KRISHNA CHAITANYA DEGREE COLLEGE (A), NELLORE.
(AFFILIATED TO V.S. UNIVERSITY)

MINUTES OF THE MEETING OF THE BOARD OF STUDIES (DEPARTMENT OF MATHEMATICS – PG)

The first board of studies (BoS) meeting in the department of mathematics (PG) was held on 19-11-2025 at 11:00 AM in the Board Room under the Chairmanship of the BoS in Mathematics for the preparation of Course Structure, Syllabus and Model Question Papers for the Academic Year 2025-26.

The following members were present in the meeting.

1. Dr. R.V Krishna Reddy – Chairman.
2. Dr. B. V. Venkateswarlu– Member (University Nominee).
3. Prof. V. Sugunamma– Member (Subject Expert from outside the parent university & nominated by Academic Council).
4. Prof. B.Satyanarayana – Member (Subject Expert from outside the parent university & nominated by Academic Council).
5. Sri. D.V. Kishore Kumar – Member (Faculty of the Department).
6. Smt. S.Parvathi– Member (Faculty of the Department).
7. Sri. D.Sreenivasulu – Member (Faculty of the Department).
8. Sri. P. Subba Reddy – Member (Representative from Industry).
9. Sri.Sk.Mahaboob Basha – Member (Alumni).

Members Absent:

- Nil -

At the opening of the meeting of the BoS, Sri.D.V.Kishore Kumar, the faculty Member of the BoS welcomed the members and introduced the Chairman and members of BoS as the Chairman and Incharge of the Department Dr.R.V.Krishna Reddy went on leave on some personal work. He requested for the approval of Course Structure, Syllabus and Model Question Papers for the Academic Year 2025-26.

Agenda

1. To finalize M.Sc. Mathematics R25 Course Structure and syllabus for Semesters I & II.
2. To finalize Model Question Papers.
3. Approval of MOOCs / Open Online Elective
4. Approval of Panel of Examiners.
5. Any other proposal with the permission of the Chair.

Modifications:

Semester	Course	Title of the Course	Modification
I	Core Course	1. Algebra	No Changes were made.
		2A) Real Analysis	No Changes were made.
		2B) Lattice Theory	No Changes were made.
		3A) Differential Equations	No Changes were made.
		3B) Integral Equations	No Changes were made.
	Practical – 1 (Related to CC 2 & 3)	Core Course – 2 & 3	No Changes were made.
	Skill Oriented Course	1A) Numerical Methods	No Changes were made.
		1B) MATLAB	No Changes were made.
		2A) 'C' Programming Language	No Changes were made.
		2B) Discrete Mathematics	No Changes were made.
	Practical – 2 (Related to SOC I & II)	Skill Oriented Course - 1 & 2	No Changes were made.
	OOTC	MOOCS / Open Online Elective	No Changes were made.
	Audit Course	Ancient Indian Mathematics	No Changes were made.
II	Core Course	4. Complex Analysis	No Changes were made.
		5A) Partial Differential Equations	No Changes were made.
		5B) Semi Group Theory	No Changes were made.
		6A) Linear Algebra	No Changes were made.
		6B) Topology	No Changes were made.
	Practical – 3 (Related to CC 2 & 3)	Core Course – 5 & 6	No Changes were made.
	Skill Oriented Course	3A) Data Structures and Algorithms.	No Changes were made.
		3B) Number Theory	No Changes were made.
		4A) Mathematical Statistics	No Changes were made.
		4B) Python	No Changes were made.
	Practical – 4 (Related to SOC I & II)	Skill Oriented Course - 3 & 4	No Changes were made.
	OOTC	MOOCS / Open Online Elective	No Changes were made.
	Audit Course	Vedic Mathematics	No Changes were made.

Resolutions:

1. After careful review and discussion, the board discussed and prepared the Course Structure (for semesters I & II) and the Syllabus (for I & II Semesters) for M.Sc. Mathematics R25.
2. The board discussed and prepared the model question papers (for I & II Semesters) for M.Sc. Mathematics R25.
3. It is resolved the following with regard to the distribution of internal and external marks.

100 Marks Question Paper

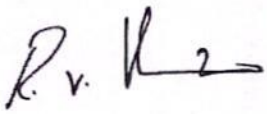
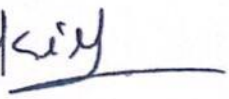
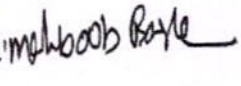
- ❖ Internal Assessment : 30 Marks
- ❖ External Examination : 70 Marks

75 Marks Question Paper

- ❖ Internal Assessment :25 marks
- ❖ External Examination : 50 Marks

4. It is resolved and approved the list of panel of examiners.
5. Resolved to suggest that the scheme of valuation should be given by the paper setter for uniform evaluation. If the paper setter fails to supply the scheme of valuation, the chairman of BoS / BoS Member should take the responsibility to prepare the scheme of valuation for uniform evaluation.

Members Present (Online / Offline)

S.No	Cadre in BoS	Name	Mode of attendance	Signature
1.	Chair Person	Dr. R.V Krishna Reddy Dept., of Mathematics, Krishna Chaitanya Degree College, Nellore.	Online	
2.	Member	Sri. D.V. Kishore Kumar, Dept., of Mathematics, Krishna Chaitanya Degree College, Nellore.	Offline	
3.	Member	Smt.S.Parvathi, Dept., of Mathematics, Krishna Chaitanya Degree College, Nellore.	Offline	
4.	Member	Sri.D.Sreenivasulu, Dept., of Mathematics, Krishna Chaitanya Degree College, Nellore.	Offline	
5.	Member	Prof. V. Sugunamma, Dept., of Mathematics, Sri Venkateswara University, Tirupati.	Offline	
6.	Member	Prof.B.Satyanarayana, Professor, Dept., of Mathematics, Acharya Nagarjuna University, Guntur.	Online	
7.	Member	Dr.B.Venkateswarlu, Associate Professor & HOD, Dept., of Mathematics, Vellore Institute of technology, Vellore.	Online	
8.	Member	Sri. P. Subba Reddy, Vice President, Brainvire Infotech Pvt. Ltd., Mumbai.	Online	
9.	Member	Sri.Sk.Mahaboob Basha, PGT Maths Facilitator, iMemory School,Nellore.	Online	

Chairman

Board of Studies

KRISHNA CHAITANYA DEGREE COLLEGE :: NELLORE.
(Autonomous)
(Affiliated to V.S. University)
Course Structure and Syllabus
(With effect from the academic year 2025-26)
M.Sc. (Mathematics)

SEMESTER-I

S.NO	COURSE	CODE MAT	TITLE OF THE COURSE	H/W	C	SEE	IA	TOTAL MARKS
1	CC	101	**1.**Algebra	6	4	70	30	100
2		102	**2(A).** Real Analysis **2(B).** Lattice theory	5	3	50	25	75
3		103	**3(A).** Differential Equations **3(B).** Integral Equations	5	3	50	25	75
4	P	104	**Practical-I** (related to CC 2&3)	4	2	35	15	50
5	SOC	105	**1(A).**Numerical Methods **1(B).** MATLAB	5	3	50	25	75
6		106	**2(A).**C-Programming Language **2(B).** Discrete Mathematics	5	3	50	25	75
7	P	107	**Practical- II** (related to SOC 1 &2)	4	2	35	15	50
8	OOTC	108	MOOCS/Open online elective	-	2	-	-	-
9	Audit Course	109	Ancient Indian Mathematics	2	0	0	0	0
			Total	36	22	340	160	500

Note: Course OOTC, Paper code: 108 MOOCS / Open Online Elective Paper, Online Certificate will be submitted on or before 4th semester result Published.

SEMESTER-II

S.NO	COURSE	CODE MAT	TITLE OF THE COURSE	H/W	C	SEE	IA	TOTAL MARKS
1	CC	201	**4.** Complex Analysis	6	4	70	30	100
2		202	**5(A). P**artial differential equations **5(B).** Semi group theory	5	3	50	25	75
3		203	**6(A).** Linear Algebra **6(B).** Topology	5	3	50	25	75
4	P	204	**Practical-III** (Related to CC 5&6)	4	2	35	15	50
5	SOC	205	**3(A).** Data Structures and Algorithms **3(B).** Number theory	5	3	50	25	75
6		206	**4(A).** Probability & Statistics **4(B).** Python	5	3	50	25	75
7	P	207	**Practical -IV (related to SOC 3 &4)**	4	2	35	15	50
8	OOTC	208	MOOCS/Open online elective	-	2	-	-	-
9	Audit Course	209	Vedic Mathematics	2	0	0	0	0
				36	22	340	160	500

Note: Course OOTC, Paper code: 108 MOOCS / Open Online Elective Paper, Online Certificate will be submitted on or before 4th semester result Published.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)
M.Sc. (Mathematics)

(Effective from Academic year 2025-2026)

Instructions for evaluation:-

- Core 1 is evaluated for 100 Marks out of which 70 Marks through end examination and internal assessment would be for 30 Marks mandatory with 4 credits.
- Core 2, Core 3, SOC 1 & SOC 2 are evaluated for 75 marks out of which 50 Marks through end examination and internal assessment would be for 25 Marks with 3 credits.
- Practicals for Core 2, Core 3, SOC 1 and SOC 2 are for 50 marks out of which 35 Marks through end examination and internal assessment would be for 15 Marks with 2 credits.
- Totally 6 core courses are distributed in I, II semesters. Student must complete Open Online Transdisciplinary Courses during I and II Semesters each with 2 credits
- And student has to take Indian Knowledege system-1 and II in I and II semesters respectively for zero credits as Audit Courses.
- The minimum marks for qualifying in theory subject shall be 40%.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)
M.Sc. (Mathematics)

(Effective from Academic year 2025-2026)

End Examination Question Paper Pattern for Theory is as follows:

Model Paper

Time:3Hrs **Max.marks:70**

PART – A

Answer any **FIVE** questions from the following.
Each question carries 6 Marks.
5X6=30 Marks

1.
2.
3.
4.
5.
6.
7.
8.

PART - B

Answer FOUR questions from the following.
Each question carries 10 Marks.
4X10=40Marks

UNIT-I

9.
(or)
10.

UNIT-II

11.
(or)
12.

UNIT-III

13.
(or)
14.

UNIT-IV

15.
(or)
16.

KRISHNA CHAITANYA DEGREE COLLEGE :: NELLORE (Autonomous)
M.Sc. (Mathematics)

(Effective from Academic year 2025-2026)

End Examination Question Paper Pattern for Theory is as follows:

Model paper

Time:3 Hrs **Max.marks:50**

Answer five questions.

Choosing atleast ONE Question from each Unit.

Each question carries 10 marks.

(5X10=50 Marks)

Unit – I

1.

2.

Unit – II

3.

4.

Unit – III

5.

6.

Unit – IV

7.

8.

KRISHNA CHAITANYA DEGREE COLLEGE:: NELLORE (Autonomous)
M.Sc. (Mathematics)

(Effective from Academic year 2025-2026)

Procedure to evaluate internal examinations: Theory:

Internal Examinations –I &II	30 marks for core 1
	25 marks for Core 2&3 and SOC 1&2
Practical"s	15 marks for Practicals -I and II

***Note 1: If the final marks are in fraction, it shall be rounded off to the next number**

- If the student is absent for the internal examination, no re-exam shall be conducted If the student failed to attend both the internal examinations, his/her aggregate marks shall be considered zero.

- **Note:** Final internal semester marks shall be awarded as average of two internal examinations.

Practical/Lab:

Continuous assessment/ Day to day work	**End examination**	**Total**
35 marks	35T+15P	50M

- Internal marks will be awarded by internal examiner only.

KRISHNA CHAITANYA DEGREE COLLEGE :: NELLORE (Autonomous)
M.Sc. (Mathematics)
(Effective from Academic year 2025-2026)
FIRST SEMESTER
MAT 101: ALGEBRA

Algebra is one of the broad areas of Mathematics together with Number theory Geometry and analysis. Algebra is applicable to all mathematical domains.

Course objectives:

1. To understand Sylow‟s theorems.
2. Develop knowledge on Ideals and homomorphism.
3. Discuss U.F.D, E.D and polynomial Rings.
4. To introduce algebraic structure Module.

UNIT-I

Structure theorems of groups:- Conjugacy and G-Sets- Direct products - Finitely generated abelian groups-Invariants of a finite abelian group-Sylow Theorems. (Sections 1 to 4 of the Chapter 8)

UNIT-II

Ideals and Homomorphisms:- Ideals-Homomorphisms-Sums and direct sums of ideals-Maximal and prime ideals-Nilpotent and nil ideals-Zorn‟s lemma. (Chapter 10)

UNIT-III

Unique factorization domains and Euclidean domains:- Unique factorization domains-Principal ideal domains-Euclidean domains-Polynomial rings over UFD (Chapter 11)

UNIT IV

Modules and Vector Spaces: Definition and examples – Submodules and direct sums – R- homomorphisms and quotient modules-Completely reducible Modules- Free Modules - Representation of linear mappings – Rank of linear mapping (Chapter - 14)

Scope and standard in the book **“Basic Abstract Algebra” by P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul, Cambridge University Press, Reprint 1997.**

References:

1. Topics in Algebra, by I.N. Herstein
2. Commutative algebra, by Zariski and Samuel Affiliated East-West Press.
3. Abstract Algebra – Ronald. Solomon.
4. A First course in „ABSTRACT ALGEBRA‟ seventh edition by John B. Fraleigh, Pearson Education.
5. Abstract algebra by David S. Summit, Richard .M.Forte, Wiley publication, 3rd edition.
6. Introduction to rings and modules by C.Musli, Narosa Publications.

7. A first course in abstract algebra by John B Fraleigh.
8. Basic algebra by Jacobson.Nathan , Vol 1, Hindustan Publishing corporation 1991 .

Course outcomes: After completing this course the student will be able to

1. Explain the applications of Sylow‟s theorems
2. Discuss homomorphism and ideals in Rings.
3. Understand U.F.D, E.D and Polynomial Rings
4. Develop concepts on modules

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)
M.Sc. (Mathematics)

(Effective from Academic year 2025-2026)

MAT 102:2 (A) - REAL ANALYSIS

This course covers Riemann-Stieltjes Integral, Sequences and Series of Functions, Functions of Several Variables, Improper Integrals, Fourier series, Maxima and Minima.

Course Objectives:

1) Acquire knowledge on Riemann-Stieltjes Integration and Differentiation.
2) Discuss Uniform Convergence, Continuity Integration and Differentiation
3) Learn comparison Tests
4). Understand the concept of functions of several variables.

UNIT –I:

The Riemann –Stieltijes Integral : Definition and Existence of the integral properties of the integral, integration and Differentiation, Integration of vector valued function, Rectifiable curves.

UNIT – II:

Sequence and series of functions : Discussions of main problem, uniform convergence, uniform convergence and continuity, Uniform convergence and Integration, Uniform convergence and Differentiation.

UNIT – III:

Improper Integrals: Introduction, Integration of unbounded functions with finite limit of Integration, comparison tests for convergence at a ∞, infinite Range of Integration.

UNIT-IV:

Functions of Several Variables : Explicit and Implicit functions, Continuity, Partial derivations, differentiability, partial derivatives of higher order, differentials of higher order, function of functions, change of variables, Taylor‟s theorem, Extreme values, Maxima and Minima, functions of several variables.

Scope and standard as in Chapters 6, sections 7.1 to 7.18 of chapter 7 of Walter Rudin" Principles of Mathematical Analysis" 3rd edition 1976, Nc. Graw hill International student edition.

Scope and standard as in chapters 11, 12 and 15 of **Mathematical Anlaysis by " S.C. Malik 1994" Wiley Eastern limited**

Reference:

(1) Mathematical Analysis- A modern Approach to Advanced Calculus Narosa Book Distributors Pvt LTD- New Delhi
(2) Real Analysis - Golden Math Series By N.P. Bali.
(3) A course of Mathematical Analysis by Shanti Narayan -.K. Mittal , S-Chand & Company LTD-New Delhi

Course Outcomes:

1. Understand the concepts of Riemann Stieltijes integration and Differentiation.
2. Understand Uniform Convergence and continuity.
3. Learn comparison tests at a infinity.
4. Analyze the concept of functions of several variables.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)
M.Sc. (Mathematics)

(Effective from Academic year 2025-2026)

MAT 102:2(B) - LATTICE THEORY

The course mainly designs with the aim of introducing the Lattice theory and Boolean algebra, the portion of lattice theory discuss modular, distributive lattice.

Course Objectives:

1. To study the Partially Ordered Sets.
2. To discuss Lattices.
3. To analyze Complete Lattices.
4. To explain distributive and modular lattices.

UNIT-I

Partially Ordered Sets: Set Theoretical Notations, Relations, Partially Ordered Sets, Diagrams, Special Subsets of a Partially Ordered Set, Length, Lower and Upper Bounds, The Minimum and Maximum Conditions, The Jordan–Dedekind Chain Condition, Dimension Functions.
(Sections 1 to 9 of Chapter 1)

UNIT-II

Lattices in General: Sub Lattices, Ideals, Bound Elements of a Lattice, Atoms and Dual Atoms, Complements, Relative Complements, Semi Complements, Irreducible and Prime Elements of a Lattice, The Homomorphism of a Lattice, Axiom Systems of Lattices. (Sections 10 to 21 of Chapter 2)

UNIT-III

Complete Lattices: Complete Lattices, Complete Sub Lattices of a Complete Lattice, Conditionally Complete Lattices, Compact Elements and Compactly Generated Lattices, Sub Algebra Lattice of an Algebra, Closure Operations, Galois Connections, Dedekind Cuts, Partly Ordered Sets as Topological Spaces.
(Sections 22 to 29 of Chapter 3)

UNIT-IV

Distributive and Modular Lattices: Distributive Lattices, Infinitely Distributive and Completely Distributive Lattices, Modular Lattices, Characterization of Modular and Distributive Lattices by their Sub lattices, Distributive Sub lattices of Modular Lattices, The Isomorphism Theorem of Modular Lattices, Covering Conditions, Meet Representation in Modular and Distributive Lattices.
(Sections 30 to 36 of Chapter 4)

Scope and Standard as in:
Introduction to Lattice Theory, Gabor Szasz, Academic press.

References:
Lattice Theory, G. Birkhoff, Amer, Math. Soc.

Course Outcomes: From this course students are able to

1. Identify Partiallly Ordered Sets.
2. Understand Lattices as Algebraic structures
3. Study complete Lattices.
4. Compare the distributive and modular lattices

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc. (Mathematics)

(Effective from Academic year 2025-2026)

MAT 103:3(A) - DIFFERENTIAL EQUATIONS

This course introduces fundamental knowledge in Mathematics that is applicable in the engineering aspects.

Course objectives:

1. To study Linear equations with regular and singular points
2. To provide knowledge on Legendre Polynomials and properties of Bessel function.
3. To know the existence and uniqueness of solutions.
4. To study surfaces and curves in 3-D Space.

UNIT –I:

Oscillation Theory and boundary value problems: Qualitative properties of solutions –The Sturm comparison theorem- Eigen values, Eigen functions and the vibrating string.

UNIT – II:

Power Series solutions: Series solutions of first order equations –Second order linear equations-Ordinary points-Regular singular points-Gauss‟s hyper geometric equation

UNIT –III:

Some special functions of Mathematical physics: Legendre polynomials – properties of Legendre polynomials –Bessel functions –The gamma function- Properties of Bessel functions

UNIT – IV:

The existence and uniqueness of solutions: The method of successive approximations-Picard‟s theorem-Systems. The second order Linear equations.

Scope and standard as in 22 to 24 of chapter 4(excluding appendix A),Sections 26 to 30 of chapter 5,sections 32 to 35 of chapter 6 (excluding appendices) and sections 55 to 57 of chapter 11 of "**Differential Equations with Applications and Historical notes" by George F. Simmons, (1992)** Tata McGraw Hill Publications.

References:

1. Advanced Differential Equations, M.D. Raisinghania , S. Chand Publications
2. Differential Equations" Ross, Shepley L Wieley India Pvt LTD.
3. Engineering Mathematics y Bali NP, SatyanarayanaBhavanari, kelkar, University Science Press, New Delhi 2012.
4. An introduction to O.D.E by Earl.A.Coddington , Prentice Hall of India Private Limited, New Delhi 1991.
5. Theory of ODE by Sam Sundaram, Narosa Publications
6. Ordinary and Partial Differential Equations by M.D. Raisinghania.
7. An elementary course to P.D.E by T.Amarnath, Second Edition, Narosa publishing house.

Course Outcomes:

1. Recognize and classify O.D.Es.

2. Learn boundary value problems, Eigen values and Eigen functions.

3. Apply knowledge on special functions of Mathematical Physics.

4. Understand the method of successive approximation and solve the second order linear equations.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc. (Mathematics)

(Effective from Academic year 2025-2026)

MAT 103:3(B) - INTEGRAL EQUATIONS

Course Objectives:

1. To convert Ordinary Differential equations into Integral Equations
2. To study the Kernels
3. To understand he Volterra Equations and Hilbert Transform
4. To obtain the solutions of Linear Integral equations

Unit – 1: PRELIMINARY CONCEPTS

Introduction; Some Problems which give Rise to Integral Equations; Conversion of Ordinary Differential Equations into Integral Equations; Classification Linear Integral Equations; Integral- differential Equations.

Unit – 2: FREDHOLM EQUATIONS

Analogies with Matrix Algebra; Degenerate Kernels; Hermitian and Symmetric Kernels; The Hilbert-Schmidt Theorem; Hermitization and Symmetricization of Kernels; Solution of Integral Equations with Green's Function Type Kernels; Miscellaneous.
(Chapter 2 of Text Book).

Unit – 3 : VOLTERRA INTEGRAL EQUATIONS:

Types of Volterra Equations, Resolvent Kernel of Volterra Equation ;Convolution Type Kernels; Some Miscellaneous Types of Volterra IntegralEquations.

INTEGRAL EQUATIONS AND TRANSFORMATIONS:

Preliminary; Fourier Integral Equations; Laplace Integral Equations; Hilbert Transform; Finite Hilbert Transforms; Miscellaneous Integral Transforms.

Unit – 4: APPROXIMATE METHODS.:

General; Non-linear Volterra Equations; Non-liner Fredholm Equations; Approximate Methods of Solution for Liner Integral Equations; Approximate Evaluation of Eigen values and Eigen functions.

Scope and standard as in Problems and Exercises in Integral Equations, MIR Oybkusgers, Moscow, 1971 by M. Krsnov, A. Kiselev and G. Makarendo.

References:

1) Integral Equations and their Applications, WIT press, 25 Bridge Street, Billerica, MA 01821, USA, by M. Rahman.
2) Introduction to Integral Equations with Applications, John Wiley & Sons, 1999, by Jerri, A.
3) Linear Integral Equation, Theory and Techniques, Academic Press, 2014 by Kanwal R. P.
4) A first course in Integral Equations, 2nd edition, World Scientific Publishing Co. 2015 by Wazwaz, A. M.

Course outcomes: From this course students will be able to

1. Apply and analyze the integral equations in ordinary differential equations.
2. Find Hermitian and Symmetric Kernels
3. Gain the knowledge about the types of Volterra equations.
4. Evaluate solutions of Linear Integral Equations.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 104: PRACTICAL-I

(Related to CC 2 :(2A) & CC 3 :(3A)

Practicals for Real Analysis: CC 2:2A

1. Write a program to find the largest value in an array of elements.
2. Write a program using pointers to compute the sum of all elements stored in an array
3. Write a program to illustrate error handling in the file operators.
4. Write a program of function power that computes X raised to the power Y for integers X and Y and return double type value.
5. Write a program which would print the alphabet set a to z and A to Z in decimal and character form.
6. Write a program to evaluate the equation sum$\sum_{i=1}^{n} \binom{1}{i}$ using a cost

Practicals for Differential Equations: CC 3:3A

1. Evaluate the Eigen Values and Eigen functions for the equation.
2. Explain the Power series solution of the given Differential equation
3. Obtain the solution of the D.E using Recurrence formula
4. Discuss the Legendre polynomial of degree n.
5. Obtain the equation of Bessel‟s function and discuss properties of Bessel‟s function.
6. Discuss the Recurrence relations of Bessel‟s function.
7. Explain the Picard‟s method of successive approximation of the given intial value problems.

(OR)

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 104: PRACTICAL-I
(Related to CC 2:2 B & CC3:3B)

Practicals for Lattice Theory: CC 2:2B

1. Demonstrate lattice homomorphism between two lattices with a given function.
2. Given a finite-dimensional vector space, list all its subspaces and show that they form a lattice.
3. Construct Galois connections between different posets and verify the defining properties.
4. Create a Hasse diagram for a finite poset and define the corresponding topology.
5. Verify the modular property in the lattice of subspaces of a three-dimensional vector space.
6. Identify distributive sub-lattices within the modular lattice of subspaces of R^3

Practicals for Integral equations: CC 3: 3B

1. Convert an ODE to Integral equation
2. Write kernels in finite-sum form and solve related integral equations.
3. Determine if kernels are Hermitian or symmetric and study their integral equation solutions.
4. Verify Hilbert-Schmidt conditions and compute eigenvalues and eigenfunctions for kernels.
5. .Construct and use Green's functions to solve integral equations.
6. Solve Volterra integral equations of various types using appropriate methods (resolvent kernels, Laplace transforms).
7 Apply Laplace transforms/ Hilbert transforms/ Fourier transforms to handle convolution-type integral equations.

KRISHNA CHAITANYA DEGREE COLLEGE :: NELLORE (Autonomous)

M.Sc (Mathematics)

(Effective from Academic year 2025-2026)
SKILL ORIENTED COURSE (SOC-I)

MAT 105: SOC-1(A) - NUMERICAL METHODS

Course objectives:

1. To provide suitable Numerical Methods, for obtaining Roots of algebraic and Transcendental equations
2. To study of different methods of Interpolation.
3. To know the interpolation with unevenly spaced points.
4. To study the various methods of Numerical integration.

UNIT-I:
Solutions of Algebraic and Transcendental Equations: Introduction - Bisection method – Method of False position - Newton Raphson –method solutions of non-linear equations – Method of iteration.

[Above topics are from 2.1 to 2.7, 2.12 of Chapter-2 of the Text Book]

UNIT-II:
Interpolation : Introduction - Finite Differences- Newton‟s formulae for interpolation- Newton‟s forward difference interpolation- Backward difference interpolation- Central interpolation formulae –Gauss‟s central difference formulae- Strilling‟s formula- Bessel‟s formula.

[Above topics are from 3.1, 3.3, 3.6, 3.7:3.7.1,3.7.2, 3.7.3 of Chapter-3 of the Text Book]

UNIT-III:
Interpolation with unevenly spaced points- Lagrange‟s Interpolation Formula -Divided Differences and their properties – Newton‟s general Interpolation Formula-Spline Interpolation [Above topics are from 3.9.1, 3.10.1, 3.13 of Chapter-3 of the Text Book]

UNIT-IV:
Numerical integration: Trapezoidal rule- Simpsons rules – numerical solution of ODEs by Picard – Euler - Modified Euler – Runge-Kutta methods.
[Above topics are from 5.4.1 to 5.4.3 of Chapter- 5 and 7.1 to 7.5 of Chapter- 7of the Text Book]

Text Book:
Scope and standard as 1.“**Introductory methods for Numerical Analysis by S.S.Sastry fourth edition**”.

Reference Book:

1. An Introduction to Numerical Analysis by Kendall E. Atkinson.
2. Information Technology and Numerical methods fot Atul Kahate
3. Theory and problems in Numerical Methods with programs in C and C++.
4. Numerical Methods and computing by Ward Cheney and David Kincaid
5. Numerical Methods for Scientific and Engineering Computation by M. K. Jain, S.R K. Iyengar, R. K. Jain, New Age International (p) Limited, Publishers, 5th Edition

Course Outcomes:

From this Course Students are able to

1. Solve Algebraic and Transcendental polynomial equations.
2. Understand Interpolation.
3. Study interpolation with unevenly spaced points
4. Analyze and evaluate the accuracy of area, volume by Numerical methods.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 105: SOC- 1(B) - MATLAB

Course Objectives:

1. Getting started with MATLAB To create M-files.
2. To learn 2D and 3D Plotting Techniques.
3. To know how to write programs to solve Algebraic Equations 4.

UNIT-I (Basics of MATLAB)
Getting Started with MATLAB- Different windows-Mathematical Operators and Mathematical functions-Creating matrices and arrays- Matrix algebra-Linear algebra concepts.

UNIT-II:. **(MATLAB Programming)**
M-files-Script files- Function files-Relational operators-conditional statements.

UNIT-III
Graphics: Basic 2-D plots- 3-D plots

UNIT-IV: Algebraic Equations: solving linear system-Gaussian elimination-finding eigen values and eigen vectors.

Scope and Standard as in:

1. **Getting Started with MATLAB – A Quick Introduction for Scientists and Engineers, RudraPratap, Oxford University Press**.

References:

1.. MATLAB Programming for Engineers. (4th ed.), Stephen J. Chapman, Cl Engineering.
2. MATLAB: Demystified -Basic Concepts and Applications, K K Sarma, Vikas Publishing House Pvt Lt.
3. Engineering Problem solving with MATLAB, D.M.Etter, Printice-Hall

Course Outcomes: From this course students will be able to

1. Understand the mathematical operations & functions.
2. Able to write a program to addition & multiplication matrices.
3. Understand the 2-D plotting and 3-D plotting techniques.
4. Able to Solve Algebraic equations.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 106 SOC-2(A) - C-Programming language

Course Objectives:

1. To learn basic concepts in C-language
2. To know the various operators in C-Language
3. To draw conclusion by using decision making, branching and looping
4. To learn more about arrays

UNIT-I:

Constants, Variables, and Data Types: Introduction-Character set-C Tokens-Key words and Identifiers-Constants–Variables-Data types – Declaration of variables- Assigning Values to Variables- Defining Symbolic Constants – Declaring a Variables as Constant- Declaring a Variable as Volatile- Overflow and Underflow of Data.

UNIT-II:

Operators and Expressions : Introduction - Arithmetic operators –Relational operators –Logical operators –Assignment operators- Increment and decrement operators –Conditional operators-Bitwise Operators-Special Operators – Arithmetic Expressions- Evaluation of Expressions-Precedence of Arithmetic Operators – Some Computational Problems-Type Conversions in Expressions –Operator Precedence and Associatively- Mathematical Functions .

UNIT-III:

Decision making and Branching : Introduction – Decision making with if Statement-Simple if Statement- The if…Else Statement –Nesting of if… Else Statements-The Else if Ladder-The Switch Statement – The ?: Operator- The Go to Statement.

UNIT-IV:

Decision Making and Looping: - Introduction-The While Statement – The do Statement-The for Statement-Jumps in Loops-Concise Test Expressions.

Arrays

Introduction - One Dimensional Arrays – Declaration of One-Dimensional Arrays-Initialization of One Dimensional Arrays-Two Dimensional Arrays – Initializing Two – Dimensional Arrays- Multi-Dimensional Arrays- Dynamic Arrays-More about Arrays.

Scope and Standard as in sections 2.1 to 2.14 of Chapter 2, 3.1 to 3.16 of Chapter 3, 5.1 to 5.9 of Chapter 5, 6.1 to 6.6, of Chapter 6, 7.1 to 7.9 of Chapter 7, of " Programming in ANSI C" by E. Balaguruswamy(Sixth edition) Mc. Graw Hill Edition, India.

References: 1. Programming in C by D. Ravichandran, New Age International, 1998.
2.C and Data Structures by Ashok N. Karthane, Pearson Education.

Course Outcomes: From this course students will be able

1. To use different data types and variables in C-language
2. To decide the various operators in C-Language while writing a program
3. To able to use decision making, branching and looping 4 .To create arrays and learn more about arrays

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

SKILL ORIENTED COURSE (SOC-2)

MAT 106:SOC-2(B) : DISCRETE MATHEMATICS

The aim of the discrete mathematics is the study of mathematical structure that are fundamentally discrete rather than continuous.

Course Objectives:

1. To understand the connectives & tautology.
2. To study the mathematical structure that is countable or distinct and separable.
3. To learn sets functions, logic, calculus and analysis.
4. To study the Algebraic systems such as Lattices ,Boolean Algebra and Boolean function.

UNIT –I:

Introduction – connectives – well formed formula Tautologies – Equivalence formulas – duality Tautological implications – Formula with distinct truth tables – Functionally complete sets of connectives – other connectives Two – state Devices and Statement Logic.
(Sections 1.1 and 1.2 of Chapter 1)

UNIT – II:

Normal Forms-Disjunctive-Conjunctive Principal Disjunctive, Principal Conjunctive Normal Forms –Ordering and Uniqueness of Normal Forms. The theory of Inference for the statement Calculus-Rules of inferences – Consistency of Premises (Sections 1.3 and 1.4 of Chapter 1)

UNIT – III:

The predicate calculus-Inference Theory of the Predicate Calculus (Sections 1.5 and 1.6 of Chapter 1)

UNIT-IV:

Lattices and Boolean Functions: Lattices as partially Ordered sets-Lattices as Algebraic Systems –Boolean algebra-Boolean Functions- Minimization.
(Sections 4.1, 4.2, 4.3 and 4.4 of Chapter 4)

Scope and Standard as in the book **" Discrete Mathematical Structures With Applications To Computer Science" by Tremblay, J.P&Manohar, R-Published by McGraw-Hill International Edition -1987 Edition**

References: 1. Discrete Mathematics & Graph Theory by BhavanariSatyanarana& KunchamSyam Prasad, PHI Publications, New Delhi, Second Edition, 2014.
2. Mathematical Foundation of Computer Science, by Bhavanari Satyanarayana, T.V. Pradeep Kumar, SK. Mohiddin Shaw, BS Publications, Hyderabad.2016

Course Outcomes: From this course students will be able to

1. Use standard notations of propositional logic.
2. Understand the truth tables for expressions involving negation, conjunction, and disjunction
3. Determine if a logical argument is valid or invalid.
4. Understand the Boolean algebraic structures.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 107: PRACTICAL-II

Practicals for Numerical Methods: SOC 1:1A

(Practicals with C-Programming)

1. Bi-section method.
2. False position method.
3. Newton Raphson method.
4. Trapezoidal rule.
5. Simpson‟s $3/8^{th}$ rule
6. Picard‟s Method
7. Euler method
8. Modified Euler method
9. Range-Kutta Method

Practicals for C-Programming language: SOC 2:2A

1. write a C- program of the given problems.
2. Write a C-program to evaluate the power series.
3. Write a C-program using single subscripted variables.
4. Write a C-program using a two dimensional array.
5. Write a C-program to compute and print a multiplication.
6. Write a C-program for standard deviation.

(OR)

KRISHNA CHAITANYA DEGREE COLLEGE:: NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 107: PRACTICAL-II

Practicals for MATLAB: SOC 1:1B

1. Create any M-file
2. Creating arrays and Matrices
3. Basic 2D-plots
4. Basic 3D-plots
5. Solving system of algebraic equations
6. To find Eigen values and Eigen vectors

Practicals for DISCRETE MATHEMATICS: SOC 2: 2B

1. Generate truth tables automatically for complex formulas.
2. Convert logical expressions into their Disjunctive Normal Form (DNF) and Conjunctive Normal Form (CNF).
3. Construct truth tables for NAND, NOR, and XOR connectives.
4. Apply Karnaugh maps (K-maps) to minimize Boolean functions.
5. Draw Hasse diagrams and visually represent lattices. (Use graphing tools or software like Graphviz or Gephi).
6. Construct examples of modular lattices and distributive lattices and demonstrate their properties.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 108: MOOCS/Open elective

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 109: Ancient Indian Mathematics
(Common with paper AMA 109 of Branch I (B) Applied Mathematics)

Course objectives :

1. To know about Ancient Indian Mathematicians.
2. To create awareness on Ancient Indian Mathematics
3. To inculcate interest on History of Mathematics
4. To understand the development of basic concepts

UNIT – I : (Heralding the Golden Age: Aryabhata I and his Followers):
Introduction – The Mathematics in Aryabhatiya- I and its followers Aryabhatiya –Geometry – series –Algebra –Indeterminate equations.

Unit- II: (Riding the Crest of a Wave: From Brahmagupta to Mahavira- I)
The Mathematics in the Brahmasphut a siddhanta –arithmetic of calculation –Triangles and Quadrilaterals

Unit-III : (Riding the Crest of a Wave: From Brahmagupta to Mahavira-II)
Geometry of circles –intersecting circles -Shadow Problems –intermediate analysis works of Brahmasphut a siddhanta –solution of Quadratic equations –volume of sphere – Mahavira – Unit fractions.

Unit-IV: (The 500 Year Climax: Bhaskaracharya and His Legacy)
The Contents of Lilavati – Arithmetic calculation –Method if inversion –Solution of Cubic and biquadratic equations.

Scope and standard as **"Indian Mathematics Engaging with the World from Ancient to Modern Times" by** George Gheverghese Joseph University of Manchester, UK National University of Singapore, Singapore McMaster University, Canada.

Reference Book:

1. **"History of Ancient Indian Mathematics" by Srinivasiengar .C.N, The World press Calcutta**.

Course outcomes: From this course students will be able to

1. Know about our Ancient Indian Mathematicians.
2. Get awareness on Ancient Indian Mathematics
3. Develop interest in research through History of Mathematics
4. Able to solve problems using basic concepts .

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

SECOND SEMESTER

MAT 201: 4 - COMPLEX ANALYSIS

Complex analysis, traditionally known as the theory of functions of a complex variable, is the branch of mathematical analysis that investigates functions of complex numbers.

Course Objectives:

1. To define analytic functions and derivative rules of complex functions.
2. To introduce Mobius transformations and explain its applications.
3. To evaluate definite integrals using Cauchy integral formula.
4. To understand power series and expansion of analytic function**.**

UNIT –I :

Differentiation: Analytic Functions : Derivative Rules for Differentiating Complex Functions-The Cauchy-Riemann Equations –Analytic Functions-Geometrical Interpretation of Arg $f^1(z)$ and $\left| f^1(z) \right|$ - Conformal Mapping –The Mapping w = $\frac{\pm b}{cz+d}$ -Conformal Mapping of the Extended Plane.

UNIT – II:

Mobius Transformations: The Group Property of Mobius Transformations – The Circle – Preserving Property of Mobius Transformations-Fixed points of a Mobius Transformation-Invariance of Cross Ratio-Mapping of a circle onto a Circle –Symmetry Transformations.

UNIT – III:

Complex Integrals: Cauchy Integral Theorem: Rectifiable Curves-Complex Integrals-The Case of Smooth Curves-Cauchy‟s Integral Theorem-The Key Lemma proof of Cauchy‟s Integral Theorem-Application to the Evaluation of Definite Integrals Cauchy‟s Integral Theorem for a system of Contours. Cauchy‟s Integral Formula –Morera‟s Theorem – Cauchy‟s Inequalities.

UNIT-IV:

Power Series: The Cauchy-Hadamard Theorem – Taylor Series. The Uniqueness Theorem for Power series-Expansion of an Analytic Function in a power series –Liouvill‟es Theorem. The Uniqueness Theorem for Analytic functions-A Points and Zeros-Weirstrass‟ Double Series Theorem-Substitution of One Power Series into Another- Division of Power series.

Scope and Standard as in Chapters 3,5,7,8 and 10 of **“ Introductory Complex Analysis” by Richard A. Silverman Dover Publications, Inc. (1972). New York**

References : 1 Complex Variables - Schaum outline series, 2/E by Speigel

2. An Introductions to Complex Analysis, by C.L. Siegel :North Holland.

Course outcomes:

1. Identify curves and regions in the complex plane defined by simple expressions.
2. Describe basic properties of complex integration and having the ability to compute such integrals.
3. Decide when and where a given function is analytic and be able to find it series development.
4. Describe conformal mappings between various plane regions.
5. Apply the concepts of Complex Analysis in many branches of mathematics, including algebraic geometry, number theory, analytic combinatorics, applied mathematics; as well as in physics, including the branches of hydrodynamics, thermodynamicsand particularly quantum mechanics.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc. (Mathematics)

(Effective from Academic year 2025-2026)

MAT 202:5(A) – PARTIAL DIFFERENTIAL EQUATIONS

Course objectives:

1. To provide the students various methods to find solutions of O.D.Es and P.D.Es.
2. To introduce orthogonal trajectories in 3-D space.
3. To Explain methods to solve Linear P.D.Es with constant and variable coefficients.
4. To discuss the boundary value problems and Laplace equation.

UNIT –I:

Differential equation in more than two variables: Methods of solutions of dx/P=dy/Q=dz/R- Orthogonal Trajectories of a system of curves on surface- pfaffian differential forms and equations in three variables.(Sections 3,4,5 and of chapter 1)

UNIT –II:

Partial differential equations of first order : Partial differential equations- origins of first order Partial differential equations –Cauchy‟s problems for first order equations- Linear equations of first order – Integral surfaces passing through a given curve – surfaces orthogonal to a given system of surfaces – Charpit‟s method. (Sections 1,2,3,4,5,6 and 10 of chapter 2)

UNIT –III:

Partial differential equations of the second order : the origin of second order equations- Linear partial differential with constants coefficients – equations with variable coefficients. (sections 1,4 and 5 of chapter 3)

UNIT –IV:

Laplace‟s Equations: Elementary solutions of Laplace‟s equation- families of equipotential Surfaces- boundary value problems- separation of variables (Sections 2,3,4 and 5 of chapter 4)

Scope and Standard as in "**Elements of partial differential equations"** by IAN Sneddon.

References:

1. Ordinary and partial differential equations by M.D.Raisinghania.
2. Advance differential equations by M.D.Raisinghania, S.Chand company Limited, New Delhi, 2021
3. An Elementary course to P.D.E by T.Amarnath , Second Edition, Narosa publishing house

Course outcomes:

1. Identify Linear and non linear P.D.E and solve non linear P.D.E by charpirt‟s method.
2. Apply variables separable methods to solve Laplace equations in Cylindrical or spherical coordinates.
3. Obtain equipotential surfaces using Laplace‟s equation.
4. Understand the importance of P.D.Es in geometry, Physics and other subjects.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc. (Mathematics)

(Effective from Academic year 2025-2026)

MAT 202:5(B) - SEMIGROUP THEORY

Course Objectives:

1. Introduce basic definitions and examples of semi groups and semi Lattices.
2. Discuss free semi groups and lattices of equivalences.
3. Explain Ree‟s theorem& primitive Idempotents.
4. Analyze O-simple semi groups and free semi groups with Illustrations.

UNIT-I

Basic definitions – Homogenic Semigroups – Ordered sets- Semi lattices and lattices – Binary relations- Equivalences- Congruences.

UNIT-II

Free Semi groups Ideals and – Rees Congruences. Lattices of equivalences and congruences – Green‟s equivalences. The structure of D.Classes – regular semigruops.

UNIT-III

Simple and Q-Simple semi groups. Principle factors, Rees‟s Theorem, Primitive idempotents.

UNIT-IV

Congruences on completely O-Simple semi groups. The Lattice of Congruences on a completely O-Simple semi groups. Finite Congruences, free semi groups.

Text Book :

Scope and Standard as in An Introduction to Semi group Theory by J.M. Howie (1976), Academic Press, (Content of the Syllabus: Chapters-I, II and III).

Course Out comes:

1. Understand semi groups with the properties.
2. Explain the structure of D.Classes – regular semigruops.
3. Obtain proofs of Rees‟s Theorem.
4. Know the congruences on completely O-Simple semi groups

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 203:6(A) - LINEAR ALGEBRA

Course Objectives:

The goal of this course is to make students capable of understanding the consistency of system of linear algebraic equations and the concepts of linear transformations. Also projected to the concepts of orthogonal property in the spectral theory, bilinear form and its nature.

Unit-I

System of linear equations: Matrices and elementary row operations, uniqueness of echelon forms, solutions of homogeneous and non homogeneous linear system of equations.

Unit-II

Vector spaces: Vector spaces, sub spaces, bases, and dimension, coordinates.

Unit-III

Linear transformations: Linear transformations, algebra and representation by matrices, algebra of polynomials, Rank-Nullity Theorem.

Unit-IV

Diagonalization of matrices: Elementary canonical forms, characteristics values and characteristics vectors, Cayley-Hamilton theorem

Inner product spaces:Inner products, inner products spaces, Linear Functionals and Adjoints, Cauchy Schwarz inequality, Triangle inequality, Parallelogram law, Pythagoras Theorem,Orthogonal vectors, Orthogonal set, Ortho normal set, Ortho normal basis, Parseval's Identity, Bessel's inequality, Unitary Operations, Normal Operation

Text books

1. Linear algebra K.Hoffman and R.Kunze, prentice hall of India, New Delhi, 2003
2. Linear algebra done right, Sheldon, Sheldon Axier, Springer nature, 2015, third edition.

Reference books:

1. First course in linear algebra, P.G. Bhattacharaya, S.K. Jain and S.R. Nagpaul, Wiley eastern ltd. New Delhi, 1991.
2. Matrix and linear algebra, K.BD, prentice hall of India, New Delhi, 2006.
3. N. Herstein, Topics in Algebra, Wiley, (2006).

Course Outcomes:

Student will be able to solve linear system of equations. Provides knowledge of vector spaces and linear transformations. Able to diagonalize matrices and learn concepts of inner product space

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MA 203:6(B) - TOPOLOGY

Topological concepts play important role in the development of modern mathematics and it has large applications in theoretical physics.

Course Objectives:

1. This course aims to teach the fundamentals of point set topology and constitute an awareness of need for the topology in Mathematics.
2. Introduce the basic definitions and standard examples of topological spaces.
3. Define and illustrate a variety of topological properties such as compactness, connectedness and separation axioms.
4. Explain the idea of topological equivalence and define homeomorphisms.

UNIT –I :

Metric spaces:-open sets-closed sets- convergence-completeness and Baire‟s theorem-Continuous mappings – Cauchy‟s Inequality and Minkowski‟s Inequality.

UNIT – II:

Topological Spaces, definition & examples-open bases and open sub bases- compact spaces

UNIT – III:

Product of spaces-Trychonoff‟s theorem -compactness for Metric spaces.

UNIT-IV:

Separation –T_1 space and Hausdorff spaces –completely regular spaces and Normal spaces – Urysohn‟s lemma- Tietze extension theorem-Urysohn‟s imbedding theorem.

Scope and Standard as in Articles 9 to 14,16,17,18,21, 22, 23, 26-29 and 31 of Chapters II,III,IV,V,andVI of **Introduction to Topology and Modern Analysis" by G.F. Simmons of MC Graw Hill Publishing company, ltd**.

Reference:

1. „Topology‟ by K.ChandraSekharaRao, Narosa Publications
2. "Topology" by J.P. Chauhan, J.N. Sharma, Krishna Publications
3. "General Topology" by M.G. Murdeshwar, new age International publications

Course Outcomes:

Upon completion of this course, the student will be able to:

1. Understand to construct topological spaces from metric spaces and using general properties of neighbourhoods, open sets, closed sets, basic and sub-basis.
2. Apply the properties of open sets, closed sets, interior points, accumulation points and derived sets in deriving the proofs of various theorems.
3. To understand the concepts of countable spaces and separable spaces.
4. They know what we mean by connectedness, compactness, and hausdorf property and their general characteristics.
5. Understand the Countability axioms, the separation axioms and normal spaces.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 204 : PRACTICAL-III

(Related to CC:5A & CC:6A)

(OR)

K**RISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)**

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MA 204: PRACTICAL-III

(Related to CC:5B & 6B)

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 205: SOC- 3(A) - DATA STRUCTURES AND ALGORITHMS

Course objectives:

1. Learn complexity analysis with examples
2. Study queues operations and applications of queues
3. Acquire knowledge on Binary trees and representations
4. Understand Basic algorithms to sort

Unit-I

Introduction to algorithm and data structure: Algorithm definition and characteristics, data structure defition,Types of data structure.

Linked Lists: Introduction, Single Linked List, Representation of a Linked List in Memory, Different Operations on a Single Linked List, Advantages and Disadvantages of Single Linked List, Circular Linked List, Double Linked List.

Unit-II

Stacks: Basic Stack Operations, Representation of a Stack using Array and linked list.

Queues: Basic Queue Operations, Representation of a Queue using array and linked list,

Unit-III

Trees: Definition of Tree, Properties of Tree, Binary Tree, Representation of Binary Trees using Arrays and Linked Lists, Operations on a Binary Tree, Binary Tree Traversals (recursive), Binary Search Tree.

Unit-IV

Basic Search Algorithms: Linear Search and Binary Search
Basic Sorting Algorithms: Bubble Sort, Insertion Sort, Selection Sort
Divide-and-Conquer Algorithms: merge sort, quick sort

Scope and Standard as in Data Structures and Algorithms by Alfred V. Aho, John E. Hopcraft and Jefryn D. Ullman

References:

1. Data Structures and Algorithms by R.D.Sathiya
2. Data Structures and Algorithms Made Easy" by Narasimha Karumanchi
3. Data Structures and Algorithm Analysis in C++" by Mark Allen Weiss
4. Data Structures and Algorithm Analysis in Java" by Mark Allen Weiss

Course outcomes:

1. To understand the complexity analysis
2. To use queues operations and study applications of queues
3. To understand Binary trees and representations
4. To explain Basic sorting algorithms.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

SKILL ORIENTED COURSES

MAT205:3(B) NUMBER THEORY

Course Objectives:

1. Identify and apply various properties of and relating to the integers including the Well-Ordering Principle, primes, unique factorization, the division algorithm and greatest common divisors.
2. Identify certain number theoretic functions and their properties.
3. Understand the concept of a congruence and use various results related to Congruence including the Chinese Remainder Theorem.
4. Solve certain types of Diophantine equations.
5. Identify how number theory is related to and used in cryptography.

UNIT –I :

Arithmetical Functions and Dirichlet Multiplication: Introduction-The Mobius function μ (n)-The Euler totient function $\emptyset$ (n) –A relation connection $\emptyset$ and μ -A product formula for $\emptyset$ (n) - The Dirichlet product of arithmetical functions –Dirichlet inverses and the Mobius inversion formula-The Mangoldt function Λ(n) –Multiplicative functions-Multiplicative functions and Dirichlet multiplication-The inverse of a completely multiplicative function-Liouville‟s Function λ(n)-the divisor functions $\sigma_\propto$ (n) – Generalized convolutions –Formal power series –The Bell series of an arithmetical function –Bell series and Dirichlet multiplications –Derivatives of arithmetical functions-The Selberg identity .

UNIT – II:

Averages of Arithmetical Functions : Introduction –The big oh notation Asymptotic equality of functions- Euler‟s summation formula –Some elementary asymptotic formulas-The average order of d(n)-The average order of the divisor functions $\sigma_\propto$ (n)-The average order of $\emptyset$ (n) -An application to the distribution of lattice points visible from the origin-The average order of μ (n) and of Λ(n) -Another identity for the partial sums of a Dirichlet product.

UNIT – III:

Congruences: Definition and basic properties of congruences-Residue classes and complete residue systems-Linear congruences –Reduced residue systems and the Euler-Fermat theorem- Polynomial congruences modulo p.Langranage‟s theorem-Applications of Lagarange‟s theorem-Simultaneous linear congruences – The Chinese remainder theorem –Applications of the Chinese remainder theorem – Polynomial congruences with prime power moduli- The Principle of cross-classification- A decomposition property of reduced residue systems.

UNIT-IV:

Quadratic Residues and the Quadratic Reciprocity Law: Quadratic residues-Lengendre‟s symbol and its properties –Evaluation of (-1|p) and (2|p) –Gauss‟ lemma-The quadratic reciprocity law – Applications of the reciprocity law –The Jacobi symbol

Scope and Standard as in chapter 2, Chapter 3, Chapter 5, Sections 9.1 to 9.7 of Chapter 9 **by Tom. M. Apostal , " Introduction to Analytical Number Theory" Springer International Student Edition .**

Course outcomes:

1. Find quotients and remainders from integer division
2. Apply Euclid‟s algorithm and backwards substitution
3. Understand the definitions of congruences, residue classes and least residues
4. Add and subtract integers, modulo n, multiply integers and calculate powers, modulo n
5. Determine multiplicative inverses, modulo n and use to solve linear congruence.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

SKILL ORIENTED COURSE (SOC-II)

MAT 206: SOC: 4(A) – PROBABILITY & STATISTICS

Course Objectives:

The main object of this course is to provide students with the foundation of probabilistic and statistical analysis mostly used in various applications in Engineering and Science.

UNIT-I

Sample Space & Events - Axioms of probability - Some theorems on probability - oole‟s Inequality – Probability - Multiplication theorem on probability – Independent events - Multiplication theorem on probability for independent Events - Extension of Multiplication theorem on Probability to n Events - Baye‟s theorem. [section 3.2 to 3.95, & Section 4.2]

UNIT-II

Distribution functions: Discrete random variable - Continuous random variable - Two-Dimensional Random variables - Mathematical expectation - Moments of a distribution function - Moment generating functions - Characteristic functions and their properties - Chebychev inequality - Probability generating functions.[5.2 to 5.5(up to 5.5.5.) of Chapter- 5, Chapter 6 except 6.7 and 7.1, 7.2, 7.3, 7.5 and 7.9 of Chapter 7]

UNIT-III

Distributions: Discrete Distributions Binomial - Poisson distributions and their properties - Continuous distributions - Normal and Rectangular distributions and their properties. [8.1 to 8.5 of Chapter 8 and 9.1 to 9.3 of Chapter 9]

UNIT-IV

Sampling distribution: Sampling and Large sample tests, Exact sampling distributions χ^2, t and F-distributions.
[Chapter-14, Chapter 15 up to 15.6.4 and Chapter 16 up to 16.6 except 16.4]

Prescribed Text Book:

Fundamentals of Mathematical Statistics by S.C. Gupta and V.K. Kapoor, 11th Edition, Sultan Chand & Sons, NewDelhi.

Reference Book:

Probability and Statistics for Engineers and Scientists,9th edition, Walpole Myers, Keying Ye Pearson Publications.

Course Outcomes:

From this course students will be able to analyze the basic probability axioms, distributive functions, distributions, correlation and regression.

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 206: SOC- 4(B) - Python

Course Objectives:

1. To get familiar with Pyhon
2. To learn various operators and conditional statements
3. To create Modules and Strings
4. To understand functions, files and lists

Unit -I:- Basics of Python: Python Installation and Working of it, get familiar with python variables and data types, Operator understanding and its usage, understanding of python blocks **Operators in Python:** Arithmetic Operators, Relational Operators, Assignment Operators, Logical Operators, Bitwise Operators, Shift Operators, Ternary Operators, Membership Operators, Identity Operators, Expressions and order of evaluations.
Input and Output statements: input() function, reading multiple values from the keyboard in a single line, print() function, „sep" and „end" attributes, Printing formatted string, replacement operator ({}).
Control flow statements: Conditional statements – if, if-else and if-elif-else statements. Iterative statements – for, while. Transfer statements – break, continue and pass.

Unit-II:-Functions: Defining Functions, Calling Functions, Types of Arguments - Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Function Returning Values, Global and Local Variables.
Modules: Creating modules, import statement, from Import statement.
Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Unit-III:- Lists: Creation of list objects, Accessing and traversing the elements of list. Important functions of list – len( ), count( ), index( ), append( ), insert( ), extend( ), remove( ), pop( ), reverse( ) and sort( ).

Basic Operations on List: Aliasing and Cloning of List objects, Mathematical Operators for list objects, Comparing list objects, Membership operators on list, Nested Lists, List Comprehensions.

Tuples: Creation of Tuple objects, Accessing elements of tuple, Mathematical operators for tuple, Important functions of Tuple – len( ),count( ),index( ), sorted( ), min( ), max(), cmp( ).Tuple Packing and Unpacking.
Files: Opening files, Text files and lines, Reading and writing files, Searching through a file, Using try, except and open, handling exceptions, debugging.

Unit-IV

Scientific and Mathematical Computing Using Python: Numerical Computing using NumPy, Matplotlib, SciPy

Python libraries and modules used in Data Science, AI and ML: Pandas, tensorflow, scikit- learn, pytorch, keras etc...

Scope and Standard as in "Learn Python the right way How to think like a computer scientist, Ritza," 2021-2022

References:

1. Think Python: How to Think Like a Computer Scientist", 3rd edition, Allen B. Downey, O"Reilly 2024
2. Learning To Program With Python. Richard L. Halterman. Copyright © 2018

Course Outcomes: After completion of this course students are able to

1. Familiar with basic concepts of Pyhon
2. Make use of various operators and conditional statements
3. Create Modules and Strings
4. Understand functions, files and lists

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 207: PRACTICAL-IV
(Related to SOC -3(A) an4(A))

(OR)

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 207: PRACTICAL-IV
(Related to SOC -3(B) and 4(B))

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 208 : MOOCS/Open elective

KRISHNA CHAITANYA DEGREE COLLEGE::NELLORE (Autonomous)

M.Sc.(Mathematics)

(Effective from Academic year 2025-2026)

MAT 209: Vedic Mathematics

Course objectives:

1. To inculcate interest on Vedic Mathematics.
2. To understand the development of basic concepts
3. To know about Vedic Sutras.
4. To create awareness on Vedic techniques

Unit -I:-Actual applications the Vedic Sutras- Arithmetical computations- Factorization

Unit-II:- Simple equations-simultaneous simple equations-quadratic equations- cubic equations

Unit-III:-Partial fractions-integration by partial fractuions.

Unit-IV:-Vedic Numerical code -recurring decimals

Standard Text Book:
Vedic Mathematics by Jagadguru Swamisri Bharathi Krsna Thirthaji Maharaja

Course Outcomes: After the completion of the course students are able to

1. Understand Vedic sutras and Techniques
2. Solve simple equations using Vedic formulae
3. Apply techniques to integrate by partial fractions
4. Write Numerical code