Final Copy

Davangere University

Bachelor of Science (B.Sc.) Semester Scheme

Curriculum Structure for Undergraduate Programme for 2026-27

Syllabus for Mathematics

	Title of the Paper	Subject Category	Teaching Hours/ week	Semester End Exam	Internal Assessment	Total Marks	Credits	Duration of the Exam
	Semester-V							
	24-MT-5.1 -Vector Calculus-2, Improper Integrals & Abstract Algebra	MT-T	04	80	20	100	03	3 Hrs.
	24-MT-5.2 -Ordinary Differential Equations-3 and Complex Analysis	MT-T	04	80	20	100	03	3 Hrs.
	Practical — V Mathematics Lab — V	MT-P	04	40	10	50	02	3 Hrs.
	Elementary Research Methodology		02	40	10	50	02	2Hrs
	Total		14	240	60	300	10	
	Semester-VI							
	24-MT-6.1- Partial Differential Equations and Linear Algebra	MT-T	04	80	20	100	03	3 Hrs.
	24-MT-6.2- Numerical Analysis, Line & Multiple Integrals and Fourier Series.	MT-T	04	80	20	100	03	3 Hrs.
	Practical — VI Mathematics Lab — VII	MT-P	04	40	10	50	02	3 Hrs.
	Project/ Internship/ Dissertation	MT-P	02	40	10	50	2	2 Hrs.
	Total		14	240	60	300	10	
	Grand total		28	480	120	600	20	

BoS-Chairman,
Department of Mathematics
Davangere University
Shivagangotri, Davangere-577007

05/01/2026
Prof. M. Govindappa
Dean-Science & Technology
Davangere University
Shivagangotri, Davangere-577007

Registrar
Davangere University
Shivagangotri, Davangere

SEMESTER-V

THEORY PAPER - 24MT-5.1:

VECTOR CALCULUS-2, IMPROPER INTEGRALS AND ABSTRACT ALGEBRA

TOTAL HOURS – 56

Course Learning Objectives:

a) To provide students with a strong foundation in vector calculus- Geometry of space curves and its applications in various scientific and engineering fields.

b) To bring awareness in basic applications of improper integrals.

c) To gain knowledge in the field of abstract algebra –Rings, Integral domain and fields.

d) To bring awareness in the concepts of homomorphism of rings and polynomial rings.

Course Outcome: On successful completion of the course, the student will be able to:

a) Learn Unit Tangent, Normal and Binormal of the space curves, radius of the curvature & torsion and Serret-Frenet formulae.

b) Learn various applications of Beta and Gamma functions, relations between Beta and Gamma functions and improper integrals.

c) Understand the definitions, Properties and examples on rings, Integral domain, field, subrings and quotient rings.

d) Also get clarification regarding the applications of homomorphism of rings and Polynomial rings.

VECTOR CALCULUS-2:

Unit —I : Geometry of space curves: —Multiple product — scalar triple product, vector triple product, interpretation, related problems; vector function of a scalar variable interpretation as a space curve, derivative, tangent, normal and binormal vectors to a space curve; Curvature and Torsion of a space curve definitions, Derivation and problems, Serret-Frenet formulae. **14 Hours**

IMPROPER INGEGRALS:

Unit — II: Definitions, Properties and examples, relations between beta and gamma functions, standard theorems, applications of evaluations of definite integrals, duplication formula and its applications.

14 Hours

ABSTRACT ALGEBRA:

Unit – III: Rings, Integral Domains & Fields

Rings — definition and properties of rings, Rings of integers modulo n, Integral Domain, Fields. Examples and standard properties. Subrings, Ideals, Quotient rings. **14 Hours**

Unit – IV: Homomorphism of rings and Polynomial rings

Principal, Prime and Maximal ideals –definition, examples and standard properties. Homomorphism and Isomorphism of rings- definition, properties and various examples. Polynomial rings - definition, Examples on reducible and irreducible polynomials, test for rational roots, factor theorem and remainder theorem.

14 Hours

Prescribed Books:

1. Prof. G. K Ranganath – A text book of Mathematics for B.Sc Course – Chand Publishers.
2. Prof. G. B. Gururajachar – A text book of Mathematics for B.Sc Course- Academic Excellent Series Publications, Bangalore. Edition-2021-22

Reference Books:

Unit 1:

1. M. D. Raisinghania, *Vector Calculus*, S. Chand & Company Pvt. Ltd., New Delhi, 2013.

2. M. Spiegel, *Vector Analysis*, 2nd Edition, Schaum's Outline Series, McGraw-Hill Education, 2017.

3. C. E. Weatherburn, *Elementary Vector Analysis*, Alpha Edition, 2019.

4. P. N. Wartikar and J. N. Wartikar, *A Textbook of Applied Mathematics*, Vol. II, Pune Vidyarthi Griha Prakashan, Pune, 2009.

Unit 2:

5. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publications.

6. H. K. Das, *Higher Engineering Mathematics*, S. Chand Publishers.

Unit 3:

7. I. N. Herstein (1990), *Topics in Algebra*, 2nd Edition, Wiley Eastern Ltd., New Delhi.

8. Joseph A. Gallian (2021), *Contemporary Abstract Algebra*, 10th ed., Taylor and Francis Group.

9. Michael Artin (2015), *Algebra*, 2nd ed., Pearson.

10. John B. Fraleigh (2003), *A First Course in Abstract Algebra*, 7th Edition, Pearson Education.

11. B. Sury (2003), *Rings and Fields*, Hindustan Book Agency.

12. D. S. Malik and J. N. Mordeson (2008), *Abstract Algebra*, PHI Learning Pvt. Ltd., New Delhi.

Unit 4:

13. Michael Artin, *Algebra*, 2nd Edition, Prentice Hall of India, New Delhi, 2011.

14. John B. Fraleigh, *A First Course in Abstract Algebra*, 7th Edition, Addison-Wesley Longman, 2002.

15. Joseph A. Gallian, *Contemporary Abstract Algebra*, 10th Edition, Cengage Learning, 2021.

16. B. Sury, *Rings and Fields*, Hindustan Book Agency, New Delhi, 2003.

17. D. S. Malik and J. N. Mordeson, *Abstract Algebra*, PHI Learning Pvt. Ltd., New Delhi.

SEMESTER-V

THEORY PAPER - 24MT-5.2:

ORIDINARY DIFFERENTIAL EQUATIONS-3 & COMPLEX ANALYSIS

TOTAL HOURS – 56

Course Learning Objectives:

a) To bring knowledge in finding the solution of differential equation with variable coefficients, total and simultaneous differential equations.

b) To learn basics in the field of Complex analysis and its applications.

c) To bring awareness in the field of complex integration and its applications

d) To gain knowledge in the field of Bilinear Transformations and its applications.

Course Outcome: On successful completion of the course, the student will be able to:

a) Learn the Five different methods of solving ordinary differential equations with variable coefficients, total and simultaneous differential equations.

b) Learn about analytic functions, C-R equations, Milne-Thomson method to fine real or imaginary part.

c) Learn about Cauchy's Integral theorem, Cauchy's Integral formula and its applications.

d) Learn about bilinear transformations, Cross ratio of four points and conformal mappings.

ORDINARY DIFFERENTIAL EQUATIONS-3

Unit – I: Solutions of second order ordinary linear differential equations with variables coefficients by the following methods. (i) When a part of complementary function is given. (ii) By changing the independent variable. (iii) By changing the dependent variable. (iv) By the method of variation of parameters. (v) By the method of testing exactness. Total and Simultaneous differential equations.

14 Hours

COMPLEX ANALYSIS

Unit – II: Complex numbers-Cartesian and polar form-geometrical representation-complex-Plane, Euler's formula. $e^{i\theta} = \cos\theta + i\sin\theta$. Functions of a complex variable-limit, continuity and differentiability of a complex function. Analytic function, Cauchy-Riemann equations. Harmonic function-standard properties of analytic functions-construction of analytic function when real or imaginary part is given-Milne Thomson method. **14 Hours**

Unit — III: Complex Integration

Complex integration definition, Line integral, properties and problems. Cauchy's Integral theorem-proof using Green's theorem, direct consequences. Cauchy's Integral formula with proof-Cauchy's generalized formula for the derivatives with proof and applications for evaluation of simple line integrals. Cauchy's integral problems. **14 Hours**

Unit —IV: Bilinear Transformations

Linear transformation- Definitions-Bilinear transformations- Cross-ratio of four points- Cross-ratio preserving property- Preservation of the family of straight lines and circles-Conformal mappings-

Discussion of the transformations $w = z^2, w = \sin z, w = e^z$ and $w = \frac{1}{2}(z + \frac{1}{z})$ **14 Hours**

Prescribed Books:

1. Prof. G. K Ranganath – A text book of Mathematics for B.Sc Course – Chand Publishers.
2. Prof. G. B. Gururajachar – A text book of Mathematics for B.Sc Course- Academic Excellent Series Publications, Bangalore. Edition-2021-22.

Reference Books:

Unit 1

1. V.Venkateswara Rao, N. Krishnamurthy, B.V.S.S Sharma, S. Anjaneya Sastry – A text book of B.Sc Mathematics Volume – II , For Degree Classes-18th Edition- S.Chand Publishers
2. E. A. Coddington, *An Introduction to Ordinary Differential Equations*, Prentice-Hall of India Pvt. Ltd.
3. E. L. Ince, *Ordinary Differential Equations*, Dover Publications.
4. M. D. Raisinghania, *Ordinary and Partial Differential Equations*, S. Chand Publishers.
5. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publications.
6. H. K. Dass, *Advanced Engineering Mathematics*, S. Chand Publishers.
7. C. H. Edwards and D. E. Penney, *Differential Equations and Boundary Value Problems*, Pearson Education.
8. T. K. Manicavasagam Pillai, *Ordinary Differential Equations*, S. Viswanathan Publishers.

Unit 2, Unit 3 and Unit 4.

9. L. V. Ahlfors, *Complex Analysis*, 3rd Edition, McGraw Hill Education.
10. Bruce P. Palka, *Introduction to the Theory of Functions of a Complex Variable*, Springer. Serge Lang, *Complex Analysis*, Springer.
11. Shanti Narayan, *Theory of Functions of a Complex Variable*, S. Chand Publishers.
12. S. Ponnuswamy, *Foundations of Complex Analysis*, 2nd Edition, Alpha Science International Limited.
13. R. V. Churchill and J. W. Brown, *Complex Variables and Applications*, 5th Edition, McGraw Hill Companies.
14. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publications.

PRACTICAL PAPER
SEMESTER-V
24MP-5.1: MATHEMATICS LAB-V

(4 hours/ week per batch of not more than 15 students)

Course Learning Objectives:

a) Foundation for introducing to programming.
b) Enables the student to explore mathematical concepts and verify mathematical facts through the use of software.
c) Enhances the skills in programming.
d) Acquire knowledge of practical applications of algebra and calculus through FOSS.

Course Outcome: On successful completion of the course, the student will be able to:

a) Learn Free and Open Source Software (FOSS) tools for computer programming.
b) Show proficiency in using the software MATLAB and C-Programming.
c) Understand the use of various techniques of the software for effectively doing mathematics.
d) Obtain necessary skills in programming.
e) Understand the applications of mathematics
f) Explore and grasp concepts for the future across a wealth of disciplines.

Syllabus: Problems from 24MT-5.1 and 24-MT-5.2 (Theory) may be solved with the help of programming.

Suggested Softwares: Maxima / Scilab / Phython,

List of Programs (Suggested):

1. Programs to find scalar product and vector product of two vectors.
2. Programs to find scalar triple product and vector triple product of three vectors.
3. Basic commands on gamma and beta functions with examples.
4. Evaluation of integral value of various functions using gamma and beta functions.
5. Programs to check whether the given finite set is a ring or not?
6. Programs to check whether the given ring is an Integral domain or not?
7. Programs to check whether the given ring is a Field or not?
8. Program to check whether the given set is the subring of the ring or not?
9. Program to check whether the given set is an ideal of a ring or not?
10. Program to check whether Union of two ideals need not be an ideal?
11. Programs to verify Homomorphism of given function in the rings?
12. Programs to verify Isomorphism of given function in the rings?
13. Program to find the known solution of C.F and general solution of given differential equation.
14. Program to find the general solution of differential equation by changing dependent variable.
15. Program to find the solution ordinary differential equation by changing into First integral.
16. Program to find the solution of total differential equation.
17. Programs to check whether given function is analytic or not.

18. Programs to construct analytic functions by Milne-Thomson method.
19. Programs to find the real part of the analytic function when imaginary part has given and vice versa
20. Programs to check whether given real or imaginary part of complex function is harmonic or not.
21. Program to check the orthogonally of the surfaces obtained from the real and imaginary part of the complex function.
22. Programs on Complex Integration and Cauchy's integral theorem
23. Programs on Cross Ratio of Points-Bilinear transformation.
24. Programs on Fixed Points of the bilinear transformation.
25. Programs on Invariant points of the bilinear transformation.

SEMESTER-V

SEP BSc-V Semester: Elementary Research Methodology

Subject	**Elementary Research Methodology**	Semester	V
Number hr/week	2 hours	Total hours	32
Duration of the exam	2 hours	Credits	2

Learning Outcomes:

After the completion of this course the learner will be able to:

- Describe the basic concepts of research and its methodologies.
- Identify the appropriate research topics and set up hypothesis.
- Perform literature survey using library (print) and internet (online) sources.
- Design experiments/surveys, collect data and and represent data in table and figure forms.
- Analyze data with appropriate software tools, internet results and draw conclusions.
- Write scientific report/ review and prepare seminar/ conference presentations oral or poster.
- Understand the methods of citations and referencing styles, check plagiarism.
- Identification of lacuna (finding gap-areas), hypothesis formulation, framing objectives, and preparation of questionnaire.

Unit-1	***Scientific Methods and Research***: Concept, Definitions of research; Purpose, importance, steps levels and rigor of research; different paradigms of research. ***Types of Research***: Fundamental/Applied research, Descriptive/Analytical research, Quantitative /Qualitative research, Conceptual/Empirical research, Diagnostic/Hypothesis testing research, Conclusion oriented/Decision oriented research, Theoretical / Action research, Longitudinal /Cross sectional research ***Research Question***: Introduction, types and identification; ***Research Problem***: Definition, identification of problem, ways of understanding problem, criteria of a good problem, guidelines for selecting meaningful problem; ***Research Objective***: Definition, broad and specific objectives, goals; ***Research Hypothesis***: Meaning of research hypothesis, sources of hypothesis, qualities of workable hypothesis, utilities of hypothesis;	8 h
Unit-2	***Introduction and review of sampling***: Definition, needs, steps; Definitions of population, sample, sampling unit, sampling frame, sampling error and non sampling error; Steps in sampling; Fundamentals, characteristics, advantages and disadvantages of sampling. ***Types of sampling***: Probability (simple, stratified, systematic , cluster and multistage –in brief), Process of selecting random sample; non probability sampling (convenience, purposive, quota, snowball, self selecting); Advantages and disadvantages (brief discuss only) ***Size of sample***: Factor affecting size of sample, Testing the reliability of sample, Methods of estimating sample size, Process of selecting random sample	8 h
Unit-3	***Designing of research work***: Introduction, Purposes, Characteristics of a research design, Principles of designing a research, conceptual framework and its operationalization, Sectors of research design, Research methods as research	8 h

	designing, similarities and differences between Research design and research method. ***Conventional research method:*** Principle and Importance conventional methods, Scientific methods as conventional methods, Characteristic of a scientific method; Aspects of scientific Method, Evolution of scientific Studies Steps in scientific methods,	
Unit-4	***Historical Research Method:*** Nature and Steps in Historical method, Importance and fundamentals of Historical method, Sources of Historical data, Limitations. ***Experimental Research Method:*** Introduction, Types of experiments, steps in experimental research, Problems in experimentation; Ex-post facto research: definition and technique. ***Survey Research Method:*** Introduction, and Importance of survey method, Comparison of survey method with other methods; Objectives of social and survey and technical survey, types of social and technical survey, Steps in social and technical surveys, Pilot survey ***Case study:*** Introduction, Types of case studies: Exploratory and Hypothesis testing; Steps in case studies, Sources of case data, limitations. **Analysis of data-** introduction, data analysis tools. Project time line, literature review and references, research report structure, plagiarism.	8 h

SEMESTER-VI
THEORY PAPER - 24MT-6.1:
PARTIAL DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA

TOTAL HOURS – 56

Course Learning Objectives:

a) To bring knowledge in finding the solutions of Partial differential equations of various types.

b) To bring awareness in finding the solutions of non-linear, homogeneous and non-homogeneous linear partial differential equations with constant coefficients

c) To learn basic properties of linear algebra like vector spaces, subspaces, Basis & dimension with various types of examples.

d) To gain knowledge in field of linear transformations and its applications.

Course Outcome: On successful completion of the course, the student will be able to:

a) Solve Partial Differential Equations of first order using Lagrange's Method, and by classifying its four types.

b) Solve Non –linear and Linear Partial Differential Equations with constant coefficients and by reducing into canonical form.

c) Learn about Vector space and its properties, Subspaces, Basis and dimension with various examples and its proofs of various properties.

d) Learn about Linear transformations, Matrix of a linear transformation, Rank-Nullity theorem and its applications.

Partial Differential Equations:

Unit – 1: Basic concepts—Formation of partial differential equations by elimination of arbitrary constants and functions, Solution of partial differential equations, Solution by Direct integration, Lagrange's linear equations of the form Pp + Qq = R, Standard types of first order non-linear partial differential equations. **14 Hours**

Unit – 2: Solution of the non-linear partial differential equations by Charpit's method, Linear Partial differential equations of the second order, Homogeneous & Non-homogeneous linear partial differential equations with constant coefficients. Method of separation of variables, Classification of second-order partial differential equations and canonical forms. **14 Hours**

Linear Algebra:

Unit – 3: Vector spaces - Definition, examples and properties; Subspaces - Definition, examples and properties; Linear Combination - Linear span, Linearly dependent and independent- Definition, examples and properties,; Basis and dimension - Coordinates, ordered basis, some basic properties of basis and dimension and subspace spanned by given set of vectors; **14 Hours**

Unit – 4: Linear transformation - Definition, examples, equivalent criteria, some basic properties and matrix representation and Definition of a matrix of a linear transformation and its applications. Rank Nullity theorem - Null space, Range space, proof of rank nullity theorem and related problems.

14 Hours

Prescribed Books:

1. Prof. G. K Ranganath – A text book of Mathematics for B.Sc Course – Chand Publishers.
2. Prof. G. B. Gururajachar – A text book of Mathematics for B.Sc Course- Academic Excellent Series Publications, Bangalore. Edition-2021-22.

Reference Books:

Unit 1 and Unit 2:

1. H. T. H. Piaggio, *Elementary Treatise on Differential Equations and Their Applications*, CBS Publishers & Distributors, Delhi, 1985.
2. M. D. Raisinghania, *Ordinary Differential Equations and Partial Differential Equations*, S. Chand & Company, New Delhi.
3. K. Sankara Rao, *Introduction to Partial Differential Equations*, 3rd Edition, PHI Learning, 2015.
4. I. N. Sneddon, *Elements of Partial Differential Equations*, McGraw-Hill International Editions, 1986.
5. E. D. Rainville and P. E. Bedient, *A Short Course in Differential Equations*, 6th Edition, Prentice Hall College Division.
6. Sathya Prakash, *Mathematical Physics*, S. Chand and Sons, New Delhi.

Unit 3 and Unit 4:

7. V.Venkateswara Rao, N. Krishnamurthy, B.V.S.S Sharma, S. Anjaneya Sastry – A text book of B.Sc Mathematics Volume – II , For Degree Classes-18th Edition- S.Chand Publishers
8. Stephen H. Friedberg, Arnold J. Insel and Lawrence E. Spence, *Linear Algebra*, 4th Edition, Prentice-Hall of India Pvt. Ltd., 2003.
9. Kenneth Hoffman and Ray Kunze, *Linear Algebra*, 2nd Edition, Prentice Hall India Learning Private Limited, 2015.
10. Serge Lang, *Introduction to Linear Algebra*, 2nd Edition, Springer India, 2005.
11. Gilbert Strang, *Linear Algebra and Its Applications*, 2nd Edition, Elsevier, 2015.
12. F. M. Stewart, *Introduction to Linear Algebra*, Dover Publications.
13. S. Kumaresan, *Linear Algebra*, Prentice Hall India Learning Private Limited.
14. Vivek Sahai and Vikas Bist, *Linear Algebra*, 2nd Edition, Narosa Publishing, 2013.

SEMESTER-VI

THEORY PAPER - 24MT- 6.2:

Numerical Analysis, Line & Multiple Integrals and Fourier series

TOTAL HOURS – 56

Course Learning Objectives:

a) To bring knowledge in finding the approximate values of the polynomial functions in equal and unequal intervals, First and second order derivatives and definite integral values of the function using Numerical Methods.

b) To bring knowledge in finding the approximate solution of the Algebraic and Transcendental equations and Initial value Problems using Numerical Methods

c) To learn basics of line and multiple integrals of various types of functions.

d) To gain knowledge in finding the Fourier series of various functions.

Course Outcome: On successful completion of the course, the student will able to:

a) Find the approximate values of the polynomial functions using Newton-Gregory forward and backward interpolation formulae, Lagrange's & Newton divided interpolation formulae, derivation and integration of functions using Numerical methods

b) Find the roots of the polynomials equations using various methods, solution of initial value problems using various methods.

c) Find the line integrals, double integrals and triple integrals of the various types of functions.

d) Learn various applications of Fourier series of functions with period 2π and 2L. Fourier series of even and odd functions. Half range Cosine and Sine series.

NUMERICAL ANALYSIS

Unit – 1: Finite Differences, Numerical Differentiation & Integration

Finite differences. Forward, backward and central differences and shift operators: definitions, properties and problems; Polynomial interpolation through Newton-Gregory forward and backward interpolation, Lagrange's interpolation. Only examples on Formula for derivatives. Numerical Integration - General quadrature formula, only examples on Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Weddle's rule. **14 Hours**

Unit — 2: Solutions of Initial value Problems, Algebraic & Transcendental Equations

Solutions to algebraic and transcendental equations using - Bisection method, Regula-Falsi method and Newton-Raphson method, Solution of initial value problems for ordinary linear first order differential equation by Taylor's Method, Picard's method, Euler's method, Euler's modified method and Runge-Kutta's fourth order method. **14 Hours**

Unit – 3: Line and Multiple Integrals:

Definition of line integral and basic properties, examples on evaluation of line integrals. Definition of double integral, examples on evaluation of only double integrals— Definition of triple integral, examples on Evaluation of only triple integrals, **14 Hours**

Unit-4: FOURIER SERIES

Periodic functions. Fourier Coefficients. Fourier series of functions with period 2π and 2L. Fourier series of even and odd functions. Half range Cosine and Sine series. **14 Hours**

Prescribed Books:

1. Prof. G. K Ranganath – A text book of Mathematics for B.Sc Course – Chand Publishers.
2. Prof. G. B. Gururajachar – A text book of Mathematics for B.Sc Course- Academic Excellent Series Publications, Bangalore. Edition-2021-22.

Reference Books:

Unit 1 and Unit 2:

1. S. Ranganatham, Dr. M.V.S.S,N Prasad, Dr. V.Ramesh Babu, Numerical analysis for the students of B.A., B.Sc (Third Year) – S.Chand Publishers Edition 2016
2. S. S. Sastry, *Introductory Methods of Numerical Analysis*, 5th Edition, PHI Learning Private Limited, 2012.
3. M. K. Jain, S. R. K. Iyengar and R. K. Jain, *Numerical Methods for Scientific and Engineering Computation*, 4th Edition, New Age International, 2005.
4. B. S. Grewal, *Numerical Methods for Scientists and Engineers with Programs in C, C++ & MATLAB*, 11th Edition, Khanna Publishers, 2013.
5. H. C. Saxena, *Finite Difference and Numerical Analysis*, S. Chand Publishers, 2010.
6. E. Isaacson and H. B. Keller, *Analysis of Numerical Methods*, Revised Edition, Dover Publications, 2012.
7. B. D. Gupta, *Numerical Analysis*, Konark Publishers Pvt. Ltd., 1990.
8. E. Kreyszig, *Advanced Engineering Mathematics*, 10th Edition, Wiley India Pvt. Limited, 2015.

Unit 3:

9. R. V. Churchill and J. W. Brown, *Complex Variables and its Applications*, 5th ed, McGraw Hill Companies.
10. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publications.
11. H. K. Das, *Higher Engineering Mathematics*, S. Chand Publishers.
12. N. P. Bali, *Integral Calculus*, Golden Series.
13. S. Ponnuswamy, *Foundations of Complex Analysis*, 2nd Edition, Alpha Science International Limited.

Unit 4:

14. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publications.
15. H. K. Das, *Higher Engineering Mathematics*, S. Chand Publishers.
16. M. D. Raisinghania, *Laplace and Fourier Transforms*, S. Chand and Co. Ltd., New Delhi, 1995.
17. J. K. Goyal and K. P. Gupta, *Laplace and Fourier Transforms*, Pragati Prakashan, India, 2016.
18. B. V. Ramana, *Higher Engineering Mathematics*, Tata McGraw-Hill, 2006.
19. A. R. Vasistha and R. K. Gupta, *Laplace Transforms*, Krishna Prakashan Media Pvt. Ltd., Meerut, India, 2023.
20. S. Ranganatham, Dr. M.V.S.S,N Prasad, Dr. V.Ramesh Babu, - Fourier Series and Integral transforms – S.Chand Publishers.

PRACTICAL PAPER
SEMESTER-VI
24MP-6.1: MATHEMATICS LAB-7

(4 hours/ week per batch of not more than 15 students)

Course Learning Objectives:

a) Foundation for introducing to programming.
b) Enables the student to explore mathematical concepts and verify mathematical facts through the use of software.
c) Enhances the skills in programming.
d) Acquire knowledge of practical applications of algebra and calculus through FOSS.

Course Outcome: On successful completion of the course, the student will able to:

a) Learn Free and Open Source Software (FOSS) tools for computer programming.
b) Show proficiency in using the software MATLAB and C-Programming.
c) Understand the use of various techniques of the software for effectively doing mathematics.
d) Obtain necessary skills in programming.
e) Understand the applications of mathematics
f) Explore and grasp concepts for the future across a wealth of disciplines.

Syllabus: Problems from 24MT-6.1and 24-MT-6.2 (Theory) may be solved with the help of programming.

Suggested Soft-wares: Maxima/ Scilab/ Phython,

List of Programs (Suggested):

1. Program to solve the partial differential equation using Legrange's Method.
2. Program to solve the partial differential equation of TYPE – 1.
3. Program to solve the partial differential equation of TYPE – 2.
4. Program to solve the partial differential equation of TYPE – 3.
5. Program to solve the partial differential equation of TYPE – 4.
6. Program to solve the partial differential equation using Charpit's Method.
7. Program to check whether a vector is a linear combination of other given vectors.
8. Program to check whether given vectors are linearly independent or dependent.
9. Program to check whether given vectors form a basis or not.
10. Program to check whether given mapping is linear transformation or not.
11. Program to find the matrix of linear transformation for given linear transformation with respect to the given bases.
12. Program to find the linear transformation when matrix of a linear transformation is given.
13. Program to verify the Rank-Nullity theorem for given transformation with respect to the given bases.
14. Programs on Line integrals of the curve with change of constants and change of variables
15. Programs on Double integration with constant limits and change of variables:
16. Programs on Triple integration with constant limits and Variable limits:

17. Programs to find the Fourier series of given functions for given limit.
18. Programs to find the half- range Fourier sine and cosine series of given functions for given limit.
19. Program to find the approximate value of f(x) for x in between given data using Newton-Gregory forward interpolation formula.
20. Program to find the approximate value of f(x) for x in between given data using Newton-Gregory backward interpolation formula.
21. Program to find the approximate value of f(x) for x in between given data using Legrange's interpolation formula.
22. Program to find the approximate integral value of the given function using Trapezoidal rule.
23. Program to find the approximate integral value of the given function using Simpson's one third rule.
24. Program to find the approximate integral value of the given function using Simpson's three eighth rule
25. Program to find the approximate integral value of the given function using Weddle's rule.
26. Program to find the approximate root of the polynomial using Bisection Method.
27. Program to find the approximate root of the polynomial using Regular- Falsi Method.
28. Program to find the approximate root of the polynomial using Newton- Raphson Method
29. Program to find the approximate particular solution of the given first order differential equation using Euler's Modified method.
30. Program to find the approximate particular solution of the given first order differential equation using Runge-Kutta Method.

SEMESTER-VI

PROJECT WORK

THEORY EXAMINATION QUESTION PAPER PATTERN

(Semesters I –VI)

B.Sc. Semester-I Degree Examination; 2024-25

(Semester Scheme; New Syllabus: 2024-25)

SUBJECT: Mathematics

Paper _____ : _____ Paper Code: _____

TIME: 3 HOURS **MAX. MARKS: 80**

Instructions to candidates:

1) All sections are compulsory
2) Draw neat and labelled diagrams wherever necessary.

SECTION-A

1. Answer **all** the following questions: **(2×10=20)**

a)
b)
c)
d)
e)
f)
g)
h)
i)
j)

SECTION-B

Answer any **SIX** of the following: **(5×6=30)**

2.
3.
4.
5.
6.
7.
8.
9.

SECTION -C

Answer Any **Three** of the following: **(10×3=30)**

10. a) From Unit-I
b)
11. a) From Unit-II
b)
12. a) From Unit-III
b)
13. a) From Unit-IV
b)

BoS-Chairman,
Department of Mathematics
Davangere University
Shivagangotri, Davangere-577007

Prof. M. Govindappa
Dean-Science & Technology
Davangere University
Shivagangotri, Davangere-577007

Registrar
Davangere University
Shivagangotri, Davangere

Question Paper Pattern for Practical Paper Examinations

(Semesters I –VI)

Duration: 3 Hours

- **Experimentation (Major & Minor/Spotters) -** **30 Marks**

Answer **Any Three** of the following: **(10×3=30)**	
1. Program	- From Unit-1
2. Program	- From Unit-2
3. Program	- From Unit-3
4. Program	- From Unit-4

- **Viva Voice** - **10 Marks**

TOTAL **40 MARKS**

Internal Assessment for Theory Paper

I-VI semesters

Sl. No.	Internal Assessment	Maximum Marks
(1)	(2)	(3)
01	Two Session Tests with proper record for assessment (5+5 = 10)	10
02	Assessment of Skill Development activities/Seminars/Group Discussion/ Assignment etc., with proper record	05
03	□ Attendance with proper record	05
	TOTAL MARKS	20

□ Attendance Marks-breakup

< 75%	-	00 Marks
75-80%	-	01 Mark
80-85%	-	02 Marks
85-90%	-	03 Marks
90-95%	-	04 Marks
>95%	-	05 Marks

Internal Assessment for Practical Paper I-VI semesters

- Attendance - 05 Marks
- Record / Journal - 05 Marks

Total - **10 Marks**
