SEMESTER – VI

L	T	P	C
3	2	0	4

CORE -XI
Major Paper – XIII

COMPLEX ANALYSIS (75 Hours) (SMMA61)

Objectives:

-To understand thefunctions of complex variables

-To learn about elementary transformations concepts in complex variables

-To understand the singularity concepts and residues

Unit I **(Analytic functions)**

Functions of a complex variable – Derivatives – Cauchy – Riemann equations – sufficient conditions – Polar form – Analytic functions – Harmonic functions. **13L**

Unit II **(Integrals)**

Definite integrals – Contours – Cauchy – Goursat theorem – antiderivatives and independence of path – Cauchy Integral formula – Morera's theorem. **17L**

Unit III **(Series)**

Taylor's series – Examples – Laurent's series – Zeros of analytic functions – Residues – Residue theorem – Principal part of functions – Residues at poles. **16L**

Unit IV **(Evaluation of Integrals)**

Evaluation of improper real integrals – improper integrals involving sines and cosines – Definite integrals involving sines and coines. **14L**

Unit V **(Transformations)**

Conformal mappings–basic properties–Bilinear maps – fixed points – Applications 1**5L**

Text Book:

- Arumugam.S and T. Issac – "Complex Analysis" – Scitech Publishing House – Chennai.

Books for Reference :

- Churchill .R.V. and J.W. Brown – "Complex variables and Applications" – IV edition – McGraw Hill International Editions.
- Ponnuswamy .S – "Foundations of Complex Analysis", Narosa Publication House, New Delhi, II edition 2005.
- Duraipandian .P and Lakshmi Duraipandian – "Complex Analysis" – Emerald Publications, Chennai (2001)

L	T	P	C
4	0	0	4

SEMESTER – VI

CORE -XII
Major Paper – XIV
NUMBER THEORY (60 Hours) (SMMA62)

Objectives:

-To highlight the beauties in the world of numbers

-Toprepare the students for coding through cogruences

Unit I Peano's Axioms – Mathematical Induction – The Binomial Theorem – Early NumberTheory. **11L**

Unit II Division Algorithm – GCD – Euclidean Algorithm – The Diaphantine Equation ax+by=c. **12L**

Unit III The fundamental Theorem of Arithmetic – The Sieve of Eratosthenes – The Goldbach conjecture. **13L**

Unit IV Basis properties of congruences – Linear congruence and the Chinese Remainder Theorem. **11L**

Unit V Fermat's Theorem – Wilson's Theorem – The Fermat – Kraitchik Factorization Method. **13L**

Text Book:

- David .M. Burton - Elementary Number Theory (Sixth Edition) Tata McGraw Hill Education Pvt. Ltd.

Books for Reference :

- Ivan Niven and H, Zuckerman - An Introduction to Theory of Numbers.
- Kumaravelu .S, and Susheela Kumaravelu - Elements Theory - Nagercoil, 2002.

SEMESTER – VI

L	T	P	C
3	2	0	4

CORE -XIII
Major Paper – XV
GRAPH THEORY (75 Hours) (SMMA63)

Objectives:

-To introduce the notion of graph theory and its applications

-To learn the techniques of combinatorics in graph theory

Unit I: Definition and examples of graphs – degrees – subgraphs – isomorphism – independent sets and coverings – matrices – operation on graphs.
18L

Unit II: Degree sequences – graphic sequences – walks – trails and paths – connectedness and components – connectivity. **18L**

Unit III: Eulerian graphs – Hamiltonian graphs – characterisation of trees – centre of a tree.
13L

Unit IV: Definition and properties of planar graphs – chromatic number and chromatic index
13L.

Unit V: Chromatic polynomials – definition and basic properties of digraphs – paths and connectedness in digraphs.
13L

Text book:

Arumugam,S and S. Ramachandran – Invitation to graph Theory, Scitech publications, Chennai.

Books for reference:

- Kumaravelu. S and Susheela Kumaravelu – Graph theory.
- Narasingh Deo – Graph theory with application to engineering and computer science, Prentice – Hall of india pvt. Ltd., New Delhi.

L	T	P	C
4	0	0	4

SEMESTER -VI

CORE -XIV

MAJOR PAPER -XVI

DYNAMICS(*60* Hours) (SMMA64)

Objectives:

-To provide a basic knowledge of the behaviour of objects in motion

-To develop a working knowledge to handle practical problems

Unit I : Projectiles- Equation of path – range – maximum height- time of flight- range on an inclined plane-problems. **14L**

Unit II : Collision of elastic bodies- Laws of impact- direct and oblique impact-Problems. **11L**

Unit III : Simple Harmonic Motion (SHM) in a straighrt line- Geometrical representation – composition of SHM's of the same period in the same line and along two perpendicular directions – problems. **13L**

Unit IV : Motion under the action of central forces – velocity and acceleration in polar co-ordinates – problems. **10L**

Unit V : DifferentialEquation of central orbit - pedal equation of central orbit – problems to find the law of force towards the pole when the orbit is given. **12L**

Text Book:

Venkatraman, M.K. - A Text Book on Dynamics, Agasthiar Publication, Trichy.

Books for Reference:

1. Narayanan, S- Dynamics, S.Chand & company, 16th Edition,1986, New Delhi.
2. Duraipandiyan, P, Laxmi Duraipandian and Muthamiz Jayaprgasam- Mechanics 2003, S.Chand & Company.

L	T	P	C
4	0	0	4

SEMESTER -VI
CORE -XV
MAJOR PAPER -XVII
NUMERICAL METHODS (60 Hours) (SMMA65)

Objectives:

-To introduce the finite differences

-To solve numerical problems by different methods

Unit I Solution of Numerical algebraic and Transcendental Equations : bisection method – Newton's method. Criterion of order of convergence of Newton's method. Regula False method – Gauss elimination – Gauss Jacobi – Gauss Seidal method **13L**

Unit II **Finite Difference :** First and higher order differences – Forward and backward differences – Properties of Operator – Differences of a polynomial –Factorial Polynomial **11L**

Unit III Interpolation : Newton's Forward – backward, Gauss forward – backward interpolation formula – Bessel's formula. Divided differences – Newton's divided difference formula – Legrange's interpolation formule **11L**

Unit IV Numerical Differentation and Integration : Newtons forward and backward differences for differentiation – Derivatives using Bessel's formula – Trapezoidal rule, simpson's 1/3 rule & 3/8 rule **13L**

Unit V **Difference Equations :** Definition – order and degree of difference equation – Linear difference equation – Finding complementary function – particular Integral –simpleapplications. **12L**

Text Book:

- Venkatraman .M.L - Numerical methods in Science and Engineering National Publishing Company V Edition 1998

Books for Reference :

- Kandasamy .P.K. Thilagavathy and K. Gunavathy 'Numerical Methods' S. Chand & Company Ltd. Edn. 2006.
- B. Stephen John – Numerical Analysis
- Autar Kaw and Egwwn Enc Kalu - Numerical methods with Application Abidet. Autokaw.com 2nd 2011.

L	T	P	C
4	0	0	4

SEMESTER – VI

Paper – XIX

MAJOR ELECTIVE - III

3.2 FUZZY MATHEMATICS (60 Hours) (SMMA6B)

Objectives:

-To introduce fuzzy concepts to students

-To facilitate the students to study fuzzy operations and fuzzy numbers

Unit I **Crisp Sets – Fuzzy Sets** – Basic Types – Basic Concepts – Characteristics and Significance of the Paradigm shift. **11L**

Unit II Additional properties of α-cuts – representations of fuzzy sets – Extension principle for fuzzy sets. **13L**

Unit III **Fuzzy set operations** – Fuzzy complements – Fuzzy intersections : t-norms – Fuzzy Unions : t-conorms – Combinations of operations – Aggregation operations. **11L**

Unit IV **Fuzzy Numbers** – Linguistic variables – Arithmetic operations on intervals – Arithmetic operations of fuzzy numbers – Lattice of fuzzy numbers – Fuzzy Equations. **13L**

Unit V Fuzzy Decision Making – Individual Decision Making – Multi-person decision making – Fuzzy linear Programming. **12L**

Text Book:

- George J. Klir and Bo Bo Yuan – Fuzzy sets and Fuzzy Logic Theory Applications, Prentice Hall of India, 2002, New Delhi.

Book for Reference:

- George J. Klir and Tina .A Folger – Fuzzy sets, uncertainty and Informations – Prentice Hall of India, 2003, New Delhi.

SEMESTER-VI

L	T	P	C
4	0	0	4

PAPER-XXI
MAJOR ELECTIVE-IV
4.1 OPERATIONS RESEARCH-II (60 Hours) (SMMA6D)

Objectives:

-To introduce Games and strategies

-To understand networking problems

-To make the students solve real life problems in business and management

Unit I **Games and Strategies :** Two Person Zero sum Games – The Maximin – Minimax Principle – Games without Saddle Points – Mixed Strategies – Graphical Solution of2xnandmx2games–DominancePproperty **12L**

Unit II **Replacement** of items that deteriorate with time-replacement age of a machine taking money value into consideration-replacement of items that completely fail suddenyandStaffingProblems **13L**

Unit III **Queing models :**General concept and definitions-characteristics-properties of Poisson process Models(M/M/1: /FCFS), (M/M/1 : N/FCFS),(M/M/S : /FCFS) **11L**

Unit IV **Network scheduling by PERT / CPM :** Network and basic components – Rules of Network Construction – Time Calculation in network – Critical Path Method – PERTCalculation. **13L**

Unit V **Inventory Control :** Introductions – Types of Inventories – Inventory decisions – Deterministic inventory Problem– EOQ problems with shortages. **13L**

Text Book:

- KantiSwarup, P.K. Gupta and Manmohan – Operations Research – Sultan Chand & Sons – 2006, 12th edition.

Books for Reference :

- Gupta .P.K and D.S. Hira – Operations Research – S. Chand and Company.
- B.J. Ranganath and A.S.Srikantappa -Operations Research, Yesdee Publishing House,Chennai(2017)
- Hillier, F.S. and G.J. Lieberman - Introduction to Operations Research, 9th Ed., Tata McGrawHill, Singapore, 2009.
- Hamdy A. Taha, - Operations Research, An Introduction, 8th Ed., Prentice – Hall India, 2006.

. Hadley .G. - Linear Programming, Narosa Publishing House, New Delhi, 2002