

## SEMESTER I

### CC I - DIFFERENTIAL CALCULUS AND TRIGNOMETRY

**Internal : 25**  
**External : 75**

**Subject Code : UMA**  
**Exam Hours : 3**

#### UNIT I

Method of Successive differentiation - Leibnitz's Theorem and its applications- Increasing & Decreasing functions. (Chap. III : Sec 1.1 - 2.2, Chap. IV: Sec 2.1 – 2.2)

#### UNIT II

Curvature – Radius of curvature in Cartesian and in Polar Coordinates – Jacobians. (Chap. X: Sec 2.1-2.3 & 2.6)

#### UNIT III

Centre of Curvature – Evolutes & Involutives - Maxima and Minima of function of two variables. (Chap. X: Sec 2.4, 2.5 & Chap. V: Sec 1.1-1.4)

#### UNIT IV

Hyperbolic functions – Relation between Hyperbolic functions – Relations between hyperbolic functions corresponding to relations between Circular functions - Inverse hyperbolic functions. (Chap. II: Sec 2.1-2.2)

#### UNIT V

Logarithm of a complex number – Summation of Trigonometric series – Difference method - Angles in arithmetic progression method – Gregory's Series . (Chap. III & Chap. IV: Sec 4.1, 4.2 & 4.4)

#### TEXT BOOK(S)

- [1]. T.K. Manicavachagam Pillai & others , Calculus Volume I, S.V Publications, Chennai
- [2]. S. Narayanan, T.K. Manichavasagam Pillai, Trigonometry, S. Viswanathan Pvt Limited, and Vijay Nicole Imprints Pvt. Ltd, 2004.

#### REFERENCE(S)

- [1] S.Arumugam and Isaac, Calculus, Volume 1, New Gamma Publishing House, 1991.
- [2] S.Arumugam & others, Trigonometry, New Gamma Publications, 1985, Revised Edition

**SEMESTER I**  
**CC II - CLASSICAL ALGEBRA**

**Internal : 25**

**External : 75**

**Subject Code : UMB**

**Exam Hours : 3**

**UNIT I**

Forming the equations with the given roots -Relation between the roots and coefficients - Symmetric functions - Sum of the  $n^{\text{th}}$  powers of the roots – Newton's theorem on the sum of the powers of the roots.(problems only).( chap 6;sec 9 -14).

**UNIT II**

Transformation of equations – Reciprocal equations- Diminishing, Increasing, Multiplying the roots– Descarte's rule of signs – Simple problems.(chap 6; sec .15,16,17,18 & 24)

**UNIT III**

Inequalities – Elementary Principles – Geometric and Arithmetic means – Weirstrass inequalities – Cauchy's inequality – Applications to Maxima and Minima. (chap 4)

**UNIT IV**

Types of Matrices - - Symmetric, Skew- symmetric, Orthogonal, Hermitian, Skew- Hermitian and Unitary matrices – The Inverse of the matrix(except theorem 7.22) – Rank of the matrix ( definitions and simple problems)

**UNIT V**

Simultaneous linear equations ( except proof of the theorem )- Characteristic equation and Cayley Hamilton's Theorem (statement only) – Finding inverse of matrix using Cayley Hamilton's theorem -Eigen values and Eigen vectors – Properties of eigen values (without proof)- simple problems-

**Text Books:**

1. For units I and II - "Algebra Vol I" by T.K. M. Pillai and S. Narayanan S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai.
2. For units III - "Algebra Vol II" by T.K. M. Pillai and S. Narayanan S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai.
3. For unit IV and V - 'Ancillary Mathematics" by S.Narayanan,, R.Hanumantha Rao and T.K. M. Pillai.

**Reference Books:**

1. Algebra – M. L. Khanna
2. Modern Algebra – K. Balakrishnan and N. Ramabathran

**SEMESTER II**  
**CC III - INTEGRAL CALCULUS**

**Internal : 25**  
**External : 75**

**Subject Code : UMC**  
**Exam Hours : 4**

**UNIT I**

Revision of all integral models – simple problems.

**UNIT II**

Definite integrals - Integration by parts , reduction formula ,Bernoulli's Formula.

**UNIT III**

Geometric Application of Integration-Area under plane curves: Cartesian co-ordinates -Area of a closed curve - Examples - Areas in polar co-ordinates.

**UNIT IV**

Double integrals – changing the order of Integration – Triple Integrals.

**UNIT V**

Beta & Gamma functions and the relation between them – Integration using Beta & Gamma functions

**TEXT BOOK(S)**

1. S.Narayanan and T.K.Manicavachagom Pillai, **Calculus Volume II**, S.Viswanathan (Printers & Publishers) Pvt Limited, Chennai -2011.

UNIT I : Chapter 1 section 1 to 10

UNIT II : Chapter 1 section 11, 12 , 13 &15.1

UNIT III : Chapter 2 section 1.1, 1.2, 1.3 & 1.4

UNIT IV : Chapter 5 section 2.1, 2.2 & sec 4

UNIT V : Chapter 7 section 2.1 to 2.5

**REFERNECE:**

1. Shanti Narayan, Differential & Integral Calculus.

**SEMESTER II**  
**CC IV - ANALYTICAL GEOMETRY OF THREE DIMENSIONS**

**Internal : 25**  
**External : 75**

**Subject Code : UMD**  
**Exam Hours : 3**

**UNIT I**

Coordinates in space-Direction cosines of a line in space-angle between lines in space – equation of a plane in normal form. Angle between planes – Distance of a plane from a point.

**UNIT II**

Straight lines in space – line of intersection of planes – plane containing a line. Coplanar lines – skew lines and shortest distance between skew lines- length of the perpendicular from point to line.

**UNIT III**

General equation of a sphere-Section of sphere by plane-tangent planes – condition of tangency-system of spheres generated by two spheres - System of spheres generated by a sphere and plane.

**UNIT IV**

The equation of surface – cone – intersection of straight line and quadric cone – tangent plane and normal

**UNIT V**

Condition for plane to touch the quadric cone - angle between the lines in which the plane cuts the cone. Condition that the cone has three mutually perpendicular generators- Central quadrics – intersection of a line and quadric – tangents and tangent planes – condition for the plane to touch the conicoid

**TEXT BOOK**

1. Shanthi Narayanan and Mittal P.K:Analytical Solid Geometry 16th Edition S.Chand & Co., New Delhi.
2. Narayanan and Manickavasagam Pillay, T.K. Treatment as Analytical Geometry S.Viswanathan (Printers & Publishers ) Pvt. Ltd.,

Unit I : Chapter I, Sec 1.5 to 1.9, Chapter II Sec 2.1 to 2.3, Pages : 10-31,

Chapter II Sec 2.4 to 2.8 pages : 32-47 of [1]

Unit II : chapter III section 3.1-3.7, pages 55-89 of [1]

Unit III : Chapter VI Sec. 6.1 to 6.6 pages : 121-143 of [1]

Unit IV : Chapter V Sec.43 to 47 pages : 103-113 of [2]

Unit V : Chapter V Sec.49 to 53, Pages:115-125 of [2]

**Book for Reference**

1. P.Duraipandian & others- Analytical Geometry 3 Dimensional

**SEMESTER III**  
**CC V - DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS**

**Internal : 25**  
**External : 75**

**Subject Code : UME**  
**Exam Hours : 3**

**UNIT I**

Linear Differential equations with constant coefficients – Evaluation of particular integral of  $e^{ax}$ ,  $\cos ax$ ,  $\sin ax$ ,  $x^k$ , where  $k$  is a positive integer and  $e^{ax} f(x)$ , where  $f(x)$  is any function of  $x$ . (Chapter 2: sections 1 to 4)

**UNIT II**

Linear Equations with variable Coefficients: to find the particular integral – Equations reducible to linear homogeneous equation- method of variation of parameters (Chapter 2: sections 8 to 10)

**UNIT III**

Partial Differential Equations: Formation of equations by elimination of constants and arbitrary functions -General, particular, complete and singular integral (Geometrical meaning not expected) - Solutions of first order equations of the standard forms. ( Chapter 4: Sections 1 to 3 and 5.1- 5.4)

**UNIT IV**

Equations reducible to the standard forms- Lagrange's equation – Charpit's method( Chapter 4: Sections 5.5,6,7)

**UNIT V** Laplace Transforms - Standard formulae – Some general Theorems (statement only)and Simple Applications - Inverse Laplace transforms (problems only) - Application to the solution of Second order ordinary differential equations with constant coefficients.(Chapter 5 : Sections: 1,2,4,6,7,8)

**Text Book:**

Calculus Vol III by T.K. Manickavasagam Pillai and S. Narayanan, Viswanathan Printers and Publishers Pvt. Ltd., Chennai.

**Reference Books:**

1. Differential equations - M.L.Khanna
2. Engineering Mathematics (Vol II) – M.K.Venkatraman

**SEMESTER III**  
**CC VI - VECTOR CALCULUS AND FOURIER SERIES**

**Internal : 25**  
**External : 75**

**Subject Code : UMF**  
**Exam Hours : 3**

**UNIT I**

Vector differentiation –velocity & acceleration-Vector & scalar fields –Gradient of a vector - Unit vector normal to the surface - Directional derivative – divergence & curl of a vector - Solenoidal & irrotational vectors .- Formula involving operator  $\nabla$ - Operators involving  $\nabla$  twice and problems.

**UNIT II**

Vector integration : Line integral- conservative field – volume integral -surface integral-(problems and theorem statement only)

**UNIT III**

Gauss Divergence Theorem –Green’s theorem- Stoke’s Theorem (Statements Only) – Simple Problems( verification of theorem.)

**UNIT IV**

Fourier series – Definition – Fourier series expansion of periodic functions with period  $2\pi$ .

**UNIT V**

Even and odd functions definition-properties-use of these functions in fourier series– Half range Fourier series.-Development in cosine series-Development in sine series

**Text Book:**

1. For units I, II and III - “Vector Algebra and Analysis” by T.K.M. Pillai and S.Narayanan , S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai.
2. For units IV and V - “Differential Equations” by T.K. Manickavasagam Pillai and S. Narayanan, S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai

**Reference Books**

1. Vector Calculus – M.L. Khanna.

**SEMESTER III**  
**NME I - Mathematics for Competitive Examinations I**

**Internal : 25**  
**External : 75**

**Subject Code: UME1**  
**Exam Hours : 3**

**Unit 1**

**Series Completion:** Number Series - Alphabet Series (P. No. 139 – 159)

**Unit II**

**Coding – Decoding:** Letter Coding – Number Coding – Matrix Coding

(P. No. 169 – 192)

**Unit III**

**Blood Relation:** Deciphering jumbled up descriptions – Relation Puzzle – Coded Relations.(P.No. 220 – 241)

**Unit IV**

**Puzzle Test:** Seating / Placing arrangements – Comparison Test.

(P.No. 253 – 278 )

**Unit V**

Direction Sense Test – Logical Venn Diagram

(P.No. 324 – 333 , 348 – 366 )

**Text Book:**

“A modern approach to Verbal and Non-Verbal Reasoning” by R.S. Agarwal,  
S.Chand & Company Ltd, New Delhi- 55.

**SEMESTER IV**  
**CC VII - SEQUENCES AND SERIES**

**Internal : 25**  
**External : 75**

**Subject Code: UMG**  
**Exam Hours : 3**

**UNIT I :**

Sequences Limit of a sequence – Convergence Theorems on limits – Cauchy’s first Theorem on limit – Upper and lower bounds of an aggregate – Bounded sequences – Upper and lower limits of a sequence - Cauchy’s general principle of convergence – Monotonic sequence – Monotonic sequence always tends to a limit finite or infinite.

**UNIT II :**

Infinite series: Sum to infinity – Definition of convergence, divergence and oscillation – convergence of Geometric series – some general theorems on infinite series Series of positive terms - Comparison tests – Convergence of  $\sum \frac{1}{n^k}$  - D’ Alembert’s ratio test — Raabe’s test – Simple Problems.

**UNIT III :**

Cauchy’s Condensation test – Cauchy’s root test - Simple problems – Alternating series with problems.

**UNIT IV :**

Binomial Theorem for a rational index – Exponential and Logarithmic series – Summation of series – Approximations using these theorems

**UNIT V:**

General summation of series including successive difference and recurring series.

**Text Books:**

Content and Treatment as in ‘Algebra Vol I’ by T.K.M. Pillay, T. Natarajan and K.S. Ganapathy – S. Viswanathan Printers & Publishers Pvt. Ltd., Chennai.

**Reference Books:**

- 1 A first Course in Real Analysis – M.K. Singal & Asha Rani Singal
- 2 Sequence and Series – S. Arumugam and others.



**SEMESTER IV**  
**CC VIII - NUMBER THEORY**

**Internal : 25**  
**External : 75**

**Subject Code: UMH**  
**Exam Hours : 3**

**UNIT I:**

Prime and composite numbers-Coprimes-Sieve of Eratosthenes Euclid's theorem-Unique factorization-Fundamental theorem of Arithmetic –Positional representation of integers-Number of divisors-Sum of divisors-Symbols  $d(n), \sigma(n)$ -Arithmetic functions.

**UNIT II:**

Perfect number-Greatest integer function-Mobious function  $\mu(n)$ -Inversion formula and its converse.

**UNIT III:**

Distribution of Primes-Fermat conjecture-Fermat numbers-Gold Bach's conjecture-Mersenne numbers Gap theorem-Infinitly of primes.

**UNIT IV:**

Congruence- Definition –Residue classes-Complete and least residue system-Linear congruences-Solution of congruences-Chinese remainder theorem.

**UNIT V:**

Quadratic reciprocity-Quadratic residues and non residues-Eulers criterion-Primitive roots is a quadratic non residues-Legendre symbol-Gauss lemma-Quadratic reciprocity law.

**Text Book :** Elements of Number Theory by Prof. S.Kumaravelu and Susheela Kumaravelu, Raja Sankar offset Printers ,Sivakasi, 2002.

**REFERENCES**

1. Elementary Number Theory, David M. Burton W.M.C. Brown Publishers, Dubuque, Iowa, 1989.
2. Number Theory, George Andrews, Courier Dover Publications, 1994.

**SEMESTER IV**  
**SBE I – INTRODUCTION TO MATLAB**

**Internal : 25**  
**External : 75**

**Subject Code: UMS1**  
**Exam Hours : 3**

**Unit I**

Getting Started - MATLAB Basics (Chapters 1 & 2)

**Unit II**

Interacting with MATLAB (Chapter 3)

**Unit III**

Beyond the Basics (Chapter 4)

**Unit IV**

MATLAB Graphics (Chapter 5)

**Unit V**

MATLAB Programming (Chapter 7)

**Text Book:**

Content and treatment as in ‘A Guide to MATLAB for Beginners and Experienced Users’ by B. Hunt, R. Lipsman, J. Rosenberg, K. Coombes, J. Osborn and G. Stuck, Cambridge University Press, 2001.

**Reference Books:**

1. Basics of MATLAB and Beyond – Andrew Knight
2. MATLAB Primer – Timothy A. Davis and Kermit Sigmon

## SEMESTER IV

### NME II - Mathematics for Competitive Examinations II

**Internal : 25**

**External : 75**

**Subject Code: UME2**

**Exam Hours : 3**

#### Unit 1

**Number, Ranking and Time Series Test:** Number Test – Ranking Test –

Time

sequence Test (P. No. 417 – 432)

#### Unit 2

**Mathematical Operations:** Problem Solving by Substitution – Interchange of signs

and numbers – Deriving the appropriate conclusion (P. No. 432 – 454)

#### Unit 3

**Arithmetical Reasoning:** Calculation based Problem – Data based question – Problem on ages – Venn diagram based questions (P. No. 459 – 474)

#### Unit 4

Inserting the Missing character (P. No. 475 – 492)

#### Unit 5

Data sufficiency – Logical Sequence of Words – Logical Reasoning.  
(P. No. 495 – 506, 455 – 458, Part II 1 - 14)

#### Text Book:

“A modern approach to Verbal and Non-Verbal Reasoning” by R.S. Agarwal,  
S.Chand & Company Ltd, New Delhi- 55.

**SEMESTER V**  
**CC IX – ALGEBRA**

**Internal : 25**  
**External : 75**

**Subject Code: UMI**  
**Exam Hours : 3**

**Unit I**

Groups: Subgroups – Cyclic groups – Order of an element – Cosets and Lagrange's Theorem (Sections 3.5 to 3.8)

**Unit II**

Normal subgroups and quotient groups – Finite groups and Cayley's theorem – isomorphism and homomorphism (Sections 3.9 to 3.12).

**Unit III**

Rings and Fields: Definition and examples – Elementary properties of rings –Types of rings – Characteristics of rings – Subrings – Ideals – Quotient rings – Homomorphism of rings – Isomorphism of Rings (Sections 4.1 to 4.8 & 4.10).

**Unit IV**

Vector spaces - Definition and examples – Subspaces – Linear transformation- Span of a set – Linear independence. (Sections 5.1 to 5.5).

**Unit V**

Basis and dimension – Rank and Nullity – Matrix of a linear transformation. (Sections 5.6 to 5.8).

**Text Book:**

“Modern Algebra” by S. Arumugam and A. Thangapandi Isaac., New Gamma Publishing House, Revised Edition, Palayamkottai.

- Reference Books:**
1. Modern Abstract Algebra – Shanthi Narayan
  2. Modern Algebra – K. Sivasubramanian.
  3. Modern Algebra – R.Balakrishnan & N.Ramapathran

**SEMESTER V**  
**CC X - REAL ANALYSIS**

**Internal : 25**  
**External : 75**

**Subject Code: UMJ**  
**Exam Hours : 3**

**UNIT I**

Real number system: Absolute value of a real number and its properties – Supremum and Infimum of a set – Order Completeness Property – Countable and Uncountable sets. (Sections: 1.5 - 1.7 & 1.10)

**UNIT II**

Continuity of Functions – Types of discontinuous functions – Algebra of Continuous functions – Intermediate value Theorem – Inverse function theorem and Uniform continuity of a function. (Sections: 5.3, 5.4, 5.6 to 5.8)

**UNIT III**

Derivability and continuity – Algebra of derivatives – Inverse function theorem – Darboux's theorem. (Sections: 6.1 to 6.5)

**UNIT IV**

Rolle's Theorem – Mean value theorems on derivatives - Taylor's theorem with remainder. (Sections: 8.1 to 8.5)

**UNIT V**

Riemann integration: Definition – Darboux's theorem – Conditions of Integrability – Integrability of continuous and monotonic functions – Properties of Integrable functions – Integral functions – Continuity and derivability of Integral functions – The first Mean value Theorem – fundamental theorem of integral calculus.  
(Chapter 6)

**TEXT BOOKS:**

1. For units I to IV - "A first course in Real Analysis" by M.K. Singal and Asha Rani Singal, 20<sup>th</sup> edition (1998) R. Chand and Co., New Delhi.
2. For unit V – "A Course of Mathematical Analysis" by Shanthi Narayan.

**REFERENCES:**

- 1 A First course in Real Analysis – Walter Rudin.
- 2 Real Analysis – Shanthi Narayan.

## SEMESTER V

### - CORE COURSE XI – MECHANICS

**Internal : 25**

**External : 75**

**Subject Code : UMK**

**Exam Hours : 3**

#### UNIT I

Equilibrium of a Particle – Triangle of Forces – Lami’s Theorem – Moment of a Force – General Motion of a Rigid Body – Parallel Forces – Varignon’s Theorem – Forces along the sides of a triangle - Couples. (Chapter 3: Section 3.1, Chapter 4: Sections 4.1, 4.2, 4.4, 4.5, 4.6)

#### UNIT II

Hanging strings – Equilibrium of a uniform homogeneous strings – Suspension bridge – Simple Problems. (Chapter 9: Sections 9.1 & 9.2)

#### UNIT III

Rectilinear motions under varying force – Simple Harmonic Motion S .H.M along a horizontal line – S.H.M. along a vertical line – Projectiles – Forces on a Projectiles – Projectile projected on an inclined plane – enveloping Parabola. (Chapter 12: sections 12.1 to 12.3 & 13.1 to 13.3)

#### UNIT IV

Impact – Impulsive force – Impact of Spheres – Impact of two smooth spheres - Impact of a smooth sphere on a plane – Oblique impact of two smooth spheres. (Chapter 14: Sections 14.1 to 14.5)

#### UNIT V

Central orbits – General orbits – Central orbit – Conic as a centered orbit - Moment of Inertia – Perpendicular and Parallel axes theorems. (Chapter 16: Sections 16.1, 16.2, 16.3 & Chapter 17 : 17.1)

#### TEXT BOOK:

Mechanics by P.Duraipandian, Laxmi Duraipandian and Muthamizh Jayapragasam, Published by S. Chand and Company, New Delhi ( 2005 ).

#### REFERENCE BOOKS:

- |             |   |                   |
|-------------|---|-------------------|
| 1. Dynamics | - | M.K. Venkatraman. |
| 2. Statics  | - | M.K. Venkatraman. |

**SEMESTER V**  
**MBE I - OPERATIONS RESEARCH**

**Internal : 25**  
**External : 75**

**Subject Code: UME3**  
**Exam Hours : 3**

**UNIT I :** Linear Programming Problem – Mathematical Formulation of L.P.P – Graphical Solution – Introduction – Graphical Solution method – Some exceptional cases – General Linear Programming Problem – Canonical and Standard form of LPP – Simplex method – Introduction - The computational Procedure. ( Excluding Theorems ); ( Sections 2.1 , 2.2 , 3.1 to 3.5 , 4.1 , 4.3 )

**UNIT II :** Use of Artificial Variables – Two – Phase Method – Duality in Linear Programming problem – Introduction – General primal–Dual Pair–Formulating a dual Problem – Duality and Simplex Method–Dual Simple Method.(Excluding Theorems ); (Sections: 4.4, 5.1 to 5.3, 5.7,5.9)

**UNIT III :** Transportation Problem – Introduction – General Transportation problem – Finding Initial Basic feasible Solution – Test for Optimality – Transportation Algorithm ( MODI Method); ( Sections: 10.1 , 10.11)

**UNIT IV:** Assignment problem : Mathematical formulation of an AP – The Assignment algorithm – The Traveling Salesman Problem.( Sections: 11.1 to 11.3 & 11.6)

**UNIT V:** Network Scheduling by PERT / CPM – Network and Basic Components – Rules of Network Construction – Time Calculations in Networks – Critical Path Analysis – PERT Calculations. ( Sections 21.1 to 21.7 )

**TEXT BOOKS:**“ Operations Research ” by Kanti Swarup , P.K. Gupta and Man Mohan , Sultan Chand and Sons , Educational Publishers , New Delhi ( 2004 ).

**TEXT BOOK:**

“ Operations Research ” by Kanti Swarup , P.K. Gupta and Man Mohan , Sultan Chand and Sons , Educational Publishers , New Delhi ( 2004 ).

**REFERENCE BOOKS:**

- |   |   |   |                             |
|---|---|---|-----------------------------|
| 1 | Operations Research                             | - | S. Dharani Venkatakrishnan. |
| 2 | Operations Research                             | - | Gupta and Hira.             |
| 3 | Operations Research (6 <sup>th</sup> edition )- |   | Hamdy A. Taha               |

**SEMESTER V**  
**SBE II - QUANTITATIVE APTITUDE**

**Internal : 25**  
**External : 75**

**Subject Code: UMS2**  
**Exam Hours : 3**

**Unit I**

Blood Relation - Puzzle Test  
(P. No. 220 – 241, 253 – 278)

**Unit II**

Number, Ranking and Time Series Test - Mathematical Operations  
(P. No. 417 – 432, 432 – 454)

**Unit III**

Arithmetical Reasoning  
(P. No. 459 – 474)

**Unit IV**

Inserting the Missing character  
(P. No. 475 – 492)

**Unit V**

Data sufficiency – Logical Sequence of Words.  
(P. No. 495 – 506, 455 – 458)

**Text Book:**

“A modern approach to Verbal and Non-verbal Reasoning” by R.S.Agarwal,  
S.Chand & Company Ltd, Delhi.



## SEMESTER V

### SBE III – INTRODUCTION TO FUZZY MATHEMATICS

**Internal : 25**  
**External : 75**

**Subject Code: UMS3**  
**Exam Hours : 3**

#### UNIT – I

Crisp sets and Fuzzy sets – Crisp sets: an over view – The notion of Fuzzy sets – Basic concepts of Fuzzy sets. (Sections 1.2-1.4)

#### UNIT – II

Operations on Fuzzy sets : General discussion – Fuzzy complement – Fuzzy Union (Sections 2.1 – 2.3)

#### UNIT – III

Fuzzy Intersection – Combinations of Operations (Sections 2.4, 2.5)

#### UNIT – IV

General Aggregation Operations – Crisp and Fuzzy relations – Binary relations (Sections 2.6, 3.1, 3.2)

#### UNIT – V

Binary relations on a single set – Equivalence and Similarity relations - Compatibility and tolerance relations – Orderings. (Sections 3.3 - 3.6)

#### TEXT BOOK:

‘Content and treatment as in ‘Fuzzy Sets, Uncertainty and Information’, by George J.Klir and Tina A. Folger, Prentice Hall of India, New Delhi, 2006’.

#### REFERENCE(S)

[1] H.J. Zimmermann, Fuzzy Set Theory and its Applications, Allied Publishers Limited, New Delhi, 1991.

[2] G.J. Klir and B. Yuan, Fuzzy Sets and Fuzzy Logic, Prentice Hall of India, New Delhi, 1995.

**SEMESTER VI**  
**CC XII- COMPLEX ANALYSIS**

**Internal : 25**  
**External : 75**

**Subject Code: UML**  
**Exam Hours : 3**

**UNIT I**

Analytic Functions: Functions of complex variable – C.R. Equations – Analytic functions  
- Harmonic functions. (Sections 2.1, 2.6 to 2.8)

**UNIT II**

Bilinear Transformations: Elementary transformations – Bilinear transformations – Cross  
ratio – Fixed points of bilinear transformations. (Sections 3.1 to 3.4)

**UNIT III**

Complex Integration: Definite integral – Cauchy’s theorem – Cauchy’s integral formula –  
Higher derivatives. (Sections 6.1 to 6.4)

**UNIT IV**

Series Expansions: Taylor’s series – Laurent series – zeros of analytic functions –  
Singularities. (Sections 7.1 to 7.4)

**UNIT V**

Calculus of Residues: Residues – Cauchy’s residue theorem – Evaluation of definite  
integrals. (Sections 8.1 to 8.3)

**TEXT BOOK:**

“Complex Analysis” by S.Arumugam , A.Thankapandi , issac, A.Somasundaram, New  
Gamma Publishing House , Palaymkottai.

**REFERENCE BOOKS:**

- 1 Complex Analysis - P.Duraipandian.
- 2 Complex VARIABLES - T.K.Manickavachagam Pillai.

## SEMESTER VI

### CC XIII – NUMERICAL METHODS WITH ‘C’ PROGRAMMING

**Internal : 25**  
**External : 75**

**Subject Code : UMM**  
**Exam Hours : 3**

#### UNIT I

Structure of C programs-Constants, Variables and Data types-Operators and Expressions- Mathematical functions-Input and output operators.

#### UNIT II

Decision making and Branching-IF statements-GOTO statement-Decision making and looping - WHILE, DO, FOR statements-Arrays

#### UNIT III

Handling of character strings - Arithmetic operations on characters - String handling functions - User defined functions - Recursion..

#### UNIT IV

Bisection method, false position method and Newton Raphson method - Solving simultaneous algebraic equations - Gauss-Seidel method - Gauss elimination method..

#### UNIT V

Interpolation - Newton's forward and backward difference formulae - Lagrange's interpolation formula - Numerical integration using Trapezoidal and Simpson's one-third rules - solution of ODE's - Euler method and Runge-Kutta fourth order method.

#### Books for Study:

1. E. Balagurusamy, Programming in ANSI C, Sixth edition, Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi, 2012. (For Units I, II and III).
2. M.K.Venkatraman, Numerical methods in Science and Engineering, National Publisher Company, Fifth Edition, 2001. (For Units IV and V).

Unit 1: Chapters 1-4 of [1]

Unit 2: Chapters 5-7 of [1]

Unit 3: Chapters 8-9 of [1]

Unit 4: Chapter 1, Sections 1.7-1.8, Chapter 3, Sections 2, 4 and 5, Chapter 4, Sections 2, 6 of [2]

Unit 5: Chapter 6, Sec 3,4, Chapter 8, Sec 4, Chapter 9, Sec 8,10, Chapter 11, Sec 10,16 of [2]

#### Books for Reference:

1. Yashavant.P.Kanetkar, Let us „C“, BPB Publications, 2002.
2. Rajaraman, Computer oriented numerical methods, Prentice-Hall of India, 1971.

## SEMESTER VI

**Core Practical-I NUMERICAL METHODS WITH 'C' PROGRAMMING (P)**  
**Internal : 40** **Subject Code: UMN Y**  
**External : 60** **Exam Hours : 3**

1. Solving a Quadratic Equation.
2. Sum of series ( Sine , Cosine ,  $e^x$  )
3. Ascending and descending order of numbers.
4. Largest and smallest of given numbers.
5. Sorting names in alphabetical order.
6. Finding factorial, generating Fibonacci numbers using recursive functions.
7. Matrix Manipulations (Addition, subtraction and Multiplication).
8. Mean Standard Deviation and Variance.
9. Solving equations by Bisection method
10. Solving equations by False position method
11. Solving equations by Newton –Raphson method
12. Gauss elimination method of solving simultaneous equations
13. GAUSS-Seidel method of solving simultaneous equations
14. Euler method ,Trapezoidal and Simpson,s 1/3 rd rule of integration
15. .R-K Fourth order method of solving differential equations.

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**SEMESTER VI**  
**CC XIV – ASTRONOMY**

**Internal : 25**

**External : 75**

**UNIT – I**

**Subject Code: UMO**

**Exam Hours : 3**

Relevant properties of a sphere and relevant formulae of Spherical trigonometry (Relevant properties and formulae without proofs) - Celestial Sphere – Diurnal motion. (Chapter I and II)

**UNIT – II**

Earth – Dip of the horizon – Twilight – Astronomical refraction – Tangent and cassinie’s formulae – Properties and simple problems applying them. (Chapter III – Sections 1, 5 and 6 & Chapter IV full)

**UNIT – III**

Kepler’s laws of Planetary motion (Statement only) – Newton’s deducations from them (Statements only) – Three anomalies of the earth and relations between them – Times – Equation of time – Seasons. (Chapter VI – Articles 146, 153, 158 to 164 and Chapter VII – Sections 1, 2)

**UNIT – IV**

Geocentric parallax – Annual parallax – Aberration of light – Simple problems in the above (Chapters V, VIII and IX)

**UNIT – V**

Moon – Phases of Moon – Harvest Moon – Metonic cycle – Lunar Mountain – Earth shine – Tides – Eclipses.(Chapter XII – Articles 229 – 242 and 249 – 255 and Chapter XIII)

**TEXT BOOK:** Astronomy” by Kumaravelu and Susila Kumaravelu.

**REFERENCE BOOKS:** 1.Astronomy for Degree Classes by Dr. S.M. Sirajudeen.

2. Astronomy by G.V. Ramachandran.

3. Astronomy by M.L. Khanna.

**SEMESTER VI**  
**MBE II - STOCHASTIC PROCESSES**

**Internal : 25**  
**External : 75**

**Subject Code : UME4**  
**Exam Hours : 3**

**UNIT I**

Stochastic Processes: Some notions-Introduction-Specification of Stochastic Processes-Stationary processes-Markov chains: Definition and examples- Higher transition probabilities.(sec 2.1-2.3, 3.1 and 3.2)

**UNIT II**

Classification of states and chains- Determination of higher transition probabilities-Stability of a Markov system.(sec 3.4 and 3.6)

**UNIT III**

Markov Processes with discrete statespace: Poisson process and its extension- Poisson process-Poisson process and related distribution-Generalization of Poisson process- Birth and death process(sec 4.1-4.4)

**UNIT IV**

Renewal processes and Theory: Renewal processes- Renewal processes in continuous time- Renewal equation- Stopping Time: Wald's equation(sec 6.1- 6.4)

**UNIT V**

Stochastic processes in Queueing and Reliability: Queueing system: General concepts-The Queueing model M/M/1: Steady state behavior-Transient behavior of M/M/1 model.(sec 10.1-10.3).

**TEXT BOOK:** Stochastic Processes by J.Medhi –second edition.

**References:**

1. First course in Stochastic Processes by Samuel Karlin.
2. Stochastic Processes by Srinivasan and Metha (TATA McGraw Hill).

**SEMESTER VI**  
**MBE III - GRAPH THEORY**

**Internal : 25**  
**External : 75**

**Subject Code: UME5**  
**Exam Hours : 3**

**UNIT I**

Introduction- Definition finite and infinite graphs- Incidence and degree-Isolated vertex,  
null graph- Walk,path and circuits – connected and disconnected graphs -Euler graphs –  
Operation on graphs – Hamiltonian path and circuits.  
(Sections 1.1 to 1.5, 2.4 to 2.9)

**UNIT II**

Trees and Fundamental Circuits – Trees – Properties of trees – Pendant vertex in a tree –On counting trees – Spanning tree – Fundamental circuits – Finding all Spanning trees.(Sections 3.1 to 3.9)

**UNIT III**

Cut sets – Properties of a cut set – All cut sets in a graph – Fundamental circuits and cut sets – Connectivity and separability. (Section 4.1 to 4.5)

**UNIT IV**

Planner graphs – Kuratowski's two graphs – Different representations of a planner Graphs – Detection of planarity – Geometric dual. (Section 5.2 to 5.6)

**UNIT V**

Chromatic number – Chromatic partitioning – Chromatic polynomial – matching – Coverings – Four color problem. (Section 8.1 to 8.6)

**TEXT BOOK:**

“Graph theory with applications to Engineering and computer science” by Narsing Deo, Prentice-Hall of India Private limited, New Delhi,1986.

**REFERENCE BOOKS:**

1.Graph Theory – Harary