Up to K4	2	K1&K2	1	K2	2 (K2&K2)	1(K4)
4	CLO 4	Up to K3	2	K1&K2	1	K2	2 (K3&K3)	1(K2)
5	CLO 5	Up to K3	2	K1&K2	1	K2	2 (K4&K4)	1(K3)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	5	-	-	-	05	4	50%
K2	5	10	20	20	55	46	
K3	-	-	20	20	40	33.33	33.33%
K4	-	-	10	10	20	16.67	16%
Total marks	10	10	50	50	120	100	100%

Blue Print for CIA – I

Sl. No	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K- Level	No. of Questions	K- Level		
1	CLO 1	Up to K3	2	K1& K2	1	K1& K2	2 (K2&K3)	1(K2) 1(K3)
2	CLO 2	Up to K4	2	K1& K2	2	K1& K2	2 (K2&K3)	1(K4)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each section			4		6		10	20

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidate d
K1	2	2	-	-	4	6.67	50%
K2	2	4	10	10	26	43.33	
K3	-	-	10	10	20	33.33	33%
K4	-	-	-	10	10	16.67	17%-
Total marks	4	6	20	30	60	100	100%

Blue Print for CIA – II

Sl. No	CLOs	K-Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K- Level	No. of Questions	K- Level		
1	CLO3	Up to K4	2	K1& K2	2	K1& K2	2 (K2&K3)	1(K4)
2	CLO 4	Up to K3	2	K1& K2	1	K1& K2	2 (K2&K3)	1(K2) 1(K3)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each section			4		6		10	20

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	2	2	-	-	4	6.67	50%
K2	2	4	10	10	26	43.33	
K3	-	-	10	10	20	33.33	33%
K4	-	-	-	10	10	16.67	17%-
Total marks	4	6	20	30	60	100	100%

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THE MADURA COLLEGE (Autonomous), MADURAI – 625 011
(AFFILIATED TO MADURAI KAMARAJ UNIVERSITY)
RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME: B.Sc.,

COURSE CODE : 20U2MAC2

COURSE TITLE : Allied Mathematics-II

QN.NO : 10606

TIME : 3 Hours

MAX.MARKS :75

COURSE OBJECTIVES:

On completion of this course, the learner will

1. Know methods of solving differential equations of first order and higher order.
2. To understand the fundamental ideas of Partial differential equations.
3. Know application of Laplace transforms and method of solving ordinary differential equations using Laplace transforms.

Unit-I: (16 hrs)

Differential equation of first order and first degree – Variable-Separable – Homogeneous and Non-homogeneous differential equations – Exact Differential equations – Integrating factors-Problems.

Unit-II: (16 hrs)

Introduction – Linear equation with constant coefficients – Methods of finding complementary functions – Methods of finding particular integrals – Problems.

Unit-III: (20 hrs)

Formation of partial differential equations – Classification of solution of PDE – Solutions of standard types of first order partial differential equations (Types 1-4) – Lagrange’s linear equation -Problems.

Unit-IV: (18 hrs)

Laplace transforms – Inverse Laplace transforms – solution of differential equations using Laplace transforms - Problems.

Unit-V: (20 hrs)

Finite differences – Newton’s forward and backward formula –Lagrange’s formula – Problems.

Text Book:

1. Allied Mathematics by Dr.S.Arumugam&Issac. Vol III, New Gamma Publishing House,Palayamkottai. (2012) (For UNIT – I – IV) (Chapter1(1.1-1.4),2,3,4(4.1-4.4)).
2. Allied Mathematics by Dr.S.Arumugam&Issac. Vol II, New Gamma Publishing House,Palayamkottai. (2011) (For UNIT-V) (Chapter 7).

Books for Reference:

1. Ancillary Mathematics, Volume I, T.K Manikavasagampillai& Others, Viswanathan Printers and Publishers Pvt Ltd.Chennai.
2. Allied Mathematics, Volume II, P.Kandasamy, K.Thilagavathy, S.Chand& Company Pvt. Ltd.

References:

1. <https://www.math24.net/exact-differential-equations/>
2. <https://www.math24.net/higher-order-linear-homogeneous-differential-equations-constant-coefficients/>
3. https://www.brainkart.com/article/Lagrange---s-Linear-Equation_6488/
4. <https://lpsa.swarthmore.edu/LaplaceXform/FwdLaplace/LaplaceProps.html>
5. <https://www.geeksforgeeks.org/newton-forward-backward-interpolation/>

Pedagogy: Lecture, Seminar, Quiz, Problem Solving, Tutorial, Group Discussion, PPT.

Course Learning Outcomes

Number	Course Learning Outcome	Knowledge level
CLO1	Solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous and non-homogeneous differential equation.	Up to K3
CLO2	Solve 2nd and higher order differential equations with constant coefficients	Up to K3
CLO3	Construct partial differential equations and to solve first order partial differential equations	Up to K4
CLO4	Solve Laplace transform and inverse transform of simple functions and application to differential equations with constant coefficients.	Up to K3
CLO5	Apply various interpolation methods and finite difference concepts.	Up to K3

K1 - Remembering and recalling facts with specific answers

K2 - Basic understanding of facts and stating main ideas with general answers

K3 - Application oriented - Solving Problems

K4 - Examining, analyzing, presentation and make inferences with evidences

Mapping with Courses Learning Outcomes (CLOs)

CLO/ PO-PSO	PO					PSO						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO 1	3	2	-	-	1	2	1	2	3	3	-	-
CLO 2	3	2	-	-	1	2	1	2	3	3	-	-
CLO 3	3	2	-	-	1	2	1	2	3	3	-	-
CLO 4	3	2	-	-	1	2	1	2	3	3	-	-
CLO 5	3	2	-	-	1	2	1	2	3	3	-	-

3 - Advanced Application

2 - Intermediate Level

1- Basic Level

BLUE PRINT - External Exam

Sl. No	CLOs	K Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K Level	No. of Questions	K Level		
1	CLO 1	Up to K3	2	K1& K2	1	K1	2(K2& K2)	1(K3)
2	CLO 2	Up to K3	2	K1& K2	1	K2	2(K3& K3)	1(K3)
3	CLO 3	Up to K4	2	K1& K2	1	K2	2(K4 & K4)	1(K4)
4	CLO 4	Up to K3	2	K1& K2	1	K2	2(K2& K2)	1(K3)
5	CLO 5	Up to K3	2	K1& K2	1	K1	2(K2& K2)	1(K3)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3

Marks for each question	1		2		5	10
Total Marks for each Section	10		10		25	30

K1 - Remembering and recalling facts with specific answers

K2 - Basic understanding of facts and stating main ideas with general answers

K3 - Application oriented - Solving Problems

K4 - Examining, analyzing, presentation and make inferences with evidences

Distribution of section wise marks with K levels

K Levels	Section A (No choice)	Section B (No Choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	5	4	-	-	9	7.5	42 %
K2	5	6	30	-	41	34.17	
K3	-	-	10	40	50	41.67	42%
K4	-	-	10	10	20	16.67	16%
Total marks	10	10	50	50	120	100	100%

BLUE PRINT – CIA – I

Sl. No.	CLOs	K level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K Level	No. of Questions	K Level		
1	CLO 1	Up to K3	2	K1 & K2	1	K1	2 (K2 & K2)	1(K3)
2	CLO 2	Up to K3	2	K1 & K2	2	K2 & K2	2 (K2 & K2)	2(K3 & K3)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each Section			4		6		10	20

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	2	2	-	-	4	6.67	50%
K2	2	4	20	-	26	43.33	
K3	-	-	-	30	30	50	50%
K4	-	-	-	-	-	-	-
Total marks	4	6	20	30	60	100	100%

BLUE PRINT – CIA – II

S. No.	CLOs	K level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. Of Questions	K-Level	No. of Questions	K- Level		
1	CLO 3	Up to K4	2	K1 & K2	1	K2	2(K2 & K2)	2(K3 & K4)
2	CLO 4	Up to K3	2	K1 & K2	2	K1 & K2	2(K2 & K2)	1(K3)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each Section			4		6		10	20

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	2	2	-	-	4	6.67	50%
K2	2	4	20	-	26	43.33	
K3	-	-	-	20	20	33.33	33%
K4	-	-	-	10	10	16.67	17%
Total marks	4	6	20	30	60	100	100%

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 RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME : B.Sc., Mathematics **COURSE CODE : 20U3MMC5**
COURSE TITLE : Mathematical Statistics **QN.NO : 10607**
TIME : 3 Hours **MAX.MARKS :75**

Objectives:

1. To learn the Basic concepts about Axiomatic and Mathematical approach to find Probability, Conditional probability of events and Baye’s theorem.
2. To understand Distribution functions of Discrete and Continuous type random variables, and to Calculate Marginal, Conditional distributions, Mathematical Expectations, Variance,, Covariance.
3. To acquire knowledge of Sampling Distributions, Testing Hypothesis, Type I, Type II errors, Evaluate and interpret Powers of Test, Critical region, Level of Significance, One/Two tailed tests Critical Value and large sample test.
4. To study and analyse about the small sample tests based on t, F and χ^2 distributions.

Unit	Description	Hours	K-level	CLO
I	Definitions of various terms – Axiomatic Probability – Random Event – Mathematical Probability – Addition and Multiplication Laws of Probability – Independent Events – Conditional Probability_ Baye’s Theorem – Simple applications.	12	Up to K3	CLO1
II	Distribution functions – Discrete random variable – Continuous random variable- Joint Probability mass function Joint Probability distribution function – Marginal distribution function – Joint density function – conditional distribution function.	18	Up to K4	CLO2
III	Mathematical Expectation – Addition and Multiplication theorem – Covariance Expectation and Variance of linear combination of random variables - Moment generating function – Characteristic function – Probability generating function.	20	Up to K4	CLO3
IV	Sampling Distributions – Student’s t-distribution, F-distributions - χ^2 - distribution (Definition and derivation only. Testing statistical hypothesis: Null and alternative hypothesis – Type I and Type II errors – Powers of attest – Critical region – Level of Significance – One/Two tailed tests critical value. Large Sample test: Test of Significance for mean and difference of means.	22	Up to K3	CLO4
V	Small Sample Test – Tests based on t, F and χ^2 distributions.	18	Up to K4	CLO5

Text Book:

VITTAL P R Mathematical Statistics -2004-Maragatham Publishers.

- Chapters: UNIT I Ch.1,
 UNIT II Ch 2,
 UNIT III Ch 3,4,5,6 (Relevant Topics only)
 UNIT IV Ch 22,24 (Relevant Topics only)
 UNIT V Ch 25,26,27 (Relevant Topics only)

Reference Books:

1. Kandasamy, P.K.Thilagavathi and K.Gunavathi, PROBABILITY, STATISTICS,AND QUEUEING THEORY –(2007) S.chand and co. New Delhi.
2. S. C. Gupta , V .K Kapoor FUNDAMENTALS OF MATHEMATICAL STATISTICS-2002 Sultan Chand & Sons, New Delhi – Eleventh thoroughly revised edition.
3. Veerarajan T. FUNDAMENTALS OF MATHEMATICAL STATISTICS, Yesdee Publishing Private Ltd. 2017
4. Arumugam and Thangapandi Issac- STATISTICS ,New Gamma Publishing House,2016.

Web Resources:

1. <http://nptel.ac.in>
2. <http://www.ocw.mit.edu>
3. <https://www.khanacademy.org>
4. <http://onlinestatbook.com/2/introduction/descriptive.html>
5. <https://www.statstichowto.datasciencecentral.com/probability-and-statistics/descriptive-statistics/>

Pedagogy:

Lecture, Seminar, Quiz, Problem Solving, Tutorial, Seminar, Power Point Presentation.

Rationale for Nature of the course:

Thinking critically and applying basic mathematics skills to interpret data, draw conclusions, and solve problems; developing proficiency in making decisions based on data and make predictions ; Application of reasoning in quality testing.

Course Learning Outcomes

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

Number	Course Learning Outcome	Knowledge level
CLO1	Learn about Probability, Conditional probability, Bayes's theorem	Up to K3
CLO2	Understand the concepts of discrete and continuous type random variables, distribution/density functions and find variants: joint, marginal, conditional probability distribution/density functions	Up to K4
CLO3	Apply techniques to find Expectation, Variance, Covariance and of random variables and linear combinations of random variables.	Up to K4
CLO4	Know about t-, F, χ^2 -distributions, and find Type I Type II errors, Critical region, level of significance and Large sample test	Up to K3
CLO5	Know how to do small sample test based on t,F, χ^2 distributions	Up to K4

K1 – Remembering and recalling facts with specific answers

K2 - Basic understanding of facts and stating main ideas with general answers

K3 – Application Oriented- solving problems

K4 - Examining, analyzing, presentation and make inference with evidences.

Mapping of Course Outcomes with Program Outcomes & Program specified outcomes**-CLOs with PSOs**

CLOs/PO & PSOs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO1	3	3	2	3	2	3	2	3	2	3	3	2
CLO2	3	3	2	3	2	3	3	3	3	3	3	3
CLO3	3	3	2	3	3	3	3	3	3	1	3	3
CLO4	3	3	2	3	2	3	2	3	2	3	3	1
CLO5	3	3	2	3	2	3	2	3	-	1	3	2

1.Basic level

2. Intermediate level

3.Advance level

BLUE PRINT**Mapping with Course Learning Outcomes(CLOs)**

S. No.	CLOs	K Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of questions	K Level	No. of questions	K level		
1	CLO 1	Up to K2	2	K1 & K2	1	K1	2(K2 & K2)	1(K2)
2	CLO 2	Up to K3	2	K1 & K2	1	K2	2(K2 & K2)	1(K3)
3	CLO 3	Up to K4	2	K1 & K2	1	K2	2(K4 & K4)	1(K4)
4	CLO 4	Up to K3	2	K1 & K2	1	K1	2(K3 & K3)	1(K3)
5	CLO 5	Up to K3	2	K1 & K2	1	K2	2(K3 & K3)	1(K3)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each Section			10		10		25	30

- K1 - Remembering and recalling facts with specific answers
 K2 - Basic understanding of facts and stating main ideas with general answers
 K3 - Application oriented - Solving Problems
 K4 - Examining, analyzing, presentation and make inferences with evidences

Distribution of section wise marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/or)	Section D (Open Choice)	Total marks	% of marks without choice	Consolidated
K1	5	4	-	-	9	7.5	42%
K2	5	6	20	10	41	34.17	
K3	-	-	20	30	50	41.67	42%
K4	-	-	10	10	20	16.67	16%
Total marks	10	10	50	50	120	100	100%

BLUE PRINT – CIA – I

Mapping with Course Learning Outcomes(CLOs)

Sl.No	CLOs	K level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K Level	No. of Questions	K Level		
1	CLO 1	Up to K2	2	K1 & K1	1	K1	2(K2 & K2)	1(K2)
2	CLO 2	Up to K3	2	K1 & K1	2	K2	2(K3 & K3)	2(K3)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each Section			4		6		10	20

- K1 - Remembering and recalling facts with specific answers
 K2 - Basic understanding of facts and stating main ideas with general answers
 K3 - Application oriented - Solving Problems
 K4 - Examining, analyzing, presentation and make inferences with evidences

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	4	2	-	-	6	10	50%
K2	-	4	10	10	24	40	
K3	-	-	10	20	30	50	50%
K4	-	-	-	-	-	-	-
Total marks	4	6	20	30	60	100	100%

BLUE PRINT – CIA – II

Mapping with Course Learning Outcomes(CLOs)

Sl.No	CLOs	K level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K-Level	No. of Questions	K-Level		
1	CLO 3	Up to K4	2	K1 & K2	1	K2	2(K2 & K2)	2(K2&K4)
2	CLO 4	Up to K3	2	K1 & K2	2	K1&K2	2(K3 & K3)	1(K3)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each Section			4		6		10	20

- K1 - Remembering and recalling facts with specific answers
 K2 - Basic understanding of facts and stating main ideas with general answers
 K3 - Application oriented - Solving Problems
 K4 - Examining, analyzing, presentation and make inferences with evidences

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	2	2	-	-	4	6.67	50%
K2	2	4	10	10	26	43.33	
K3	-	-	10	10	20	33.33	33%
K4	-	-	-	10	10	16.67	17%
Total marks	4	6	20	30	60	100	100%

Lesson Plan

Unit	Description	Hours	Pedagogy
I	Definitions-Axiomatic Probability-Random Event-Mathematical Probability-Addition and Multiplication Laws of Probability	6	Lecture, Quiz
	Independent Events-Conditional Probability-Bayes's theorem-applications.	6	Problem Solving
II	Random Variables-Distribution functions	2	Lecture, Quiz
	Discrete random variable-Continuous random variable	3	Quiz
	Joint Probability mass function Joint Probability distribution function	3	Lecture, Problem Solving
	Marginal distribution function, Joint density function	4	Lecture, Group
	Conditional distribution function	6	Problem
III	Mathematical expectation –Addition and Multiplication theorem	4	Lecture
	Covariance Expectation and linear combination of random variables	8	Lecture
	Moment generating function	4	Problem
	Characteristic function, Probability generating function	4	Problem
IV	Sampling distribution, Students t- distribution, F-distribution, χ^2 -distribution,(Definition, Derivation only)	6	Lecture
	Testing statistical hypothesis: Null and alternative hypothesis, Type I and Type II errors	6	Lecture, Seminar
	Powers of test- Critical region-Level of significance-	4	Tutorial
	One/two tailed tests critical value.	2	Problem
	Large sample test: Test of significance for mean and difference of means	4	Problem Solving
V	Tests based on t- distribution	6	Lecture
	Tests based on F- distribution	6	Lecture
	Test based on χ^2 -distribution	6	Lecture
Total Hours		90	

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(AFFILIATED TO MADURAI KAMARAJ UNIVERSITY)
RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME : B.Sc., Mathematics

COURSE CODE : 20U3MMC6

COURSE TITLE : Graph Theory

QN.NO : 10608

TIME : 3 Hours

MAX.MARKS :75

Objectives:

Graph Theory is one of the most flourishing branches of Mathematics with wide applicability in a variety of areas ranging from Engineering to Molecular Biology. The objective of this course is to introduce basic concepts in the theory of graphs and to develop problem-solving ability and mathematical maturity in this area.

Course content:

Unit	Description	Hours	K-Level	CLO(s)
I	BASICS: Graphs – Pictorial representation – Subgroups – Isomorphism and degrees – Walks and connected graphs – Cycles in graphs – Cut-vertices and cut-edges.	9	K3	1
II	EULERIAN AND HAMILTONIAN GRAPHS: Eulerian graphs – Fleury’s algorithm –Hamiltonian graphs – weighted graphs.	9	K4	2
III	BIPARTITE GRAPHS AND MATRICES: Bipartite graphs – Marriage problem – Trees –Connector problem – Matrix representations – Vector spaces associated with graphs – Cycle space – cut-set space.	9	K3	3
IV	PLANAR GRAPHS: Planar Graphs – Euler formula – Platonic solids – Dual of a plane graph – Characterization of planar graphs.	9	K3	4
V	GRAPH COLOURINGS: Vertex colouring – Edge colourings – An algorithm for vertex colouring.	9	K3	5

Book or study:

- S.A.Choudum– A First Course in Graph Theory, Macmillan India Limited, 1987.
UNIT I – 1.1 to 1.7
UNIT II – 2.1 to 2.4
UNIT III – 3.1 to 3.4 and 4.1 to 4.4
UNIT IV – 5.1 to 5.5
UNIT V – 6.1 to 6.3

Books for Reference:

1. S. Arumugam and S. Ramachandran, - *Invitation to Graph Theory*, SCITECH publications (India) Pvt. Ltd, Chennai, 2006.
2. Gary Chartrand and Ping Zhang. *Introduction to Graph Theory*. New Delhi; New York : Tata McGraw-Hill Pub. Co. 2006.
3. Robin J.Wilson, *Introduction to Graph Theory*, Pearson publications, 5th Edition, 2010.

Web Resources

- <https://d3gt.com>
- https://www.brianheinold.net/graph_theory/graph_theory_book.html
- https://www.youtube.com/playlist?list=PLoJC20gNfC2gmT_5WgwYwGMvgCjYVslQg

Rationale for Nature of the course:

This course namely Graph Theory has applications in various fields. Graph theory has been serving as an elegant tool to easily approach/solve several problems/concepts in other fields ranging from Science to Sociology. This course will enable the students to acquire skills by which they can model certain real-life problems as graph theoretical terms and can make inference.

Activities having direct bearing on Skill development / Employability / Entrepreneurship:

Modeling certain real-life problems like Scheduling problem, Traffic signal problem, Marriage problem and so on.

Pedagogy: Chalk and Talk, PPT, Group Discussion, Quiz, Seminar, Problem solving, Tutorial, LMS (CANVAS, FLICKERS).

Course Learning Outcomes

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

CLO #	Description	K -Level
CLO1	Identify various types of sub graphs of a graph, to find degree sequence of a graph, to identify isomorphic graphs, to determine connectedness of a graph, to list out cut-vertices and cut-edges of the given graph	Up to K3
CL02	Determine whether graphs are Hamiltonian and/or Eulerian	Up to K4
CL03	Recognize bipartite graphs, to find various matrices representing a graph, to determine vector spaces associated with a given graph and also to solve problems involving Matchings and trees	Up toK3
CL04	Identify planar graphs, to find dual of a plane graph	Up to K3
CL05	Find minimum vertex and edge coloring of certain families of graphs	Up to K3

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Mapping with Programme Specific Outcome

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO1	3	1	1				2
CLO2	3	1				1	
CLO3	3	2	1		1	2	1
CLO4	3		2	1	1	2	
CLO5	3	2	2		1	2	1

Mapping with Programme Outcome

	PO1	PO2	PO3	PO4	PO5
CLO1	3				
CLO2	2		2		
CLO3	2	1	3		
CLO4	2				
CLO5	1		2		1

1- Basic Level

2- Intermediate Level

3- Advanced Applications

BLUE PRINT (for External Examinations)

Articulation Mapping –K Levels with Course Learning Outcomes (CLOs)

Sl.No	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K- Level	No. of Questions	K- Level		
1	CLO 1	Up to K3	2	K1/ K2	1	K1	2 (K2/K2)	1(K3)
2	CLO 2	Up to K4	2	K1/ K2	1	K1	2 (K4/K4)	1(K4)
3	CLO 3	Up to K3	2	K1/ K2	1	K2	2 (K3/ K3)	1(K3)
4	CLO 4	Up to K3	2	K1/ K2	1	K2	2 (K3 /K3)	1(K2)
5	CLO 5	Up to K3	2	K1/ K2	1	K2	2 (K1/ K1)	1(K3)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consoli- dated
K1	5	4	10	-	19	15.83	41.66%
K2	5	6	10	10	31	25.83	
K3	-	-	20	30	50	41.67	41.67
K4	-	-	10	10	20	16.67	16.67
Total marks	10	10	50	50	120	100	100%

Blue Print for CIA - I

Articulation Mapping –K Levels with Course Learning Outcomes (CLOs)

Sl.No	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K- Level	No. of Questions	K- Level		
1	CLO 1	Up to K3	2	K1/ K2	1	K2/K2	2 (K2/K2)	1(K3)
2	CLO 2	Up to K4	2	K1/ K2	2	K1	2 (K3/K3)	1(K3) 1(K4)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each section			4		6		10	20

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Blue Print for CIA - II

Articulation Mapping –K Levels with Course Learning Outcomes (CLOs)

Sl.No	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K- Level	No. of Questions	K- Level		
1	CLO 3	Up to K3	2	K1/ K2	2	K1/ K2	2 (K2/K2)	2(K3)
2	CLO 4	Up to K3	2	K1/ K2	1	K2	2 (K3 /K3)	1(K3)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each section			4		6		10	20

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

COURSE PLAN

Unit	Description	Hours	Pedagogy
I	Graphs – Pictorial representation	1	Chalk and talk, D3 Graph Theory – ICT tool, Interaction, Group Discussion
	Subgroups	1	
	Degrees	1	
	Isomorphism	1	
	Walks and connected graphs	2	
	Cycles in graphs	1	
	Cut-vertices and cut-edges	1	
	Tutorial	1	
II	Introduction to Eulerian graphs	1	Chalk and talk, PPT, D3 Graph Theory – ICT tool, Interaction, Group Discussion and e - quiz
	Theorems on Eulerian graphs	2	
	Fleury's algorithm to find Eulerian trail	1	
	Hamiltonian graphs	2	
	weighted graphs	2	
	Tutorial	1	
III	Bipartite graphs	1	Chalk and talk, PPT, D3 Graph Theory – ICT tool, Interaction, Assignment and Seminar
	Marriage problem	1	
	Trees	2	
	Connector problem	1	
	Matrix representations	1	
	Vector spaces associated with graphs Cycle space – cut-set space.	2	
	Tutorial	1	
IV	Introduction to Planar Graphs – definition and example	1	Chalk and talk, PPT, D3 Graph Theory – ICT tool, Interaction and e-Quiz
	Properties of planar graphs	2	
	Euler formula for plane graphs and its applications	1	
	Platonic solids	1	
	Dual of a plane graph	1	
	Characterization of planar graphs	2	
	Tutorial	1	
V	Vertex colouring – definition and examples	1	Chalk and talk, D3 Graph Theory – ICT tool, Assignment and Interaction
	Theorems on vertex colouring	2	
	Algorithm to find a minimum vertex colouring	1	
	Introduction to Edge colouring	1	
	Results on edge colouring	3	
	Tutorial	1	

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THE MADURA COLLEGE (Autonomous), MADURAI – 625 011
(AFFILIATED TO MADURAI KAMARAJ UNIVERSITY)
RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME : B.Sc., Mathematics
COURSE TITLE : Mathematics for
Competitive Examinations - I
TIME : 3 Hours

COURSE CODE : 20U3MSM1
QN.NO : 10609
MAX.MARKS :75

Objectives:

- To provide the students with an overview of Aptitude view in Mathematics.
- To learn about topics such as logic and proofs and easy calculations ways.
- To give clear idea about competitive exams.

Unit	Description	Hours	K-level	CLO
I	Introduction– Important facts – Present ages – Age ratio – Some related problems –Definition in Percentage – Important facts and Formulae – Results on populations – Results on depreciation – Difference percentage – Some other related problems.	6	Up to K3	CLO1
II	Introduction - Important facts and Formulae – Calculate cost and selling price – Calculate Gain and Loss – Problems - Ratio - Proportion - Important facts and Formulae – Types of Proportional – Comparison and Compound ratio – Variation – Related problems.	6	Up to K3	CLO2
III	Time and work - Important facts and Formulae – Days and hours calculations – problems - Pipes and Cistern - Important facts and Formulae – Two or more pipe calculations - Problems.	6	Up to K3	CLO3
IV	Time and Distance - Important facts and Formulae –Calculation Speed and Distance – Related problems- Problems on Trains - Important facts and Formulae – Calculate train speed and distance - Problems.	6	Up to K4	CLO4
V	Simple interest - Important facts and Formulae – Principal – Interest calculation - Compound interest - Important facts and Formulae – Calculate Compound interest annually, half-yearly and quarterly – Some related problems.	6	Up to K3	CLO5

Text Book:

1. R.S. Aggarwal, Quantitative Aptitude, Reprint 2016, S.Chand& Company Limited.
Sections: 8, 10, 11, 12, 15, 16, 17, 18, 21, 22.

Reference Books:

1. G. K. Ranganath, C. S. Sampangiram and Y. Rajaram, A text book of business Mathematics, 2008, Himalaya Publishing House.
2. R.V. Praveen, Quantitative Aptitude and Reasoning by, 2nd revised edition, 2013, Prentice – Hall of India Pvt. Ltd.

Web Resources

1. <https://affairsccloud.com/aptitude-questions/age.html>
2. <https://affairsccloud.com/aptitude-questions-profit-and-loss-set-23.html>
3. <https://www.youtube.com/watch?v=0Hqd1M0UuAQ>
4. <https://www.bankexamstoday.com/2013/10/time-and-distance-problems-solutions.html>
5. <https://www.bankexamstoday.com/2015/07/simple-interest-and-compound-interest.html>

P.T.O.

Rationale and Activities having direct bearing on nature of the course:

Thinking critically and applying basic mathematics skills to interpret data, draw conclusions, and solve problems; developing proficiency in numerical reasoning; Application of quantitative reasoning in aptitude tests. Aptitude is considered to be an important characteristic of an individual which can predict success in a course of career. This course imparts problem solving skills to the students by the following activities such as Exercise, Assignment and Quiz.

Pedagogy:

Lecture, power point Presentation, Group Discussion, Quiz, Seminar, Problem solving, Tutorial and LMS (CANVAS, FLICKERS).

Course Outcome

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

CLO1	Important facts – Present ages – Age ratio – Some related problems – Definition in Percentage – Important facts and Formulae – Results on populations – Results on depreciation – Difference percentage – Some other related problems.	Up to K3
CLO2	Important facts and Formulae – Calculate cost and selling price – Calculate Gain and Loss – Problems - Ratio - Proportion - Important facts and Formulae – Types of Proportional – Comparison and Compound ratio – Variation – Related problems.	Up to K3
CLO3	Time and work - Important facts and Formulae – Days and hours calculations – problems - Pipes and Cistern - Important facts and Formulae – Two or more pipe calculations - Problems.	Up to K3
CLO4	Time and Distance - Important facts and Formulae – Calculation Speed and Distance – Related problems- Problems on Trains - Important facts and Formulae – Calculate train speed and distance - Problems.	Up to K4
CLO5	Simple interest - Important facts and Formulae – Principal – Interest calculation - Compound interest - Important facts and Formulae – Calculate Compound interest annually, half-yearly and quarterly – Some related problems.	Up to K3

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4 - Examining, analyzing, presentation and make inferences with evidences

Mapping of Course Learning Outcomes (CLOs) with Program Outcomes (POs) and Program Specified Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO1	3	1	1				2
CLO2	3	1				1	
CLO3	3	2	1		1	2	1
CLO4	3		2	1	1	2	
CLO5	3	2	2		1	2	1

Mapping with Programme Outcome

	PO1	PO2	PO3	PO4	PO5
CLO1	3				
CLO2	2		2		
CLO3	2	1	3		
CLO4	2				
CLO5	1		2		1

3- Advanced Applications

2- Intermediate Level

1- Basic Level

BLUE PRINT (for External exams)

S.No	CLOs	K- Level	Section A MCQs	Section B Short Answers	Section C (Either/or Choice)	Section D (Open Choice)
1	CLO 1	Up to K2	2 (K1&K2)	1 (K2)	2 (K1&K1)	1(K2)
2	CLO 2	Up to K3	2 (K1&K2)	1 (K1)	2 (K2&K2)	1(K3)
3	CLO 3	Up to K2	2 (K1&K2)	1 (K1)	2 (K3&K3)	1(K3)
4	CLO 4	Up to K4	2 (K1&K2)	1 (K2)	2 (K4&K4)	1(K4)
5	CLO 5	Up to K3	2 (K1&K2)	1 (K2)	2 (K3&K3)	1(K3)
No. of Questions to be asked			10	5	10	5
No. of Questions to be answered			10	5	5	3
Marks for each question			1	2	5	10
Total Marks for each Section			10	10	25	30

K1 - Remembering and recalling facts with specific answers

K2 - Basic understanding of facts and stating main ideas with general answers

K3 - Application oriented - Solving Problems

K4 - Examining, analyzing, presentation and make inferences with evidences

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	5	4	10	-	19	15.83	41.66%
K2	5	6	10	10	31	25.83	
K3	-	-	20	30	50	41.66	41.66%
K4	-	-	10	10	20	16.66	16.66%
Total	10	10	50	50	120	100	100%

BLUE PRINT – CIA - I

S. No.	CLOs	K level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K Level	No. of Questions	K Level		
1	CLO 1	Up to K3	2	K1 &	1	K2	2(K1 & K1)	1(K2)
2	CLO 2	Up to K3	2	K1 &	2	K1 & K1	2(K2 & K2)	2(K3 & K3)
No. of Questions to be asked			4		3		4	3
No. of Questions to be answered			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each Section			4		6		10	20

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	2	4	10	-	16	26.66	30.66%
K2	2	2	10	10	24	4.0	
K3	-	-	-	20	20	33.33	33.33%
K4	-	-	-	-	-	-	-
Total	4	6	20	30	60	100	100%

BLUE PRINT – CIA – II

S.No.	CLOs	K level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K-Level	No. of Questions	K-Level		
1	CLO 3	Up to K3	2	K1 & K2	1	K1	2(K3 & K3)	2(K3 & K3)
2	CLO 4	Up to K4	2	K1 & K2	2	K2 & K2	2(K4 & K4)	1(K4)
No. of Questions to be asked			4		3		4	3
No. of Questions to be			4		3		2	2
Marks for each question			1		2		5	10
Total Marks for each Section			4		6		10	20

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (No choice)	Section C (Either/ or)	Section D (Open choice)	Total marks	% of marks without choice	Consolidated
K1	2	2	-	-	4	6.67	16.67%
K2	2	4	-	-	6	10	
K3	-	-	10	20	30	50.00	50.00%
K4	-	-	10	10	20	33.33	33.33%
Total marks	4	6	20	30	60	100	100%

Lesson Plan

Unit	Description	Hours	Pedagogy
I	Introduction – Important facts	1	ICT tools
	Present ages – Age ratio – Some related problems	2	Lecture
	Definition in Percentage – Important facts and Formulae – Results on populations.	1	Lecture
	Results on depreciation – Difference percentage – Some other related problems.	3	Lecture
II	Introduction - Important facts and Formulae	1	Lecture
	Calculate cost and selling price – related examples.	2	Lecture
	Calculate Gain and Loss – Problems	1	Lecture
	Ratio - Proportion - Important facts and Formulae	1	Lecture
	Types of Proportional– Comparison and Compound ratio	1	Lecture
	Variation – Related problems.	1	Lecture
III	Time and work - Important facts and Formulae – Days and hours calculations.	1	ICT tools
	Days and hours calculations – problems	1	Lecture
	- Pipes and Cistern - Important facts and Formulae	2	Lecture
	Two or more pipe calculations - Problems.	1	Lecture
IV	Time and Distance - Important facts and Formulae.	1	Lecture
	Calculation Speed and Distance – Related problems.	2	Lecture
	Problems on Trains - Important facts and Formulae.	1	Lecture
	Calculate train speed and distance - Problems.	1	Lecture
V	Simple interest - Important facts and Formulae.	1	Lecture
	Principal – Interest calculation.	1	Lecture
	Compound interest - Important facts and Formulae.	2	Lecture
	Calculate Compound interest annually, half-yearly and quarterly – Some related problems.	2	Lecture
Total Hours		30	

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THE MADURA COLLEGE (Autonomous), MADURAI – 625 011
(AFFILIATED TO MADURAI KAMARAJ UNIVERSITY)
RE-ACCREDITED (3rd Cycle) WITH “A” GRADE BY NAAC

PROGRAMME : NME - Mathematics
COURSE TITLE : Numerical Aptitude
TIME : 3 Hours

COURSE CODE : 20U3MNM1
QN.NO : 10610
MAX.MARKS : 75

Objectives:

1. To learn simplest tricks to find hcf, lcm, average, percentage and Profit & loss problems.
2. To apply numerical techniques in solving quantitative aptitude.
3. To understand the shortcuts for the problems.

Unit	Description	Hours	K-level	CLO
I	HCF & LCM: Find HCF by Factorization Method , Division Method – find LCM by Factorization Method , Common Division Method – product of 2 numbers – co-prime – HCF & LCM of fractions – largest four digit number or smallest five digit number exactly divisible by some numbers – least number which divided by some numbers	6	Up to K2	CLO1
II	Square roots and cube root : Find square root by Factorization Method, Division Method – square root of numbers – square root of decimal numbers – find cube root by Factorization Method. Average: Average of N natural numbers – 4 consecutive even integers – class – scores in innings – find a result from given average – expenditure of mess	6	Up to K2	CLO2
III	Problems on ages: finding present age. Surds and Indices: law of indices, Surds and Law of surds and its related problems.	6	Up to K2	CLO3
IV	Percentage: Express percent as fraction – express fraction as percent – problems on populations – problems on Depreciation.	6	Up to K2	CLO4
V	Profit and loss: Gain and Loss – Gain% and Loss% – find SP from given CP and gain% or loss% – find CP from given SP and gain% or loss%.	6	Up to K2	CLO5

Book for Study:

1. **R.S. Aggarwal, Quantitative Aptitude**, Reprint 2016, S.Chand & Company Limited. Sections : 2 , 5, 6, 8, 9, 10, 11

Books for Reference:

1. **G. K. Ranganath, C. S. Sampangiram and Y. Rajaram, A text book of business Mathematics**, 2008, Himalaya Publishing House.
2. **R.V. Praveen, Quantitative Aptitude and Reasoning**, 2nd revised edition, 2013, Prentice – Hall of India Pvt. Ltd.

Web Resources:

1. <https://www.math-shortcut-tricks.com/>
2. <https://www.ibpsguide.com/numerical-ability/>
3. <https://www.youtube.com/watch?v=PYLpkIFMb6E>
4. <https://www.youtube.com/watch?v=Xe3cDAP-GIg>

Rationale for Nature of the course:

Thinking critically and applying basic mathematics skills to interpret data, conclusions and solve problems; developing proficiency in numerical aptitude.

Activities having direct bearing on Employability:

This course imparts problem solving skills in the students and is crafted to help the students in identifying the best solution for a given problem. This course helps in strengthen the students in their “Numerical Aptitude knowledge” with the essentials such as short techniques, quiz to help increase their curiosity and also help them to become expert with knowledge of peripheral concepts.

Pedagogy :

Chalk and Talk, Problem Solving, Tutorial, Group Discussion, Quiz,.

Course Learning Outcomes

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

Number	Course outcome	knowledge level
CLO1	Learn mathematical tricks to find LCM and HCF	Up to K2
CLO2	Learn shortcuts in finding square root, cube root and average	Up to K2
CLO3	Understand the idea of solving problems on ages, surds and indices	Up to K2
CLO4	Acquire the knowledge of percentage	Up to K2
CLO5	Solve the problems on profit and loss	Up to K2

K1- Recall,

K2 – Understanding

Mapping with Course Learning Outcomes(CLOs)

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO1	3	-	1	2	1	3	3	1	-	3	-	1
CLO2	3	-	1	2	1	3	3	1	-	3	-	1
CLO3	2	-	1	2	1	3	3	1	-	3	-	1
CLO4	3	-	1	2	1	3	3	1	-	3	-	1
CLO5	3	-	1	2	1	3	3	1	-	3	-	1

1. Basic level

2. Intermediate level

3. Advance level

BLUE PRINT – External Exam**Articulation Mapping K-level with Course Learning Outcomes(CLOs)**

units	CLOs	K-level	Section A Short Answer	Section B Either/or Choice	Section C Open Choice
1	CLO 1	Up to K2	1(K1)	2(K2 & K2)	1(K1)
2	CLO 2	Up to K2	1(K1)	2(K2 & K2)	1(K1)
3	CLO 3	Up to K2	1(K1)	2(K2 & K2)	1(K1)
4	CLO 4	Up to K2	1(K1)	2(K2 & K2)	1(K1)
5	CLO 5	Up to K2	1(K1)	2(K2 & K2)	1(K1)
No. of Questions to be asked			5	10	5
No. of Questions to be answered			5	5	3
Marks for each question			2	7	10
Total Marks for each Section			10	35	30

Distribution of Section-wise Marks with K levels

K Levels	Section A (No choice)	Section B (Either/ or)	Section C (Open choice)	Total marks	% of marks without choice	Consolidated
K1	10	-	50	60	46.15	46%
K2	-	70	-	70	53.85	53%
Total marks	10	50	50	130	100	100%

The Components of assessment shall be

S.No	CLO	Test Component	Marks	K Level
1	5	Assignment	5 Marks	K2
2	5	Seminar	5 Marks	K1
3	5	Quiz	5 Marks	K1

Blue Print – CIA – I**Articulation Mapping K-level with Course Learning Outcomes (CLOs)**

Sl. No	CLOs	K. Level	Section A (Short Answers)	Section B (Either/or Choice)	Section C (Open Choice)
1	CLO1	Up to K2	3(K1)	2(K2 & K2)	2(K1&K1)
2	CLO2	Up to K2	2(K1)	2(K2 & K2)	1(K1)
No. of Questions to be asked			5	4	3
No. of Questions to be answered			5	2	2
Marks for each question			2	5	10
Total Marks for each Section			10	10	20

Distribution of Section-wise Marks with K levels*

K Levels	Section A (Short Answers)	Section B (Either/ or)	Section C (Open choice)	Total marks	% of marks without choice	Consolidated
K1	10	-	30	40	66.67	67%
K2	-	20	-	20	33.33	33%
Total marks	10	20	30	60	100	100%

Blue Print – CIA – II

Articulation Mapping K-level with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K. Level	Section A Short Answers	Section B (Either/or Choice)	Section C (Open Choice)
1	CLO3	Up to K2	3(K1)	2(K2 & K2)	2(K1&K1)
2	CLO4	Up to K2	2(K1)	2(K2 & K2)	1(K1)
No. of Questions to be asked			5	4	3
No. of Questions to be answered			5	2	2
Marks for each question			2	5	10
Total Marks for each Section			10	10	20

Distribution of Section-wise Marks with K levels*

K Levels	Section A (Short Answers)	Section B (Either/or)	Section C (Open choice)	Total marks	% of marks without choice	Consolidated
K1	10	-	30	40	66.67	67%
K2	-	20	-	20	33.33	33%
Total marks	10	20	30	60	100.00	100%

Lesson Plan

UNIT	DESCRIPTION	HOURS	PEDAGOGY
I	HCF by Factorization method, division method	2	Chalk and Talk, problem solving, Tutorials
	LCM by Factorization method , common division method	1	
	Co-primes and HCF and LCM of Fraction	1	
	largest four digit number or smallest five digit number exactly divisible by some numbers	2	
	least number which divided by some numbers	2	
II	Square roots of a number and decimal number	1	Chalk and Talk, Problem Solving
	cube root of a number	1	
	Average of N natural numbers – 4 consecutive even integers – class – scores in innings	2	
	find a result from given average – expenditure of mess	2	
III	Problems on ages	3	Chalk and Talk, quiz
	Law of surds	1	
	Law of indices	1	
IV	Express percent as fraction – express fraction as percent	1	Chalk and Talk, quiz, group discussion
	problems on populations	2	
	Problems on Depreciation.	2	
V	Gain and Loss – Gain% and Loss%	2	Chalk and Talk, quiz
	Find SP from given CP and gain% or loss%	2	
	find CP from given SP and gain% or loss%	2	
Total Hours		30	

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