Solapur University, Solapur.
Syllabus for
B.Sc.-III(MATHEMATICS)
CGPA pattern Syllabus w.e.f. June 2016

Structure of the revised course:

SEMESTER-V

(I) Theory Papers

Paper	Title of the Paper	Marks
VII	Algebra-II	70+30 = 100
VIII	Complex Analysis	70+30 = 100
IX	Integral Calculus	70+30 = 100
X	Partial Differential Equations	70+30 = 100

SEMESTER-VI

(I) Theory Papers

Paper	Title of the Paper	Marks
XI	Metric Spaces	70+30 = 100
XII	Numerical Analysis	70+30 = 100
XIII	Integral Transform	70+30 = 100
XIV	Programming in C	70+30 = 100

(II) Numerical Technique Laboratory[NTL]

NTL No.	Topic	Marks
NTL-III(A)	S-I:Algebra-II[6] S-II : Metric Space [6]+Seminar	70+30 = 100
NTL-III(B)	S-I :Complex Analysis[6] S-II: Numerical Analysis[6] +Project	70+30 = 100
NTL-III(C)	S-I :Integral Calculus [6] S-II: Integral Transform[6]+Study Tour	70+30 = 100
NTL-III(D)	S-I: Partial Differential Equation[6] S-II: Programming in C [6]+Viva Vocae	70+30 = 100

Note : [ ] Number inside bracket indicates **number of assignments**.

In Numerical Technique Laboratory: NTL -III(A) – III(D) [Project/ Seminar / Study Tour/Viva Vocae / Book Review]

Project : Biography of One Mathematician or One Mathematics Topic (which is not included in the syllabus upto B.Sc. -III Mathematics) about Five Pages.   **05 Marks**

Book Review : Any Mathmeatics Book except Text Book   **05 Marks**

Seminar: Any topic in mathematics.   **05 Marks**

Book Review: Mathematics Book other than text book   **05 Marks**

Study Tour: Visit to any Industry / Research Institution / Educational Institution.   **05 Marks**

Viva Voce : Viva voce on Project, Seminar, Book review and Study Tour.
                                                                                                 05 Marks

 (**Free internet should be availed for collection of Material for Project, Seminar.)**

Instructions:
   1. Each Theory Paper is allotted 45 periods per semester.
   2. All **Numerical Technique Laboratory** [**NTL**] (similar to Practicals) will be conducted in the batch as a whole Class.
   3. Total evaluation of B.Sc. III (**1200 Marks**).

[Theory papers   (**800 Marks**)

+ [Practicals **NT L**- III(A) to III(D)   (**400 Marks**)]

4. The annual **Numerical Technique Laboratory [NTL** - III(A) to III(D)**]** will carry **50 Marks** each.

5. **Department of Mathematics should provide FIVE computers per batch of TEN students.**

Nature of question Paper

Semester –V Theory Papers IX, X, XI and XII
and
Semester –VI Theory Papers XIII, XIV, XV and XVI

Theory Paper   **[Marks 70]**

Q. 1: Multiple Choice Questions (Fourteen)   Marks 14

Q. 2 : Attempt any SEVEN out of EIGHT (each of 2 Marks)   Marks 14

Q. 3:(A) Attempt any TWO out of Four (each of 5 Marks)

      (B) Compulsory (Mark 4)   Marks 14

Q. 4: Attempt any TWO out of THREE (each of 07 Marks)   Marks 14

Q. 5: Attempt any TWO out of THREE (each of 07 Marks)

                         OR

Attempt any ONE out of TWO (each of 14 Marks)   Marks 14

Nature of paper for Numerical Technique Laboratory)
(For NLT- III(A) to NLT- III(D))
Section-I

I) Attempt THREE out of SIX (each of 10 marks)   Marks 30

   OR Attempt SIX out of EIGHT (each of 05 Marks)

Section-II

II) Attempt THREE out of SIX (each of 10 marks)   Marks 30

   OR Attempt SIX out of EIGHT (each of 05 Marks)

III) Seminar/Project/Study Tour/Viva-vocae/ Book Review   Marks 05

III) Journal   Marks 05

                                      Total Marks 70

Paper-VII :Algebra - II

Unit -1 : Introduction to Rings [10]
    1.1. Definitions and Examples
    1.2. Integral Domains. Subrings
    1.3. Fields
    1.4. Isomorphism. Characteristic

Unit –2 : Quotient Rings [05]
    4.1. Homomorphisms of Rings. Ideals
    4.2. Quotient Rings

Unit–3: Vector spaces [10]
    Vector spaces, Subspaces, Linear combination and system of linear equation, Linear dependence and independence, Basis and dimensions

Unit-4 : Linear transformation and matrices [15]
    Linear transformation, Null spaces and ranges, Matrix representation of linear transformation, Composition of linear transformation and Matrix multiplication, Invertibility and isomorphism.

Unit- 5 : Inner product space [05]
    Inner products and Norms

Recommended books (Scope of Syllabus):

Modern Algebra-An Introduction, by John R. Durbin, John Wiley & Sons, Inc. Fifth Edition

Unit – 1 : Chapter-VI: Art. 24,25,26,27

Unit – 2 : Chapter-IX:Art.38, 39

Linear Algebra Fourth Edition by Stephen H. Friedberg, Arnold J. Insel Lawrence E. Spence Prentice Hall of India New Delhi (EEE)

Unit-3: Chapter-I (Vector spaces): Art. 1.2 to1.6

Unit-4 :Chapter-II (Linear transformation and matrices): Art. 2.1to 2.4

Unit-5:Chapter-VI (Inner product space) Art. 6.1.

Reference Books:

1. A First Course In Abstract Algebra J. B. Fraleigh Pearson Education 7th edition
2. University Algebra N.S. Gopalkrishnan
3. Fundamentals of Abstract Algebra D. S. Malik & N. Mordeson & M. K. Sen Mc. Graw Hill International Edition.

4.Linear Algebra by Vivek Sahai & Vikas Bist Narosa Publishing House

5. Topics In Algebra John Wiley & Sons by I. N. Herstein

6. Abstract Algebra by K.S.Bhamri and Khanna Vijay

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Paper-VIII Complex Analysis

Unit -1 : Analytic Functions   [10]

Complex Differentiation, Limits and Continuity, Differentiability, Necessary and Sufficient condition of analytic function, Method of constructing a regular function and analytic function, Simple method of constructing analytic function, Polar form of Cauchy-Riemann Equations.

Unit -2 : Complex Integration   [20]

Introduction, Some basic definitions, Complex integral, Reduction of complex integrals to real integrals, Some properties of complex Integrals, An Estimation of a complex integral, Line integrals as functions of arcs, Cauchy's Fundamental Theorem(Theorem –I), Cauchy Goursat Theorem[Statement Only], Cauchy's Integral formula[Statement only], its consequences and examples, Derivative and higher order derivatives of an analytic function   [Statement(s) only] and examples, Expansions of Analytic functions as power series (Taylor's, Maclaurin's and Laurent's Series [Statement only]) and its examples, The zeros of an analytic function, Different Types of Singularities, Some Theorems on Poles and other Singularities(Theorem –I to IV only) and its examples, The point at infinity

Unit -3: Calculus of Residues   [15]

Residue at simple pole, Residue at a Pole of order greater than unity, Residue at infinity, Cauchy's Residue Theorem. Evaluation of Definite integrals,

Integration round the unit circle. Evaluation of $\int_0^{2\pi} f(cos\theta, sin\theta)d\theta$.

Recommended Book (Scope of Syllabus):

1. Functions of Complex Variable by J. N. Sharma Revised by Dr. Shanti Swarup, (38 Edition) Krishna Prakashan Media Ltd., Meerut.

Chapter -2 (Analytic Functions): 1 to 7

Chapter-6 (Complex Integration): 1 to 8, 9(Statement Only),
            19(Theorem-1, Theorem – II (Statements only),
            20, 21,22 [Theorems I to IV only], 23.24 .

Chapter -7 (Calculus of Residues): 1 to 6.

Paper –IX: Integral Calculus

Unit 1: Improper Integrals :

Convergence of Improper integrals of the first kind, Test of convergence of' a (Positive integrand), Necessary and sufficient condition for the convergence of improper integrasl, Comparison of two integrals, A practical comparison test, Useful comparison integrals, Two useful tests, f(x) not necessarily positive General test for convergence, Absolute and conditionally convergence, Convergence of improper integrals of the second kind, Convergence at infinity(Integrand being positive),Comparison of two integrals, A useful comparison integrals, General test(for convergence at infinity and f(x) may be positive or negative), Cauchy's test for convergence, Absolute and conditionally convergence of improper integrals of second kind, Test for the absolute convergence of the integral of a product, Abel's test, Dirchilet's test..   **(20)**

Unit 2 .Beta and Gamma function :

Definition, Properties, Transformations of Gamma function and Beta function and relation between them, Some Important deductions, Duplication Formula.   **(15)**

Unit 3. Multiple integrals :

Double Integrals, Cartesian and polar, Applications of Double Integration   (Area of region and Volume of a Solid only),Change of order of integration, Change of Variables.   **(10)**

Recommended Book

Paper-VII (Integral   Calculus)

Elements of Real Analysis by Shantinarayan, M.D. Raisinghania by S. Chand(8 th Edition)

Unit 1 : 16.1 to 16.18.

Integral Calculas *by Shanti Narayan and P.K.Mittal   S.Chand Publication Revised Edition 2005.*

Unit 2 : 7.1,7.2,7.3,7.4, 7.5.

Unit 3: 12.2,12.3,12.4,12.5.

Reference books:-
1. N. Piskunov, Differential and Integral Calculus, Peace Publishers, Moscow
2. P. N. Wartikar and J. N. Wartikar, A Text Book of Applied Mathematics, Vol. I, Poona Vidyarthi Griha Prakashan, Poona 30.
3. Tom M. Apostol, Calculus Vol I and II, Wiley Publication.
4. Mathematical Analysis by S. C. Malik and Savita Arora.

Paper-X : Partial Differential Equations

Unit-1: **Linear partial differential equation of order one**   **[15]**

    1.1 Derivation of partial differential equation of arbitrary constants

    1.2 Derivation of partial differential equation of arbitrary functions.

    1.3 Lagrange's Method of solving linear partial differential equation of order one. Namely $Pp + Qq = R$ Working rule for solving $Pp + Qq = R$ by Lagrange's Method.

    1.4 Integral surface passing through a given curve

Unit-2: Non Linear partial differential equation of order one   [15]

    2.1 Solution of first order partial differential equation Charpit's Method.

    2.2 Special methods of solution applicable to certain Standard form I, II, III, IV.

Unit-3: Linear partial differential equation with constant Coefficient [10]

    3.1 Homogeneous and Non Homogeneous linear partial differential equation with constant Coefficient working rule for finding C.F. method of finding particular integral (P.I).

    3.2 Short method when f (x, y) is $\emptyset$ (ax + by) and $x^m y^n$,

Recommended Book (Scope of syllabus) :

1. Ordinary and partial differential equation by M. D.Raisinghania, S. Chand Co. [PART – III]

Unit – 1 :Chapter-1 : 1.1, 1.2, 1.2a, 1.2b, 1.3, 1.4, 1.5, 1.5a, 1.5b, 1.5c, 1.5d, 1.6

Unit – 2 :Chapter-2 : 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10,

Unit – 3 :Chapter-3: 3.1, 3.2, 3.3, 3.4, 3.4A, 3.4B, 3.5, 3.6, 3.6A, 3.6B, 3.7, 3.8, 3.9,3.10

Reference Books :

1. Elements of partial differential equation IAN Sneddon (International students edition by Mc Graw Hill Book)

2. Differential equation
   Sharma & Gupta (Krishna Prakashan Media (P)Ltd. Meerut)

3. Partial differential equation J. M. Kar.

SEMESTER-VI

Paper – XI :Metric Spaces

Unit – 1 :Limits and metric Spaces [15]

1.1 The class l^2 (Schwartz, Minkowski inequality)

1.2 Limit of a function on the real line

1.3 Metric spaces

1.4 Limits in metric spaces

Unit-2 : Continuous functions on metric spaces [15]

2.1 Functios continuous at a point on the real line

2.2 Reformulation

2.3 Functions continuous on a metric space

2.4 Open sets

2.5 Closed sets

Unit-3 : Completeness and Compactness [15]

3.1 More about open sets

3.2 Bounded sets and totally bounded sets

3.3 Complete metric spaces

3.4 Compact metric spaces

3.5 Continuous functions on compact metric spaces

Recommended Book (Scope of Syllabus):

Scope :

Methods of real analysis by R.R. Goldberg John Wiley & Sons 1976.

Metric Spaces

Unit – 1: Limits and metric spaces Art: 3.10, 4.1 to 4.3

Unit -2: Continuous functions on metric spaces Art: 5.1 to 5.5

Unit -3 : Completeness and Compactness Art: 6.1, 6.3.6.4, 6.5, 6.6

Reference books

1. A first course in mathematical analysis by D. Somasundaram &B.Choudhary Narosa Publishing House.

2. Mathematical Analysis second edition by S. C. Malik & Savita Arora.

3. Principles of Mathematical analysis by Rudin W. McGraw-Hill, New York.

4. A Course of Mathematical Analysis by Shanti Narayan S.Chand & Company New Delhi**.**

Paper –XII: Numerical Analysis

Unit- 1 : Finite Differences [10]

  1.1.Introduction

  1.2. Finite differences,

  1.3.Differences of a Polynomial

  1.4. Relation between the operators

Unit-2 : Interpolation [15]

  2.1.Introduction

  2.2. Newton's forward interpolation formula

  2.3. Newton's backward interpolation formula

  2.4. Central difference interpolation formula

  2.5. Gauss's forward interpolation formula

  2.6. Gauss's backward interpolation formula

  2.7. Stirling's formula

  2.8. Interpolation with unequal Intervals

  2.9. Lagrange's Interpolation Formula

Unit- 3 : Numerical Differentiation and Integration [10]

  3.1.Numerical differentiation

  3.2. Formula for derivatives

  3.3. Maxima and minima of a tabulated function

  3.4. Numerical Integration

  3.5. Quadrature formulae(Trapezoidal rule, Simpson's 1/3 Rule and Simpson's 3/8 th rule)

Unit- 4 : Difference Equations [10]

  4.1.Introduction

  4.2. Definitions

  4.3. Formation of difference equations

  4.4. Linear difference equation

  4.5. Rules for finding the Complementary function

  4.6. Rules for finding the Particular Integral

  4.7. Difference equations reducible to linear form

Recommended book (Scope of Syllabus):
Numerical Methods in Engineering & Science with Programs in C and
C++ Nineth Edition by B. S. Grewal Khanna Publishers New Delhi

Chapter-6. (Finite differences): Art. 1,2,3,7

Chapter-7 (Interpolation): Art. 1,2,3,4,5, 6,7, 11,12

Chapter-8 (Numerical Differentiation and Integration) Art.1, 2, 3, 4, 5(except IV and V)

Chapter-9 (Difference Equations) Art. 1 to 7

Reference books:-

1 .Numerical Analysis and Programming in C by Pundir and Pundir(Pragati Prakashan)

2. Linear Algebra And Its Application Gilbert Strang International Student Edition

3. Topics In Algebra John Wiley & Sons by I. N. Herstein

4. Hoffman & Kunj

5. K. B.Datta Matrix & Linear Algebra Prentice Hall of India Pvt. Ltd.New Delhi 2000

6. S. Kumarsen Linear Algebra A Geometric Approach Prentice Hall of India 2002.

Paper –XIII : Integral Transforms

Unit 1: Laplace Transform.   [15]

Integral Transform (Definition) ,Laplace Transform (Definition), Linearity property of Laplace Transform ,Piecewise continuous functions ,Existence of Laplace Transform, Functions of exponential order ,function of class A ,First Translation or Shifting Theorem,Second Translation or Shifting Theorem,Change of Scale Property ,Laplace Transform of the derivatives of F(t), Laplace Transform of the nth order derivatives of F(t),Initial value theorem, Final value theorem, Laplace Transform of Integrals,Multiplication by t , Multiplication by t^n, Division by t, Evalution of Integrals ,periodic functions.

Unit 2: The Inverse Laplace Transform.   [15]

Inverse Laplace Transform, Null Function, Linearity   property, Table of Inverse Laplace Transform, First Translation or Shifting Theorem, Second Translation or Shifting Theorem,Change of Scale Property, Use of partial fraction ,Inverse Laplace Transform of the derivatives , Inverse Laplace Transform of Integrals, Multiplication by powers of p, Division by powers of p, Convolution(definition), Convolution theorem, Heaviside's expansion formula, Beta function.

Unit 3: Applications of Laplace Transforms.   **[15]**

Ordinary Differential equations with constant coefficients, Ordinary Differential equations with variable coefficients, Simultaneous ordinary differential equations, Partial differential equations..

Recommended Book for Paper –XIII (Integral Transform) :

Integral Transform by *Vasistha A.R.,Gupta R.K.,Krishna Prakashan Media Pvt.Ltd.11 , Shivaji Road,Meerut India.*

Unit 1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12, 1.13, 1.14, 1.15, 1.16, 1.17, 1.18, 1.19, 1.20, 1.21.

Unit 2: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 2.16,2.17.

Unit 3 : 3.1, 3.2.3.3,3.4

Reference Books:

1. Rainville E.D. *The Laplace Transform*
2. Dr.J.R.Goyel and K.P.Gupta *Integral Transform Pragati prakashan Meerut.*
3. Sharma and Gupta, *Differential equation ,Krishna Prakashan Media co.,Meerut*

Paper-XIV : Programming in C

Unit – 1 : Overview of C   **[4]**

    1.1 Introduction

    1.2 Importance of C

    1.3 Sample C programs

    1.4 Basic structure of C programs

    1.5 Programming style

    1.6 Executing a C program

    1.7 Points to remember

Unit – 2 : Constants, Variables and Data Types   **[6]**

    2.1 Introduction

    2.2 Character set

    2.3 C Token

    2.4 Constants

    2.5 Keywords and Identifiers

    2.6 Variables

    2.7 Data Types

2.8 Declaration of variables

2.9 Assigning values to variables

2.10 Defining symbolic constants

Unit – 3 : Operators and Expressions   **[9]**

3.1 Introduction

3.2 Arthmetic operators

3.3 Relational operators

3.4 Logical operators

3.5 Assignment Operators

3.6 Increments and decrement operators

3.7 Conditional operators

3.8 Bit-wise operators

3.9 Special operators

3.10 Arithmetic expressions

3.11 Evaluation of expressions

3.12 Precedence of arithmetic operators

3.13 Some computational problems

3.14 Type conversions in expressions

3.15 Operators precedence and associativity

3.16 Mathematical functions

Unit –4: Managing Input and Output Operators   **[4]**

4.1 Introduction

4.2 Reading a character

4.3 Writing a character

4.4 Formatted input

4.5 Formatted output

Unit -5: Decision Making and Branching   **[6]**

5.1 Introduction

5.2 Decision making with IF statement

5.3 Simple IF statement

5.4 The IF…ELSE Staement

5.5 Nesting of IF…ELSE Staement

5.6 The ELSE…IF ladder

5.7 The SWITCH statement

5.8 The ?: operator

5.9 The GOTO statement

Unit -6 Decision Making and Looping [4]

    6.1 Introduction
    6.2 The WHILE statement
    6.3 The DO statement
    6.4 The FOR statement
    6.5 Jumps in loops

Unit – 7 : Arrays [3]

    7.1 Introducion
    7.2 One dimensional arrays
    7.3 Two dimensional arrays
    7.4 Initialising two dimensional arrays
    7.5 Multidimensional arrays

Unit – 8 : User-defined Functions [4]

    8.1Introduction
    8.2 Need for user-defined functions
    8.3 A multifunction program
    8.4The form of C Functions
    8.5 Return values and their types

Recommended Book (Scope of Syllabus):
[I] Programs in C by E. Balgurusamy, McGraw Hill, New-Delhi
Unit- 1 : 1.1-1.7 **Unit- 2 : 2.1 -2.10 Unit- 3** : 3.1-3.16 **Unit- 4 :**4.1-4.5
Unit- 5 : 5.1 - 5.9 **Unit- 6 :6.1-6.5 Unit- 7** : 7.1 - 7.5 **Unit- 8 :**9.1- 9.5
Reference books:

1. Numerical Methods in Engineering & Science with Programs in C and C++ Nineth Edition by B. S. Grewal Khanna Publishers New Delhi.
2. Numerical Analysis and Programming in C by Pundir and Pundir(Pragati Prakashan)
3. A Book on C, Macmillan, by Berry, R.E. and Meekings.
4. C Programming Language: An applied perspective, John Wiley & Sons
5. The C Programming Tutor, Prentice-Hall, by Wortman, L.A. and Sidebottom.
6. C made Easy, Osbone McGraw-Hill by Schildt, H. C.
7. Let us C by Yeshwant Kanetkar BPB Publications, New-Delhi.

8. Programming in C by Schaum's Outline Series, Tata McGraw Hill, EEE.

Numerical Technique Laboratory [NTL –III(A) to III(D)]

Note: Each assignment is of 1.5 periods [50+25 = 75 minutes]

NTL-III(A)(Algbra - II +Metric Spaces)
(Problems on the following topics)

Section - I : Algebra - II

Assignment-1 : Rings and subrings ,Integral domains and Fields
Assignment-2 : Isomorphism and Characteristic.
Assignment-3 : Homomorphisms of Rings. Ideals , Quotient Rings
Assignment-4 : Subspaces, Linear dependence, independence and basis
Assignment-5 : Linear transformation and matrices, Kernel and range
Assignment-6 : Inverse and Composite**,** Inner Product Space

Section – II :Metric Spaces

Assignment-7 : Metric Space-I(Examples on Metric spaces, open set, closed set, boundary set in Metric spaces)
Assignment-8 : Metric Space-II(Examples on bounded set, Totally bouunded set and Diameter of set in Metric spaces)
Assignment-9 : Metric Space-III(Examples on Limit of metric space, Cauchy sequence in Metric spaces)
Assignment- 10 : Metric Space-IV(Contraction, Isometry, homeomorphism in Metric spaces)
Assignment- 11: Metric Space-V(Examples on cover, open cover, Dense in Metric spaces)
Assignment- 12: Metric Space-VI(Examples on completeness and compactness in Metric spaces)

NTL -III(B) (Complex Analysis+ Numerical Analysis)
(Problems on the following topics)

Section - I :Complex Analysis

Assignment-1 : Find the regular (analytic) function of which function (Real , Imaginery , u+v , u-v type).
Assignment-2 : Solving the complex intigration Circle , Line and Parabola.
Assignment-3 : Obtain the Taylor's and Laurent's series.
Assignment-4 : Calculus of residue.
Assignment-5 : Integration round the unit circle.

Assignment-6 : Evaluation of integral $\int_0^{2\pi} f(\cos\theta, \sin\theta) d\theta$.

Section – II : Numerical Analysis

Assignment No.7: Finite Differences

Examples on Forward, Backward and Central difference formulae, Differences of a Polynomial, Relation between operators, (Forward(Δ), Backword(∇), Central δ, Shift (E))

Assignment No.8: Interpolation-I

Examples on Newton's forward , Newton's backward difference formulae, Central difference formulae

Assignment No.9: Interpolation – II

Examples on Gauss's forward and backward difference formulae, Stirling's formula, Lagrange's interpolation formula

Assignment No. 10: Numerical Differentiation

Examples on Numerical differentiation, formula for derivatives and maxima and minima of tabulated function

Assignment No. 11: Numerical Integration

Examples on Numerical integration, Trapezoidal rule, Simpson's 1/3 Rule and Simpson's 3/8 th rule .

Assignment No. 12: Difference Equations

Examples on Formation of difference equations, Linear difference equation, finding the Complementary function, finding the Particular Integral, Difference equations reducible to linear form.

NTL -III(C) (Integral Calculus + Integral Transforms)
Section - I : Integral Calculus

Assignment-1 : Improper Integral - I
Assignment-2 : Improper Integral - II
Assignment-3 : Beta and Gamma function - I
Assignment-4 : Beta and Gamma function -II
Assignment-5: Multiple integrals - I(Change of order and Change of Variable)
Assignment-6: Multiple integrals - II(Area and Volume)

Section – II : Integral Transform

Assignment-7 : Laplace Transforms (Numerical examples)
Assignment-8 : Inverse Laplace Transform(Numerical Examples)
Assignment-9 :Applications of Laplace Transform Ordinary Differential equations with constant coefficients,
Assignment-10 : Applications of Laplace Transform Ordinary Differential equations with variable coefficients.

Assignment-11 : Applications of Laplace Transform Simultaneous Ordinary Differential equations.
Assignment-12 : Applications of Laplace Transform Partial Differential equations.

NTL -III(D)(Partial Differential Equation +Programming in C)
(Problems on the following Topics)

Section – I : Partial Differential Equation

Assignment-1 : Solve Linear differential equation of first order by arbitrary constant and arbitrary function, Lagrange's method.
Assignment-2 : Non linear partial differential equation of order one by Charpit method.
Assignment-3 : Non linear partial differential equation of standerd form I , II , III & IV.
Assignment-4 : Find C.F and P.I for Homogeneous linear   partial differential equation with constant coefficient.
Assignment-5 : Find C.F and P.I for Non-Homogeneous linear partial differential equation with constant coefficient.
Assignment-6 : Find C.F and P.I for equation reducible to linear differential equation with constant coefficient.

Section – II :Programming in C
(Run and write following C programs only)

Assignment No.7: Sample Programms – I
Addition, subtraction, multiplication and division. Area, Volume of a sphere, Temperature Conversion, Simple Interest Calculation, Compound Interest Calculation, Salary Calculation, Bonus and Commission
Assignment No.8: Sample Programms – II
Star pattern, Reverse of a given number, Fibbonacci sequence, Factorial, ^nC_r, ^nP_r, Roots of the quadratic equation
 Assignment No.9: Sample Programms – III
Maximum and Minimum, Sum of the series $1+2+3+…+n$, $1^2+2^2+3^2+….+n^2$, $1^3+2^3+3^3+….+n^3$, $1^2+3^2+….+(n-1)^2$, $2^2+4^2+6^2+….+(2n)^2$
Assignment No.10: Sample Programms – IV
Sine, Cosine, Exponential series
Assignment No.11: Sample Programs – V
Ascending and descending data. Matrix addition/Subtraction, Matrix multiplication.
Assignment No.12: Sample Programs – VI
Trapezoidal Rule, Simpson's 1/3 Rule, Simpsons's 3/8 th Rule.

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