



MANONMANIAM SUNDARANAR UNIVERISTY,
TIRUNELVELI-12

SYLLABUS

UG - COURSES – AFFILIATED COLLEGES

Course Structure for B. Sc. Mathematics

(Choice Based Credit System)

(with effect from the academic year 2021-2022 onwards)



Semester-VI				
Part	Subject Status	Subject Title	Subject Code	Credit
III	Core	COMPLEX ANALYSIS	CMMA61	4
III	Core	GRAPH THEORY	CMMA62	4
III	Core	NUMBER THEORY	CMMA63	4
III	Core	DYNAMICS	CMMA64	4
III	Core	NUMERICAL METHODS	CMMA65	4
III	Elective 1	FUZZY MATHEMATICS	CEMA62	4
III	Elective 2	CODING THEORY	CEMA65	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 **1 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 (GP)	point	Performance
1	90-100	O	10		Outstanding
2	80-89	A+	9		Excellent
3	70-79	A	8		Very Good
4	60-69	B+	7		Good
5	50-59	B	6		Above Average
6	40-49	C	5		Pass
7	0-39	RA	-		Reappear
8	0	AA	-		Absent

➤ **Cumulative Grade Point Average (CGPA)**

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

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

➤ **Classification**

- First Class with Distinction : $CGPA \geq 7.5^*$
- First Class : $CGPA \geq 6.0$
- Second Class : $CGPA \geq 5.0$ and < 6.0
- Third Class : $CGPA < 5.0$



COMPLEX ANALYSIS

Objective:

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

UNIT-1:

Analytic functions - Functions of a complex variable, Limits, theorems on limit, continuous function, Differentiability, The Cauchy-Riemann equations, Analytic functions, Harmonic functions.

UNIT-2:

Bilinear Transformations – Elementary Transformations, Cross Ratio, Fixed Points of Bilinear Transformations, Some Special Bilinear Transformations.

UNIT-3:

Complex Integration – Definite Integral, Cauchy’s Theorem, Cauchy’s Integral Formula, Higher Derivatives.

UNIT-4:

Series Expansions – Taylor’s Series, Laurent’s Series, Zeros of an Analytic Function, Singularities.

UNIT-5:

Calculus of Residues– Residues, Cauchy’s Residue Theorem, Evaluation of Definite Integrals.

Text Book:

1. Arumugam. S and T.Issac–“Complex Analysis”–Scitech Publishing House–Chennai,(2002).

Books for Reference:

1. Churchill. R.V. and J.W.Brown– “Complex variables and Applications”– McGraw Hill International Editions–IX Edition, 2013.
2. Ponnuswamy. S “Foundations of Complex Analysis”, Narosa Publication House, New Delhi, II Edition 2005.
3. Duraipandian. P and Lakshmi Duraipandian–“Complex Analysis”–Emerald Publications, Chennai(2001).



GRAPH THEORY

Objective:

- To introduce the notion of graph theory and its applications and to learn the techniques in Graph Theory.

UNIT-1:

Definition and examples of graphs –degrees- sub graphs–isomorphism–independent sets and coverings–matrices–operations of graphs.

UNIT-2:

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

UNIT-3:

Eulerian graphs–Hamiltonian graphs, Trees and its characterization–centre of a tree.

UNIT-4:

Planar graphs-Definition and properties–chromatic number and chromatic index.

UNIT-5:

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

Text Book:

1. Arumugam.S & S.Ramachandran–Invitation to Graph Theory, Scitech Publications, Chennai, 2002.

Books for reference:

1. Kumaravelu.S and Susheela Kumaravelu –Graphtheory-Nagercoil,2002.
2. Narasingh Deo–Graph theory with application to engineering and computer science, Prentice–Hall of India pvt. Ltd., New Delhi,1979.



NUMBER THEORY

Objective:

- To highlight the beauties in the world of numbers and to prepare the students for coding through congruence.

UNIT-1:

Peano's Axioms–Mathematical induction–The Binomial Theorem–Early Number Theory.

UNIT-2:

Division Algorithm–GCD–Euclidean Algorithm–The Diophantine Equation $ax+by=c$.

UNIT-3:

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

UNIT-4:

Basic properties of congruences–Linear congruence and The Chinese Remainder Theorem.

UNIT-5:

Fermat's Theorem–Wilson's Theorem–The Fermat–Kraitchik Factorization Method.

Text Book:

1. David. M. Burton –Elementary Number Theory-Tata McGraw Hill Education Pvt. Ltd- (Sixth Edition)-2007.

Books for Reference:

1. Ivan Niven and H, Zuckerman-An Introduction to Theory of Numbers, Cambridge University Press-2019.
2. Kumaravelu.S, and Susheela Kumaravelu- Elements of Number Theory Nagercoil, 2002.



DYNAMICS

Objective:

- To provide a basic knowledge of the behaviour of objects in motion and to develop a working knowledge to handle practical problems.

UNIT-1:

Projectiles– Equation of path–range–maximum height–time of flight.

UNIT-2:

Collision of elastic bodies–Laws of impact–direct and oblique impact.

UNIT-3:

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

UNIT-4:

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

UNIT-5:

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,2020.

Books for Reference:

1. Narayanan, S-Dynamics, S. Chand & company (New Delhi),16th Edition,1986.
2. Duraipandian. P, Laxmi Duraipandian and Muthamizh Jayapragasam-Mechanics S.Chand& Company (2003).
3. I. Rajeswari–Dynamics – Saras Publication, Nagercoil, I edition (2019).



NUMERICAL METHODS

Objective:

To introduce finite differences and to solve numerical problems by different methods.

UNIT-1:

Solution of Numerical algebraic and Transcendental Equations : Bisection method– Newton’s method. Criterion of order of convergence of Newton’s method. Regula False method – Gause limination–Gauss Jacobi–Gauss Seidal method.

UNIT-2:

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

UNIT-3:

Interpolation: Newton’s Forward–backward, Gauss forward–backward interpolation formula–Bessel’s formula. Divided differences – Newton’s divided difference formula – Lagrange’s interpolation formula.

UNIT -4:

Numerical Differentiation and integration : Newton’s forward and backward differences for differentiation- Derivatives using Bessel’s formula-Trapezoidal rule-Simpson’s 1/3 rule & 3/8 rule.

UNIT-5:

Difference equations: Definitions-order and degree of difference equation-Linear difference equation-finding complementary function-particular integral-simple applications.

Text Book:

1. Venkatraman. M.K-Numerical methods in Science and Engineering National Publishing Company-Edition1998.

Books for Reference:

1. Kandasamy. P.K. Thilagavathy and K. Gunavathy, Numerical Methods, S.Chand & Company Ltd. Edn. 2006.
2. Autar Kawand Egwwn Enc Kalu–Numerical methods with Application Abidet. Autokaw.com 2nd Edtion, 2011.
3. Dr.A. Singaravelu ,Statistics & Numerical Methods, Meenakshi Agency(2012).



FUZZY MATHEMATICS

Objective:

To introduce fuzzy concepts to students and to facilitate the students to study fuzzy operations and fuzzy numbers

Course Content**UNIT-1:**

Crisp Sets– Fuzzy Sets–Basic Types–Basic Concepts–Characteristics and Significance of Paradigm Shift.

UNIT-2:

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

UNIT-3:

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

UNIT-4:

Fuzzy numbers – linguistic variables-arithmetic operations on intervals-arithmetic operations on fuzzy numbers-Lattice of fuzzy numbers-Fuzzy Equations.

UNIT-5:

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

Text Book:

1. George J.Klir and Bo BoYuan–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 Information – Prentice Hall of India, 2003, NewDelhi.



CODING THEORY

Objective:

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

UNIT -1:

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

UNIT-2:

Linear codes–subspaces independence–basis, dimension–matrices–Bases for C and C^+ generating matrices on coding.

UNIT-3:

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

UNIT-4:

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

UNIT-5:

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

Text Book:

1. Coding theory, The essentials–Marcel Dekker, Inc. Madtrison Avenue, NewYork.

Books for Reference:

1. Elwyn Berlekamp– Algebraic Coding Theory–Springer-1970
2. San Ling and Chaoping Xing, coding theory A first course, Cambridge University Press, New York (2004)

