SYLLABUS

MANONMANIAM SUNDARANAR UNIVERISTY, TIRUNELVELI-12

UG - COURSES – AFFILIATED COLLEGES

Course Structure for **B.Sc Maths** (Choice Based Credit System)

(with effect from the academic year 2017- 2018 onwards)

Semester-VI							
Part	Subject Status	Subject Title	Subject Code	Credit			
III	Core	COMPLEX ANALYSIS	SMMA61	5			
	Core	NUMBER THEORY	SMMA62	4			
	Core	GRAPH THEORY	SMMA63	5			
	Core	DYNAMICS	SMMA64	4			
	Core	NUMERICAL METHODS	SMMA65	4			
	Elective	FUZZY MATHEMATICS	SMMA5B	4			
	Elective	CODING THEORY	SEMA6E	4			



Total Marks: 100 Internal Exam: 25 marks + External Exam: 75 marks

A. Scheme for internal Assessment:

Maximum marks for written test: **20 marks 3 internal tests**, each of **I hour** duration shall be conducted every semester. To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

The break up for internal assessment shall be: Written test- 20 marks; Assignment -5 marks Total - 25 marks

B. Scheme of External Examination

3 hrs. examination at the end of the semester

- A Part : 1 mark question two from each unit
- $B-Part:\ 5\ marks$ question one from each unit
- C Part: 8 marks question one from each unit

> Conversion of Marks into Grade Points and Letter Grades

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	0	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	А	8	Very Good
4	60-69	B+	7	Good
5	50-59	В	6	Above Average
6	40-49	С	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

> <u>C</u>umulative <u>G</u>rade <u>P</u>oint <u>A</u>verage (CGPA)

$$\mathsf{CGPA} = \frac{\Sigma \left(\mathsf{GP} \times \mathsf{C}\right)}{\Sigma \mathsf{C}}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

> Classification

- a) First Class with Distinction : CGPA $\ge 7.5^*$
- b) First Class

 $CGPA \ge 7.5^{*}$ $CGPA \ge 6.0$

- c) Second Class : $CGPA \ge 5.0 \text{ and } < 6.0$ d) Third Class : $CGPA \le 5.0$



COMPLEX ANALYSIS

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.

Unit II

(Integrals) Definite integrals – Contours – Cauchy – Goursat theorem – antiderivatives and independence of path – Cauchy Integral formula – Morera''s theorem.

Unit III

(Series) Taylor"s series – Examples – Laurent"s series – Zeros of analytic functions – Residues – Residue theorem – Principal part of functions – Residues at poles.

Unit IV

(Evaluation of Integrals) Evaluation of improper real integrals – improper integrals involving sines and cosines – Definite integrals involving sines and coines.

Unit V

(**Transformations**) Conformal mappings-basic properties-Bilinear maps – fixed points – Applications

Text Book:

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

Books for Reference :

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



NUMBER THEORY

Objectives:

- To highlight the beauties in the world of numbers
- To prepare the students for coding through cogruences

Unit I

Peano"s Axioms – Mathematical Induction – The Binomial Theorem – Early NumberTheory.

Unit II

 $\label{eq:constraint} Division \ Algorithm-GCD-Euclidean \ Algorithm-The \ Diaphantine \ Equation \ ax+by=c.$

Unit III

The fundamental Theorem of Arithmetic – The Sieve of Eratosthenes – The Goldbach conjecture.

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:

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

Books for Reference :

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



GRAPH THEORY

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.

Unit II:

Degree sequences – graphic sequences – walks – trails and paths – connectedness and components – connectivity.

Unit III:

Eulerian graphs – Hamiltonian graphs – characterisation of trees – centre of a tree.

Unit IV:

Definition and properties of planar graphs – chromatic number and chromatic index.

Unit V:

Chromatic polynomials – definition and basic properties of digraphs – paths and connectedness in digraphs.

Text book:

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

Books for reference:

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



DYNAMICS

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.

Unit II :

Collision of elastic bodies- Laws of impact- direct and oblique impact-Problems.

Unit III :

Simple Harmonic Motion (SHM) in a straight line- Geometrical representation – composition of SHM"s of the same period in the same line and along two perpendicular directions – problems.

Unit IV :

Motion under the action of central forces – velocity and acceleration in polar co-ordinates – problems.

Unit V :

Differential Equation of central orbit - pedal equation of central orbit – problems to find the law of force towards the pole when the orbit is given.

Text Book:

1) 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.



NUMERICAL METHODS

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

Unit II

Finite Difference : First and higher order differences – Forward and backward differences – Properties of Operator – Differences of a polynomial –Factorial Polynomial

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

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

Unit V

Difference Equations : Definition – order and degree of difference equation – Linear difference equation – Finding complementary function – particular Integral – simpleapplications.

Text Book:

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

Books for Reference :

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



FUZZY MATHEMATICS

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.

Unit II

Additional properties of α -cuts – representations of fuzzy sets – Extension principle for fuzzy sets.

Unit III

Fuzzy set operations – Fuzzy complements – Fuzzy intersections : t-norms – Fuzzy Unions : t-conorms – Combinations of operations – Aggregation operations.

Unit IV

Fuzzy Numbers – Linguistic variables – Arithmetic operations on intervals – Arithmetic operations of fuzzy numbers – Lattice of fuzzy numbers – Fuzzy Equations.

Unit V

Fuzzy Decision Making – Individual Decision Making – Multi-person decision making – Fuzzy linear Programming.

Text Book:

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

Book for Reference:

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



CODING THEORY

Objectives:

- To introduce coding and decoding concepts
- To develop the students in the field of coding theory

Unit I

Basic assumptions – Correcting and detecting error patterns – information rate – effects of error correction and detection – finding the most likely code word transmitted.

Unit II

Linear codes – two important – subspaces independence – basic, dimension – matrices – Bases for C and C+ generating matrices on coding.

Unit III

Parity check matrices – equivalent codes – distance of a linear code – Linear codes – cosets – MLD for linear codes – Reliability of IMLD for linear codes.

Unit IV

Some bounds for codes – perfect codes – hamming codes – extended codes – The extended Golay code – decoding the extended Golay code – Golay code

Unit V

Polynomials and words – introduction to cyclic codes – introduction to cyclic codes – Polynomial encoding and decoding – finding cyclic codes – Dual cyclic codes.

Text Book:

1. Coding theory, the essentials – Marcel Dekker, Inc. Madtrison Avenue, Newyork.



