DEPARTMENT OF MATHEMATICS
ACHARYA NAGARJUNA UNIVERSITY
SYLLABUS
M.Sc,. Mathematics, I year I Semester
(With effect from the batch of students admitted during 2014-2015)
M 103 (NR): DIFFERENTIAL EQUATIONS

UNIT-I

Linear equations of the first order: Linear equations of the first order – The equation $y_1 + ay = 0$ – The equation $y_1 + ay = b(x)$ - The general linear equation of the first order. (Chapter 1 of Coddington).

Linear Equations with constant co-efficients: Introduction **-** The second order. homogeneous equation – Initial value problems for the second order equations – Linear dependence and independence – A formula for the Wronskian – The non-homogeneous equation of order two – The homogeneous equation of order n – Initial value problems for n-th order equations. (Sections 1 to 8 in Chapter 2 of Coddington).

UNIT – II

Linear Equations with Variable Co-efficients: Introduction – Initial value problems for the homogeneous equation – Solutions of the homogeneous equation – The Wronskian and linear independence – Reduction of the order of a homogeneous equation – The non-homogeneous equation – Homogeneous equations with analytic coefficients. (Sections 1 to 7 in Chapter 3 of Coddington).

UNIT – III

Linear Equations with Regular Singular Points: Introduction – The Euler equation – Second ordre equations with regular singular points –Second order equations with regular singular points – A convergence proof - The exceptional cases – The Bessel equation. (Sections 1 to 7 in Chapter 4 of Coddington).

UNIT- IV

Existence and Uniqueness of Solutions to First Order Equations: Introduction – Equation with variables separated – Exact equations – The method of successive approximations – The Lipschitz condition – Convergence of the successive approximations – Non-local existence of soltutions.(Sections 1 to 7 in Chapter 5 of Coddington).

Book: An introduction to Ordinary Differential Equations by Earl A. Coddington, Prentice-hall of Indial Private Limited, NEW DELHI, 1974.

Approved by the Board of studies in Mathematics

Name

Signature

1. Prof. Dr. Bhavanari Satyanarayana
2. Prof. K. Pandu Ranga Rao
3. Dr. B. Satyanarayana
4. Dr. M. Gnaneswar Reddy
5. Dr. K. Gangadhar

DEPARTMENT OF MATHEMATICS
ACHARYA NAGARJUNA UNIVERSITY
SYLLABUS
M.Sc., Mathematics, I year, I Semester
(Continued upto 2014-15, 2015-16 and 2016-17)
PAPER –M 103: DEFFERNTIAL EQUATIONS M 103 (OR)
M103 (OR) – DEFFERNTIAL EQUATIONS

UNIT-I

Second order linear equations: Introduction, The general solution of the homogeneous equation, The use of a known solution to find another, The homogeneous equation with constant coefficients ,The method of undetermined coefficients, The method of variation of parameters. (Sections 14 to 19 of Chapter 3)

UNIT-II

Power series solutions and special functions: Introduction , A review of power series, Series solutions of first order equations, Second order Linear equations-Ordinary points, Regular singular points,Regular singular points (continued), Gauss ‘s hyper geometric equation. (Sections 25 to 30 of Chapter 5)

UNIT-III

Some special functions of Mathematical Physics: Legendre polynomials, Bessels functions, The Gamma function, Properties of Bessel functions , Linear systems, Homogeneous linear systems with constant coefficients. (Sections 32 to 35chapter 6 & Sections 37 and 38 of chapter 7)

UNIT-IV

Laplace Transforms: Introduction, a few remarks on theory Applications to differential equations, Derivatives and integrals of laplace transforms, Convolutions, The method of successive approximations, Picards theorem. (Sections 50 to 54 of chapter 10 & Sections 55 and 56 of chapter11)

TEXT BOOK:

“Differential equations” with applications and Historical Notes by G.F. Simmons. Published by Tata Mc Graw Hill 25th reprint 2001.

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DEPARTMENT OF MATHEMATICS
ACHARVA NAGARJUNA UNIVERSITY
SYLLABUS
M.Sc., Mathematics, I Year, II Semester
(With effect from the batch of students admitted during 2014-2015)

PAPER - M.204: COMPUTER ORIENTED NUMERICAL METHODS (NR)

UNIT-I

C Programming

C Charcter set, Identifiers and key words, declaration statement date types, variables and constants, structure of C program.
(1.4, 1.5, 1.6, 1.7, 1.11 &1.12 of Ajay Mittal).
Expressions, simple expressions and compound expressions, classification of operations.
(2.2, 2.3 &2.4 of Ajay Mittal).
Statements, classification of statements.
(3.2& 3.3 of Ajay Mittal)
Single dimensional arrays, Multidimensional arrays
(4.3 & 4.6.1 of Ajay Mittal)
Functions, classification of functions
(5.2 &5.3 of Ajay Mittal)

UNIT-II

Interpolation and Approximation: Introduction, Lagrange and Newton Interpolations,
Finite difference Operators, Interpolating polynomials using finite differences, Hermite interpolations.
(Section 4.1 to 4.5 of [2]).

UNIT-III

Numerical Differentiation and Integration: Introduction, Numerical Integration, Methods based on interpolation, Methods based On Undetermined Coefficients, Composite Integration Methods
(Sections 5.1, 5.6, 5.7, 5.8 &5.9 of [2])

UNIT – IV

Ordinary Differential Equations: Introduction Numerical methods, Single step Methods, Multi step methods
(Sections 6.1 to 6.4 of [2]).

TEXT BOOKS:

[1] C Programming A Practical approach by Ajay Mittal, Pearson Edition
[2] Numerical Methods for Scientific and Engineering Computation by M.K.Jain, S.R.K. Iyangar and R.K. Jain, Third edition, New Age International (p) Limited, New Delhi ,1997.

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M 204 (NR)

ACHARYA NAGARJUNA UNIVERSITY
DEPARTMENT OF MATHEMATICS
SEMESTER – II

(Continued upto 2014-15, 2015-16 and 2016-17)

M.204 (OR) –COMPUTER ORIENTED NUMERICAL METHODS

UNIT – I

C – Basis
C – Character set
Data types
Variables
Constants
Expressions
Structure of C program
Operators and their precedence and
Associativity
Basic input and output statements
Control structures
Simple programs in c using all the operators
and control structures

Functions

Concept of a function
Parameters and how they are passed
Automatic Variables
Recursion
Scope and extent of variables
Writing programs using recursive and non –
recursive functions
(1.4, 1.7, 1.11, 1.12. of Chapter 1, 2.2, 2.3, 2.4
of Chapter 2, 3.1, 3.2, 3.3 of
Chapter 3 & 5.1, 5.2, 5.3 of Chapter 5 of [1])

UNIT – III

Interpolation and Approximation: Lagrange and
Newton Interpolations,
Finite difference Operators, Interpolating
polynomials using finite differences,
Hermite interpolations.
(Section 4.1 to 4.5 of [2]).

TEXT BOOKS:

[1] C Programming A Practical approach
By Ajay Mittal, Publishers – Pearson
Edition.
[2] Numerical Methods for Scientific and
Engineering Computation

By
M.K. Jain S.R.K. Iyangar and R.K. Jain, Third edition,
New Age International (p) Limited, New Delhi, 1997.

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UNIT –II

Arrays and Strings

Single and multidimensional Arrays
Character array as a string
Functions on strings, Writing C Programs using arrays and for string
manipulation.

Pointers

Pointers declarations
Pointers expressions
Pointers as parameters to functions
Pointers and Arrays
Pointer arithmetic

Structures & Unions

Declaring and using structures
Operations on structures
Arrays of structures
User defined data types
Pointers to Structures

Files

Introduction
File structure
File handling functions
File types
File error handling
C programming examples for using files
(4.1 to 4.6 of Chapter 4, 6.1 to 6.8 of Chapter 6, Chapter 9 & Chapter 10 of [1])

UNIT – IV

Numerical Differentiation and Integration:
Methods based on interpolation, Methods based On Undetermined Coefficients, Composite Integration Methods,
Ordinary Differential Equations: Introduction, Difference Equations,
Numerical Methods, Single step Methods.
(Sections 5.7, 5.8, 5.9 of [2] &
(Sections 6.1 to 6.4 of [2]).

Signature

DEPARTMENT OF MATHEMATICS
ACHARVA NAGARJUNA UNIVERSITY
SYLLABUS
M.Sc., Mathematics, II Year, IV Semester
(With effect from the batch of students admitted during 2013-2014)
PAPER - M 403 : NEAR-RINGS M 403(NR)

UNIT-I

The Elementary Theory of Near-Rings.

(a) Fundamental definitions and properties

1. Near-rings.
2. N-groups.
3. Substructures,
4. Homomorphisms and Ideal-like concepts
5. Annihilators
6. Generated objects. .

(b) Constructions:

1. Products, direct sums and subdirect products.

(c) Embeddings

1. Embedding in M)(Γ

UNIT-III

Structure Theory:

Elements of the structure theory

a) Types of N-groups
b) Change of the near-ring
c) Modularity
d) Quasi-regularity
e) Idempotents

UNIT-II

Ideal Theory:

(a) Sums

1. Sums and direct sums
2. Distributive sums.

(b) Chain conditions
(c) Decomposition theorems
(d) Prime ideals

1. Products of subsets
2. Prime ideals
3. Semi prime ideals

(e) Nil and nilpotent.

UNIT-IV

Primitive Near-Rings

a) General.

1. Definitions and elementary results
2. The centralizer
3. Independence and density
b) 0-Primitive near-rings
c) 1-Primitive near-rings
d) 2-Primitive near-rings
1. 2-Primitive near-rings
2. 2-primitive near-rings with
identity.

Prescribed Book:

Near-Rings, The Theory and its Applications by Gunter Pilz, North-Holland Publishing Company, AMSTERDAM, Revised Edition 1983.

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M 403 (NR)

DEPARTMENT OF MATHEMATICS
ACHARVA NAGARJUNA UNIVERSITY
SYLLABUS
M.Sc., Mathematics, II Year, IV Semester
(Continued upto 2014-15, 2015-16 and 2016-17)
PAPER - M 403 : NEAR-RINGS M 403(OR)

UNIT-I

The Elementary Theory of Near-Rings.
(a) Fundamental definitions and properties: Near-rings, N-groups, Substructures, Homomorphisms and Ideal-like concepts, Annihilators,' Generated objects. .
(b) Constructions: (1) Products, Directsums & Subdirect products.
(c) Embeddings: (l) Embedding in M)(Γ(2) More beds.

UNIT-II

Ideal Theory
(a) Sums: (1) Sums and direct sums (2) Distributive sums.
(b) Chain conditions
(c) Decomposition theorems
(d) Prime ideals (1) Products of subsets (2) Prime ideals (3) Semi prime ideals
(e) Nil and nil potent.

UNIT-III

Structure Theory
Elements of the structure theory
(a) Types of N-groups

(b) Change of the near-ring
(c) Modularity
(d) Quasi-regularity
(e) Idempotents
(f) More on Minimality.

UNIT-IV

Primitive Near-Rings
(a) General (I) Definitions and elementary results (2) The centralizer (3) Independence and density
(b) 0-Primitive near-rings
(c) 1-Primitive near-rings
(d) 2-Primitive near-rings
(1) 2-Primitive near-rings
(2) 2-primitive near-rings with identity.
Radical Theory: (a) Jacobson-type radicals: Common Theory,
(I) Definitions and Characterizations of radicals (2) Radicals of related near-rings
(3) Semi simplicity.

TEXT BOOK: Near-Rings, The Theory and its Applications by Gunter Pilz, Revised Edition 1983, North-Holland Publishing Company, AMSTERDAM.

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M 403 (OR)