SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi / Affiliated to Anna University, Chennai / Accredited by NAAC & NBA)

(An Autonomous Institution)

Dindigul – Palani Highway, Dindigul 624 002

DEPARTMENT OF MATHEMATICS

CURRICULUM & SYLLABI

Applicable to All Undergraduate Programmes

SEMESTER I - IV

AUTONOMOUS REGULATION - 2025

Department of Mathematics

Curriculum and Syllabi – For all UG Programmes

Autonomous Regulation – 2025

S. No.	DEPARTMENTS	
1	**Department of Civil Engineering**	
	Sem I	MA1101 - Calculus for Engineers
	Sem II	MA1201 - Applied Statistics and Numerical Methods
	Sem III	MA1303 - Transforms and Its Applications
2	**Department of Mechanical Engineering**	
	Sem I	MA1101 - Calculus for Engineers
	Sem II	MA1201 - Applied Statistics and Numerical Methods
	Sem III	MA1303 - Transforms and Its Applications
3	**Department of Electrical and Electronics Engineering**	
	Sem I	MA1101 - Calculus for Engineers
	Sem II	MA1201 - Applied Statistics and Numerical Methods
	Sem III	MA1303 - Transforms and Its Applications
4	**Department of Electronics and Communication Engineering**	
	Sem I	MA1101 - Calculus for Engineers
	Sem II	MA1201 - Applied Statistics and Numerical Methods
	Sem III	MA1302 - Stochastic Processes and Linear Algebra
5	**Department of Computer Science and Engineering**	
	Sem I	MA1101 - Calculus for Engineers
	Sem II	MA1201 - Applied Statistics and Numerical Methods
	Sem III	MA1301 - Discrete Mathematics and Linear Algebra

6	**Department of Computer Science & Business Systems**	
	Sem I	MA1101 - Calculus for Engineers
	Sem II	MA1201 - Applied Statistics and Numerical Methods
	Sem III	MA1301 - Discrete Mathematics and Linear Algebra
	Sem IV	MA1401 - Statistics and Random Variables
7	**Department of Artificial Intelligence & Data Science**	
	Sem I	MA1101 - Calculus for Engineers
	Sem II	MA1201 - Applied Statistics and Numerical Methods
	Sem III	MA1301 - Discrete Mathematics and Linear Algebra
	Sem IV	MA1401 - Statistics and Random Variables
8	**Department of Cyber Security**	
	Sem I	MA1101 - Calculus for Engineers
	Sem II	MA1201 - Applied Statistics and Numerical Methods
	Sem III	MA1301 - Discrete Mathematics and Linear Algebra
9	**Department of Information Technology**	
	Sem I	MA1101 - Calculus for Engineers
	Sem II	MA1201 - Applied Statistics and Numerical Methods
	Sem III	MA1301 - Discrete Mathematics and Linear Algebra
10	**Department of Artificial Intelligence & Machine Learning**	
	Sem I	MA1101 - Calculus for Engineers
	Sem II	MA1201 - Applied Statistics and Numerical Methods
	Sem III	MA1301 - Discrete Mathematics and Linear Algebra

Department of Civil Engineering

Program Outcomes & Program Specific Outcomes

Autonomous Regulation – 2025

PROGRAM OUTCOMES (POs)

PO	Description
PO1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design solutions for the complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

	Communicate effectively on complex engineering activities with the Engineering community and
PO10	with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (POs)

PSO	**Programme Specific Outcomes**
PSO.1	Enhancing the employability skills by making the students find innovative solutions for challenges and problems in various domains of Civil Engineering.
PSO.2	Inculcating state of art technologies in students to deal with practical aspects of Civil Engineering.

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Autonomous Regulation 2025

SEMESTER - I

MA1101 **CALCULUS FOR ENGINEERS** **L T P C**
3 1 0 4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To equip students with integral calculus techniques, including multiple integrals, for finding areas, volumes, and solving real-life problems.
- To introduce the concepts of vector calculus and apply integral theorems (Gauss, Green, Stokes) in physical and engineering contexts.

UNIT I **MATRICES** **9+3**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors –Cayley-Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms

UNIT II **DIFFERENTIAL CALCULUS** **9+3**

Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Maxima and Minima of functions of one variable.

UNIT III **FUNCTIONS OF SEVERAL VARIABLES** **9+3**

Partial differentiation – Jacobians – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV **INTEGRAL CALCULUS** **9+3**

Definite and Indefinite Integrals – Integration by parts – Double and Triple integrals in Cartesian form – Area and Volume in Cartesian form.

UNIT V **VECTOR CALCULUS** **9+3**

Gradient, Divergence, Curl, Solenoidal, Irrotational fields – Directional Derivative – Greens theorem (without proof): Applications of evaluating line and region – Gauss Divergence theorem and Stoke's theorem (without proof) – Applications to Cubes and Parallelopipeds

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Able to use differential calculus ideas on several variable functions

CO4: Apply the concepts of definite and indefinite integrals to solve problems in mathematics and related fields.

CO5: Apply fundamental theorems of vector calculus to relate different types of integrals.

TEXTBOOKS

1. Kreyszig, E. Advanced Engineering Mathematics. 10th Edition, John Wiley and Sons, New Delhi, 2016.
2. Grewal, B. S. Higher Engineering Mathematics. 44th Edition, Khanna Publishers, New Delhi, 2018.
3. Stewart, James. Calculus: Early Transcendentals. 8th Edition, Cengage Learning, New Delhi, 2015.

REFERENCES

1. Bali, N., Goyal, M., and Watkins, C. Advanced Engineering Mathematics. Firewall Media (An imprint of Lakshmi Publications Pvt. Ltd.), New Delhi, 7th Edition, 2009.

2. Jain, R. K., and Iyengar, S. R. K. Advanced Engineering Mathematics. Narosa Publications, New Delhi, 5th Edition, 2016.

3. Narayanan, S., and Manicavachagam Pillai, T. K. Calculus, Volumes I and II. S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

4. Ramana, B. V. Higher Engineering Mathematics. McGraw Hill Education Pvt. Ltd., New Delhi, 2016.

5. Veerarajan, T. Engineering Mathematics. 2nd Edition, Tata McGraw Hill Publishers, New Delhi, 2009.

6. Kavitha, S., Christopher, M., and Bhuvaneswari, N. Calculus for Engineers, VRB Publishers Pvt. Ltd., Chennai, 2025.

CO's-PO's & PSO's MAPPING (CIVIL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	0	0	0	0	2	0	1	3	1	0
CO2	3	3	1	1	0	0	0	0	2	0	1	3	1	0
CO3	3	3	1	1	0	0	0	0	2	0	1	3	1	0
CO4	3	3	1	1	0	0	0	0	2	0	1	3	1	0
CO5	3	3	1	1	0	0	0	0	2	0	1	3	1	0
AVG	3	3	1	1	0	0	0	0	2	0	1	3	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - II

MA1201   **APPLIED STATISTICS AND NUMERICAL METHODS**   **L T P C**

                                                              3 1 0 4

COURSE OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the principles and techniques of design of experiments for conducting systematic and efficient experiments.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I   TESTING OF HYPOTHESIS   **9 + 3**

Sampling distributions - Tests for single mean, and difference of means (Large and small samples) – Chi square test for goodness of fit – Independence of attributes.

UNIT II   DESIGN OF EXPERIMENTS   **9 + 3**

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design.

UNIT III   SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS   **9 + 3**

Solution of algebraic and transcendental equations - Newton Raphson method- Solution of linear system of equations - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

UNIT IV   INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION   **9 + 3**

Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials at the starting value – Numerical single integration using Trapezoidal, Simpson's 1/3 and 3/8 rules.

UNIT V   NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS   **9 + 3**

Single step methods: Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step method: Milne's predictor corrector method for solving first order differential equations.

TOTAL (L:45+T:15)   **: 60 PERIODS**

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3: Apply numerical techniques to solve algebraic equations, linear systems, and eigenvalue problems.

CO4: Use interpolation, differentiation, and integration methods to approximate functions, derivatives, and definite integrals with numerical accuracy.

CO5: Apply single-step and multi-step numerical methods to obtain approximate solutions of first-order differential equations.

TEXT BOOKS:

[1] Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

[2] Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

[3] Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.

REFERENCES:

[1] Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
[2] Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
[3] Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
[4] Satheesh Babu. R., Saravanan. R., Janani. R., "Applied Statistics and Numerical Methods", VRB Publishers Pvt. Ltd., Chennai, 2025.
[5] Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
[6] Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

CO's-PO's & PSO's MAPPING (CIVIL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	1	0	0	0	2	0	2	3	1	0
CO2	3	3	1	1	1	0	0	0	2	0	2	3	1	0
CO3	3	3	1	1	1	0	0	0	2	0	2	3	1	0
CO4	3	3	1	1	1	0	0	0	2	0	2	3	1	0
CO5	3	3	1	1	1	0	0	0	2	0	2	3	1	0
AVG	3	3	1	1	1	0	0	0	2	0	2	3	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - III

MA1303   **TRANSFORMS AND ITS APPLICATIONS**   **L T P C**

3 1 0 4

COURSE OBJECTIVES:

- To introduce Laplace transforms which can be used for solving the problems that occur in various branches of engineering disciplines.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier, transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes, and to develop Z transform techniques for discrete time systems.

UNIT I   LAPLACE TRANSFORMS   9+3

Existence conditions – Transforms of elementary functions – Basic properties – Shifting theorems – Inverse Laplace transforms - Transforms of periodic functions.

UNIT II   FOURIER SERIES   9+3

Dirichlet's conditions – Fourier series: Odd and Even functions – Half range sine series – Half range cosine series – Harmonic analysis.

UNIT III   APPLICATIONS OF FOURIER SERIES   9+3

Classification of PDE – Fourier series solutions of one-dimensional wave equation – One-dimensional equation of heat conduction – Steady state solution of two-dimensional heat conduction equation.

UNIT IV   FOURIER TRANSFORMS   9+3

Statement of the Fourier Integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Parseval's identity.

UNIT V   Z - TRANSFORMS AND DIFFERENCE EQUATIONS   9+3

Z- Transforms - Elementary properties – Inverse Z-transform using partial fraction – Convolution theorem – Solution of difference equations using Z-transforms.

TOTAL (L:45+T:15)   : 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1. Understand how to solve Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

CO2. Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.

CO3. Appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations.

CO4. Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

CO5. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems

TEXT BOOKS:

[1] Veerarajan. T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.

[2] Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 43rd Edition, 2014.

[3] Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt. Ltd.1998.

REFERENCES:

[1] Bali. N. P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd, 2007.

[2] Ramana. B. V., "Higher Engineering Mathematics", Tata Mc Graw Hill Publishing Company Limited, New Delhi, 2008.

[3] Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

[4] Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley India, 2016.

[5] Jain R.K. and Iyengar S.R.K., Advanced Engineering Mathematics, Narosa Publications, New Delhi , 3rd Edition, 2007.

CO's-PO's & PSO's MAPPING (CIVIL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	0	0	0	0	0	0	0	0	0	0
CO2	3	3	2	2	0	0	0	0	0	0	0	0	1	0
CO3	3	2	2	2	0	0	0	0	0	0	0	0	1	0
CO4	3	3	3	2	0	0	0	0	0	0	0	0	1	0
CO5	3	3	2	2	0	0	0	0	0	0	0	0	0	0
AVG	3	2.8	2.2	2	0	0	0	0	0	0	0	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Department of Mechanical Engineering

Program Outcomes & Program Specific Outcomes

Autonomous Regulation – 2025

PROGRAM OUTCOMES (POs)

PO	Description
PO1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design solutions for the complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

	Communicate effectively on complex engineering activities with the Engineering community and
PO10	with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (POs)

PSO	**Programme Specific Outcomes**
PSO.1	Research oriented: Comprehend journal literature, do research on new mechanical engineering problems and publish the results through patents, journals, conferences and symposium.
PSO.2	Industry oriented: Realize professional experience through industry-interaction activities, internships, and in-plant training.
PSO.3	Start-up & Entrepreneur oriented: Recognize and implement new ideas on new product design and development with the help of modern engineering tools, while ensuring the best manufacturing practices.

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Autonomous Regulation 2025

SEMESTER - I

MA1101   **CALCULUS FOR ENGINEERS**   **L T P C**
3 1 0 4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To equip students with integral calculus techniques, including multiple integrals, for finding areas, volumes, and solving real-life problems.
- To introduce the concepts of vector calculus and apply integral theorems (Gauss, Green, Stokes) in physical and engineering contexts.

UNIT I   MATRICES   9+3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors –Cayley-Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms

UNIT II   DIFFERENTIAL CALCULUS   9+3

Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Maxima and Minima of functions of one variable.

UNIT III   FUNCTIONS OF SEVERAL VARIABLES   9+3

Partial differentiation – Jacobians – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV   INTEGRAL CALCULUS   9+3

Definite and Indefinite Integrals – Integration by parts – Double and Triple integrals in Cartesian form – Area and Volume in Cartesian form.

UNIT V   VECTOR CALCULUS   9+3

Gradient, Divergence, Curl, Solenoidal, Irrotational fields – Directional Derivative – Greens theorem (without proof): Applications of evaluating line and region – Gauss Divergence theorem and Stoke's theorem (without proof) – Applications to Cubes and Parallelopipeds

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Able to use differential calculus ideas on several variable functions

CO4: Apply the concepts of definite and indefinite integrals to solve problems in mathematics and related fields.

CO5: Apply fundamental theorems of vector calculus to relate different types of integrals.

TEXTBOOKS

1. Kreyszig, E. Advanced Engineering Mathematics. 10th Edition, John Wiley and Sons, New Delhi, 2016.
2. Grewal, B. S. Higher Engineering Mathematics. 44th Edition, Khanna Publishers, New Delhi, 2018.
3. Stewart, James. Calculus: Early Transcendentals. 8th Edition, Cengage Learning, New Delhi, 2015.

REFERENCES

1. Bali, N., Goyal, M., and Watkins, C. Advanced Engineering Mathematics. Firewall Media (An imprint of Lakshmi Publications Pvt. Ltd.), New Delhi, 7th Edition, 2009.

2. Jain, R. K., and Iyengar, S. R. K. Advanced Engineering Mathematics. Narosa Publications, New Delhi, 5th Edition, 2016.

3. Narayanan, S., and Manicavachagam Pillai, T. K. Calculus, Volumes I and II. S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

4. Ramana, B. V. Higher Engineering Mathematics. McGraw Hill Education Pvt. Ltd., New Delhi, 2016.

5. Veerarajan, T. Engineering Mathematics. 2nd Edition, Tata McGraw Hill Publishers, New Delhi, 2009.

6. Kavitha, S., Christopher, M., and Bhuvaneswari, N. Calculus for Engineers, VRB Publishers Pvt. Ltd., Chennai, 2025.

CO's-PO's & PSO's MAPPING (MECHANICAL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
CO2	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0
CO3	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0
CO4	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0
CO5	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
AVG	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - II

MA1201   APPLIED STATISTICS AND NUMERICAL METHODS   **L T P C**

                              3 1 0 4

COURSE OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the principles and techniques of design of experiments for conducting systematic and efficient experiments.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS   9 + 3

Sampling distributions - Tests for single mean, and difference of means (Large and small samples) – Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS   9 + 3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9 + 3

Solution of algebraic and transcendental equations - Newton Raphson method- Solution of linear system of equations - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION   9 + 3

Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials at the starting value – Numerical single integration using Trapezoidal, Simpson's 1/3 and 3/8 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9 + 3

Single step methods: Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step method: Milne's predictor corrector method for solving first order differential equations.

TOTAL (L:45+T:15)   : 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3: Apply numerical techniques to solve algebraic equations, linear systems, and eigenvalue problems.

CO4: Use interpolation, differentiation, and integration methods to approximate functions, derivatives, and definite integrals with numerical accuracy.

CO5: Apply single-step and multi-step numerical methods to obtain approximate solutions of first-order differential equations.

TEXT BOOKS:

[1] Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

[2] Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

[3] Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.

REFERENCES:

[1] Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
[2] Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
[3] Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
[4] Satheesh Babu. R., Saravanan. R., Janani. R., "Applied Statistics and Numerical Methods", VRB Publishers Pvt. Ltd., Chennai, 2025.
[5] Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
[6] Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

CO's-PO's & PSO's MAPPING (MECHANICAL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
CO2	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
CO3	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
CO4	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
CO5	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
AVG	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - III

MA1303   **TRANSFORMS AND ITS APPLICATIONS**   **L T P C**

3 1 0 4

COURSE OBJECTIVES:

- To introduce Laplace transforms which can be used for solving the problems that occur in various branches of engineering disciplines.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier, transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes, and to develop Z transform techniques for discrete time systems.

UNIT I   **LAPLACE TRANSFORMS**   **9+3**

Existence conditions – Transforms of elementary functions – Basic properties – Shifting theorems – Inverse Laplace transforms - Transforms of periodic functions.

UNIT II   **FOURIER SERIES**   **9+3**

Dirichlet's conditions – Fourier series: Odd and Even functions – Half range sine series – Half range cosine series – Harmonic analysis.

UNIT III   **APPLICATIONS OF FOURIER SERIES**   **9+3**

Classification of PDE – Fourier series solutions of one-dimensional wave equation – One-dimensional equation of heat conduction – Steady state solution of two-dimensional heat conduction equation.

UNIT IV   **FOURIER TRANSFORMS**   **9+3**

Statement of the Fourier Integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Parseval's identity.

UNIT V   **Z - TRANSFORMS AND DIFFERENCE EQUATIONS**   **9+3**

Z- Transforms - Elementary properties – Inverse Z-transform using partial fraction – Convolution theorem – Solution of difference equations using Z-transforms.

TOTAL (L:45+T:15)   **: 60 PERIODS**

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1. Understand how to solve Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

CO2. Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.

CO3. Appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations.

CO4. Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

CO5. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems

TEXT BOOKS:

[1] Veerarajan. T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.

[2] Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 43rd Edition, 2014.

[3] Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt. Ltd.1998.

REFERENCES:

[1] Bali. N. P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd, 2007.

[2] Ramana. B. V., "Higher Engineering Mathematics", Tata Mc Graw Hill Publishing Company Limited, New Delhi, 2008.

[3] Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

[4] Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley India, 2016.

[5] Jain R.K. and Iyengar S.R.K., Advanced Engineering Mathematics, Narosa Publications, New Delhi, 3rd Edition, 2007.

CO's-PO's & PSO's MAPPING (MECHANICAL ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	0	0	0	0	0	0	0	0	0	0	0
CO2	3	3	2	2	0	0	0	0	0	0	0	0	1	0	0
CO3	3	2	2	2	0	0	0	0	0	0	0	0	1	0	0
CO4	3	3	3	2	0	0	0	0	0	0	0	0	1	0	0
CO5	3	3	2	2	0	0	0	0	0	0	0	0	0	0	0
AVG	3	2.8	2.2	2	0	0	0	0	0	0	0	0	1	0	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Department of Electrical and Electronics Engineering

Program Outcomes & Program Specific Outcomes

Autonomous Regulation – 2025

PROGRAM OUTCOMES (POs)

PO	Description
PO1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design solutions for the complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10	Communicate effectively on complex engineering activities with the Engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (POs)

PSO	Programme Specific Outcomes
PSO.1	Foundation of Electrical Engineering: Ability to understand the principles and working of electrical components, circuits, systems and control that are forming a part of power generation, transmission, distribution, utilization, conservation and energy saving. Students can assess the power management, auditing, crisis and energy saving aspects.
PSO.2	Foundation of Mathematical Concepts: Ability to apply mathematical methodologies to solve problems related with electrical engineering using appropriate engineering tools and algorithms.
PSO.3	Computing and Research Ability: Ability to use knowledge in various domains to identify research gaps and hence to provide solution which leads to new ideas and innovations.

Autonomous Regulation 2025

SEMESTER - I

MA1101   **CALCULUS FOR ENGINEERS**   **L T P C**
3 1 0 4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To equip students with integral calculus techniques, including multiple integrals, for finding areas, volumes, and solving real-life problems.
- To introduce the concepts of vector calculus and apply integral theorems (Gauss, Green, Stokes) in physical and engineering contexts.

UNIT I   MATRICES   **9+3**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors –Cayley-Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms

UNIT II   DIFFERENTIAL CALCULUS   **9+3**

Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Maxima and Minima of functions of one variable.

UNIT III   FUNCTIONS OF SEVERAL VARIABLES   **9+3**

Partial differentiation – Jacobians – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV   INTEGRAL CALCULUS   **9+3**

Definite and Indefinite Integrals – Integration by parts – Double and Triple integrals in Cartesian form – Area and Volume in Cartesian form.

UNIT V   VECTOR CALCULUS   **9+3**

Gradient, Divergence, Curl, Solenoidal, Irrotational fields – Directional Derivative – Greens theorem (without proof): Applications of evaluating line and region – Gauss Divergence theorem and Stoke's theorem (without proof) – Applications to Cubes and Parallelopipeds

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Able to use differential calculus ideas on several variable functions

CO4: Apply the concepts of definite and indefinite integrals to solve problems in mathematics and related fields.

CO5: Apply fundamental theorems of vector calculus to relate different types of integrals.

TEXTBOOKS

1. Kreyszig, E. Advanced Engineering Mathematics. 10th Edition, John Wiley and Sons, New Delhi, 2016.
2. Grewal, B. S. Higher Engineering Mathematics. 44th Edition, Khanna Publishers, New Delhi, 2018.
3. Stewart, James. Calculus: Early Transcendentals. 8th Edition, Cengage Learning, New Delhi, 2015.

REFERENCES

1. Bali, N., Goyal, M., and Watkins, C. Advanced Engineering Mathematics. Firewall Media (An imprint of Lakshmi Publications Pvt. Ltd.), New Delhi, 7th Edition, 2009.

2. Jain, R. K., and Iyengar, S. R. K. Advanced Engineering Mathematics. Narosa Publications, New Delhi, 5th Edition, 2016.

3. Narayanan, S., and Manicavachagam Pillai, T. K. Calculus, Volumes I and II. S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

4. Ramana, B. V. Higher Engineering Mathematics. McGraw Hill Education Pvt. Ltd., New Delhi, 2016.

5. Veerarajan, T. Engineering Mathematics. 2nd Edition, Tata McGraw Hill Publishers, New Delhi, 2009.

6. Kavitha, S., Christopher, M., and Bhuvaneswari, N. Calculus for Engineers, VRB Publishers Pvt. Ltd., Chennai, 2025.

CO's-PO's & PSO's MAPPING (ELECTRICAL AND ELECTRONICS ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO2	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO3	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO4	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO5	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
AVG	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - II

MA1201   APPLIED STATISTICS AND NUMERICAL METHODS   **L T P C**

                                                                 3 1 0 4

COURSE OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.

- To introduce the principles and techniques of design of experiments for conducting systematic and efficient experiments.

- To introduce the basic concepts of solving algebraic and transcendental equations.

- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.

- To acquaint knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I   TESTING OF HYPOTHESIS   9 + 3

Sampling distributions - Tests for single mean, and difference of means (Large and small samples) – Chi square test for goodness of fit – Independence of attributes.

UNIT II   DESIGN OF EXPERIMENTS   9 + 3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design.

UNIT III   SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS   9 + 3

Solution of algebraic and transcendental equations - Newton Raphson method- Solution of linear system of equations - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

UNIT IV   INTERPOLATION,   NUMERICAL   DIFFERENTIATION   AND   NUMERICAL INTEGRATION   9 + 3

Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials at the starting value – Numerical single integration using Trapezoidal, Simpson's 1/3 and 3/8 rules.

UNIT V   NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS   9 + 3

Single step methods: Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step method: Milne's predictor corrector method for solving first order differential equations.

TOTAL (L:45+T:15)   : 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3: Apply numerical techniques to solve algebraic equations, linear systems, and eigenvalue problems.

CO4: Use interpolation, differentiation, and integration methods to approximate functions, derivatives, and definite integrals with numerical accuracy.

CO5: Apply single-step and multi-step numerical methods to obtain approximate solutions of first-order differential equations.

TEXT BOOKS:

[1] Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

[2] Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

[3] Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.

REFERENCES:

[1] Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
[2] Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
[3] Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
[4] Satheesh Babu. R., Saravanan. R., Janani. R., "Applied Statistics and Numerical Methods", VRB Publishers Pvt. Ltd., Chennai, 2025.
[5] Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
[6] Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

CO's-PO's & PSO's MAPPING (ELECTRICAL AND ELECTRONICS ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO2	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO3	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO4	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO5	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
AVG	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - III

MA1303   <u>**TRANSFORMS AND ITS APPLICATIONS**</u>   **L T P C**

     3 1 0 4

COURSE OBJECTIVES:

- To introduce Laplace transforms which can be used for solving the problems that occur in various branches of engineering disciplines.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier, transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes, and to develop Z transform techniques for discrete time systems.

UNIT I   LAPLACE TRANSFORMS   9+3

Existence conditions – Transforms of elementary functions – Basic properties – Shifting theorems – Inverse Laplace transforms - Transforms of periodic functions.

UNIT II   FOURIER SERIES   9+3

Dirichlet's conditions – Fourier series: Odd and Even functions – Half range sine series – Half range cosine series – Harmonic analysis.

UNIT III   APPLICATIONS OF FOURIER SERIES   9+3

Classification of PDE – Fourier series solutions of one-dimensional wave equation – One-dimensional equation of heat conduction – Steady state solution of two-dimensional heat conduction equation.

UNIT IV   FOURIER TRANSFORMS   9+3

Statement of the Fourier Integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Parseval's identity.

UNIT V   Z - TRANSFORMS AND DIFFERENCE EQUATIONS   9+3

Z- Transforms - Elementary properties – Inverse Z-transform using partial fraction – Convolution theorem – Solution of difference equations using Z-transforms.

TOTAL (L:45+T:15)   : 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1. Understand how to solve Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

CO2. Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.

CO3. Appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations.

CO4. Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

CO5. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems

TEXT BOOKS:

[1] Veerarajan. T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.

[2] Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 43rd Edition, 2014.

[3] Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt. Ltd.1998.

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[1] Bali. N. P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd, 2007.

[2] Ramana. B. V., "Higher Engineering Mathematics", Tata Mc Graw Hill Publishing Company Limited, New Delhi, 2008.

[3] Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

[4] Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley India, 2016.

[5] Jain R.K. and Iyengar S.R.K., Advanced Engineering Mathematics, Narosa Publications, New Delhi , 3rd Edition, 2007.

CO's-PO's & PSO's MAPPING (ELECTRICAL AND ELECTRONICS ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	0	0	0	0	0	0	0	0	0	1	0
CO2	3	3	2	2	0	0	0	0	0	0	0	0	0	1	0
CO3	3	2	2	2	0	0	0	0	0	0	0	0	0	1	0
CO4	3	3	3	2	0	0	0	0	0	0	0	0	0	1	0
CO5	3	3	2	2	0	0	0	0	0	0	0	0	0	1	0
AVG	3	2.8	2.2	2	0	0	0	0	0	0	0	0	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Department of Electronics and Communication Engineering

Program Outcomes & Program Specific Outcomes

Autonomous Regulation – 2025

PROGRAM OUTCOMES (POs)

PO	Description
PO1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design solutions for the complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10	Communicate effectively on complex engineering activities with the Engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (POs)

PSO	Programme Specific Outcomes
PSO.1	Design, develop and analyze electronic systems through application of relevant electronics, mathematics and engineering principles
PSO.2	Design, develop and analyze communication systems through application of fundamentals from communication principles, signal processing, and RF System Design & Electromagnetics.
PSO.3	Adapt to emerging electronics and communication technologies and develop innovative solutions for existing and newer problem.

Autonomous Regulation 2025

SEMESTER - I

MA1101   **CALCULUS FOR ENGINEERS**   **L T P C**

                                                           3 1 0 4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To equip students with integral calculus techniques, including multiple integrals, for finding areas, volumes, and solving real-life problems.
- To introduce the concepts of vector calculus and apply integral theorems (Gauss, Green, Stokes) in physical and engineering contexts.

UNIT I   **MATRICES**   **9+3**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors –Cayley-Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms

UNIT II   **DIFFERENTIAL CALCULUS**   **9+3**

Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Maxima and Minima of functions of one variable.

UNIT III   **FUNCTIONS OF SEVERAL VARIABLES**   **9+3**

Partial differentiation – Jacobians – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV   **INTEGRAL CALCULUS**   **9+3**

Definite and Indefinite Integrals – Integration by parts – Double and Triple integrals in Cartesian form – Area and Volume in Cartesian form.

UNIT V   **VECTOR CALCULUS**   **9+3**

Gradient, Divergence, Curl, Solenoidal, Irrotational fields – Directional Derivative – Greens theorem (without proof): Applications of evaluating line and region – Gauss Divergence theorem and Stoke's theorem (without proof) – Applications to Cubes and Parallelopipeds

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Able to use differential calculus ideas on several variable functions

CO4: Apply the concepts of definite and indefinite integrals to solve problems in mathematics and related fields.

CO5: Apply fundamental theorems of vector calculus to relate different types of integrals.

TEXTBOOKS

1. Kreyszig, E. Advanced Engineering Mathematics. 10th Edition, John Wiley and Sons, New Delhi, 2016.
2. Grewal, B. S. Higher Engineering Mathematics. 44th Edition, Khanna Publishers, New Delhi, 2018.
3. Stewart, James. Calculus: Early Transcendentals. 8th Edition, Cengage Learning, New Delhi, 2015.

REFERENCES

1. Bali, N., Goyal, M., and Watkins, C. Advanced Engineering Mathematics. Firewall Media (An imprint of Lakshmi Publications Pvt. Ltd.), New Delhi, 7th Edition, 2009.

2. Jain, R. K., and Iyengar, S. R. K. Advanced Engineering Mathematics. Narosa Publications, New Delhi, 5th Edition, 2016.

3. Narayanan, S., and Manicavachagam Pillai, T. K. Calculus, Volumes I and II. S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

4. Ramana, B. V. Higher Engineering Mathematics. McGraw Hill Education Pvt. Ltd., New Delhi, 2016.

5. Veerarajan, T. Engineering Mathematics. 2nd Edition, Tata McGraw Hill Publishers, New Delhi, 2009.

6. Kavitha, S., Christopher, M., and Bhuvaneswari, N. Calculus for Engineers, VRB Publishers Pvt. Ltd., Chennai, 2025.

CO's-PO's & PSO's MAPPING (ELECTRONICS AND COMMUNICATION ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0
CO2	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0
CO3	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0
CO4	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0
CO5	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0
AVG	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - II

MA1201   APPLIED STATISTICS AND NUMERICAL METHODS   **L T P C**

3 1 0 4

COURSE OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the principles and techniques of design of experiments for conducting systematic and efficient experiments.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I   TESTING OF HYPOTHESIS   9 + 3

Sampling distributions - Tests for single mean, and difference of means (Large and small samples) – Chi square test for goodness of fit – Independence of attributes.

UNIT II   DESIGN OF EXPERIMENTS   9 + 3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design.

UNIT III   SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS   9 + 3

Solution of algebraic and transcendental equations - Newton Raphson method- Solution of linear system of equations - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

UNIT IV   INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION   9 + 3

Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials at the starting value – Numerical single integration using Trapezoidal, Simpson's 1/3 and 3/8 rules.

UNIT V   NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS   9 + 3

Single step methods: Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step method: Milne's   predictor corrector method for solving first order differential equations.

TOTAL (L:45+T:15)   : 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3: Apply numerical techniques to solve algebraic equations, linear systems, and eigenvalue problems.

CO4: Use interpolation, differentiation, and integration methods to approximate functions, derivatives, and definite integrals with numerical accuracy.

CO5: Apply single-step and multi-step numerical methods to obtain approximate solutions of first-order differential equations.

TEXT BOOKS:

[1] Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

[2] Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

[3] Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.

REFERENCES:

[1] Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
[2] Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
[3] Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
[4] Satheesh Babu. R., Saravanan. R., Janani. R., "Applied Statistics and Numerical Methods", VRB Publishers Pvt. Ltd., Chennai, 2025.
[5] Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
[6] Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

CO's-PO's & PSO's MAPPING (ELECTRONICS AND COMMUNICATION ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
CO2	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
CO3	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
CO4	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
CO5	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
AVG	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - III

MA1302   **STOCHASTIC PROCESSES AND LINEAR ALGEBRA**   **L T P C**

3 1 0 4

COURSE OBJECTIVES:

- To provide the necessary basics in probability that are relevant in applications such as random signals, linear systems in communication engineering.

- To understand the principles of random signals and random processes

- To provide students with a solid foundation in the fundamental concepts of vector spaces.

- To equip students with a strong understanding of the linear transformation concepts and their applications

- To understand the concepts of inner product spaces and orthogonalization.

UNIT I   RANDOM   VARIABLES   9 + 3

Discrete and Continuous Random Variables – Moment Generating Function - Discrete Distributions: Binomial – Poisson – Continuous Distributions: Uniform – Exponential.

UNIT II   RANDOM PROCESSES   9 + 3

Classification – SSS Processes – WSS Processes – Markov Processes – Markov Chain - Limiting Distribution

UNIT III   VECTOR   SPACES   9 + 3

Vector spaces – Subspaces – Linear Combination and Linear system of equations – Linear independence and linear dependence – Bases and dimensions.

UNIT IV   LINEAR TRANSFORMATION   9 + 3

Linear transformation – Range and Null spaces – Rank and Nullity - Dimension theorem - Matrix representation of a linear transformation

UNIT V   INNER PRODUCT SPACES   9 + 3

Inner product - Norms - Gram-Schmidt Orthogonalization Process – Adjoint of linear operations - Least square approximation.

TOTAL (L:45+T:15)   : 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Understand the fundamental concepts of Random Variables and apply them to model engineering problems.

CO2: Apply the concept of random processes in engineering disciplines

CO3: Apply Vector Spaces typically focuses on linear algebra concepts to analyze signals, systems, and physical problems.

CO4: Understand linear transformation in linear algebra helps students how mathematical operations can transform signals and systems.

CO5: Understand Inner product spaces allow students to apply linear algebra concepts to signal processing, network analysis, and other areas.

TEXT BOOKS:

[1] Ibe, O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier,1st Indian Reprint, 2007.
[2] Friedberg. A.H., Insel. A.J. and Spence. L., "Linear Algebra", Prentice Hall of India, New Delhi, 4th Edition, 2004.
[3] Saeed Grahramani, "Fundamentals of Probability with Stochastic Processes", Chennai, 3rd Edition, 2012.

REFERENCES:

[1] Hari Bhat (KN), "Probability Theory and Stochastic Processes for Engineers", Chennai. Medhi (J), "Stochastic Processes", New Age, 2011
[2] Strang. G., "Linear Algebra and its applications", Thomson (Brooks/Cole), New Delhi, 2005.
[3] Speyer (Jason L) and Chung (Walter H), "Stochastic Processes , Estimation and Control", PHI Learning, 2013.
[4] Lay (David C), "Linear Algebra and its Applications", Chennai, 3rd Edition, 2011.

CO's-PO's & PSO's MAPPING (ELECTRONICS AND COMMUNICATION ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	0	0	0	0	0	0	0	0	0	1	0	0
CO2	3	2	1	0	0	0	0	0	0	0	0	0	1	0	0
CO3	3	2	2	0	0	0	0	0	0	0	0	0	1	0	0
CO4	3	2	2	0	0	0	0	0	0	0	0	0	1	0	0
CO5	3	2	2	0	0	0	0	0	0	0	0	0	1	0	0
AVG	3	2	1.6	0	0	0	0	0	0	0	0	0	1	0	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Department of Computer Science and Engineering

Program Outcomes & Program Specific Outcomes

Autonomous Regulation – 2025

PROGRAM OUTCOMES (POs)

PO	Description
PO1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design solutions for the complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

	Communicate effectively on complex engineering activities with the Engineering community and
PO10	with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (POs)

PSO	Programme Specific Outcomes
PSO.1	Exhibit design and programming skills to build and automate business solutions using cutting edge technologies.
PSO.2	Strong theoretical foundation leading to excellence and excitement towards research, to provide elegant solutions to complex problems.
PSO.3	Ability to work effectively with various engineering fields as a team to design, build and develop system applications.

Autonomous Regulation 2025

SEMESTER - I

MA1101   **CALCULUS FOR ENGINEERS**   **L T P C**
3 1 0 4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To equip students with integral calculus techniques, including multiple integrals, for finding areas, volumes, and solving real-life problems.
- To introduce the concepts of vector calculus and apply integral theorems (Gauss, Green, Stokes) in physical and engineering contexts.

UNIT I   MATRICES   **9+3**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors –Cayley-Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms

UNIT II   DIFFERENTIAL CALCULUS   **9+3**

Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Maxima and Minima of functions of one variable.

UNIT III   FUNCTIONS OF SEVERAL VARIABLES   **9+3**

Partial differentiation – Jacobians – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV   INTEGRAL CALCULUS   **9+3**

Definite and Indefinite Integrals – Integration by parts – Double and Triple integrals in Cartesian form – Area and Volume in Cartesian form.

UNIT V   VECTOR CALCULUS   **9+3**

Gradient, Divergence, Curl, Solenoidal, Irrotational fields – Directional Derivative – Greens theorem (without proof): Applications of evaluating line and region – Gauss Divergence theorem and Stoke's theorem (without proof) – Applications to Cubes and Parallelopipeds

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Able to use differential calculus ideas on several variable functions

CO4: Apply the concepts of definite and indefinite integrals to solve problems in mathematics and related fields.

CO5: Apply fundamental theorems of vector calculus to relate different types of integrals.

TEXTBOOKS

1. Kreyszig, E. Advanced Engineering Mathematics. 10th Edition, John Wiley and Sons, New Delhi, 2016.
2. Grewal, B. S. Higher Engineering Mathematics. 44th Edition, Khanna Publishers, New Delhi, 2018.
3. Stewart, James. Calculus: Early Transcendentals. 8th Edition, Cengage Learning, New Delhi, 2015.

REFERENCES

1. Bali, N., Goyal, M., and Watkins, C. Advanced Engineering Mathematics. Firewall Media (An imprint of Lakshmi Publications Pvt. Ltd.), New Delhi, 7th Edition, 2009.

2. Jain, R. K., and Iyengar, S. R. K. Advanced Engineering Mathematics. Narosa Publications, New Delhi, 5th Edition, 2016.

3. Narayanan, S., and Manicavachagam Pillai, T. K. Calculus, Volumes I and II. S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

4. Ramana, B. V. Higher Engineering Mathematics. McGraw Hill Education Pvt. Ltd., New Delhi, 2016.

5. Veerarajan, T. Engineering Mathematics. 2nd Edition, Tata McGraw Hill Publishers, New Delhi, 2009.

6. Kavitha, S., Christopher, M., and Bhuvaneswari, N. Calculus for Engineers, VRB Publishers Pvt. Ltd., Chennai, 2025.

CO's-PO's & PSO's MAPPING (COMPUTER SCIENCE AND ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO2	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO3	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
CO4	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO5	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
AVG	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - II

MA1201 APPLIED STATISTICS AND NUMERICAL METHODS **L T P C**

3 1 0 4

COURSE OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the principles and techniques of design of experiments for conducting systematic and efficient experiments.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS **9 + 3**

Sampling distributions - Tests for single mean, and difference of means (Large and small samples) – Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS **9 + 3**

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS **9 + 3**

Solution of algebraic and transcendental equations - Newton Raphson method- Solution of linear system of equations - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION **9 + 3**

Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials at the starting value – Numerical single integration using Trapezoidal, Simpson's 1/3 and 3/8 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS **9 + 3**

Single step methods: Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step method: Milne's predictor corrector method for solving first order differential equations.

TOTAL (L:45+T:15) : 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3: Apply numerical techniques to solve algebraic equations, linear systems, and eigenvalue problems.

CO4: Use interpolation, differentiation, and integration methods to approximate functions, derivatives, and definite integrals with numerical accuracy.

CO5: Apply single-step and multi-step numerical methods to obtain approximate solutions of first-order differential equations.

TEXT BOOKS:

[1] Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

[2] Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

[3] Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.

REFERENCES:

[1] Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
[2] Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
[3] Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
[4] Satheesh Babu. R., Saravanan. R., Janani. R., "Applied Statistics and Numerical Methods", VRB Publishers Pvt. Ltd., Chennai, 2025.
[5] Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
[6] Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

CO's-PO's & PSO's MAPPING (COMPUTER SCIENCE AND ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO2	3	3	1	1	1	0	0	0	2	0	2	3	0	0	0
CO3	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO4	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO5	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
AVG	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - III

MA1301   **DISCRETE MATHEMATICS AND LINEAR ALGEBRA**   **L T P C**

3 1 0 4

COURSE OBJECTIVES:

- To introduce the basic notions of vector spaces, which will then be used to solve related problems.
- To understand the concepts of vector space, linear transformations, inner product spaces and orthogonalization.
- To extend students' logical and mathematical maturity and ability to deal with abstraction.
- To introduce most of the basic terminologies used in computer science courses and the application of ideas to solve practical problems.
- To understand the basic concepts of Combinatorics and graph theory

UNIT I   LOGIC AND PROOFS   **9+3**

Propositional logic - Propositional equivalences - Normal forms - Predicates and Quantifiers - Rules of inference.

UNIT II   GRAPH THEORY   **9+3**

Graphs: Types of graphs – Matrix representation of graphs – Connectivity - Graph isomorphism using adjacency matrix and circuits – Euler and Hamilton graph.

UNIT III   VECTOR SPACES   **9+3**

Vector spaces – Subspaces – Rank of a Matrix – Linear combinations – Linear independence and linear dependence – Bases and dimensions (simple problems)

UNIT IV   LINEAR TRANSFORMATION   **9 + 3**

Linear transformation – Range and Null spaces – Rank and Nullity - Dimension theorem - Matrix representation of a linear transformation

UNIT V   INNER PRODUCT SPACES   **9+3**

Inner product - Norms – Orthogonality: Definition and Simple problems - Gram Schmidt orthogonalization process (problems only) – Adjoint of linear operations - Least square approximation.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply logical equivalences and rules of inference to construct and simplify logical expressions.

CO2: Explain fundamental concepts of graphs, including types, representations, and basic properties

CO3: Explain the fundamental concepts of advanced algebra and their role in modern mathematics an applied contexts.

CO4: Determine the rank and nullity of a linear transformation and apply the Rank-Nullity Theorem.

CO5: Demonstrate accurate and efficient use of advanced algebraic techniques.

TEXT BOOKS:

[1] Friedberg. A.H., Insel. A.J. and Spence. L., "Linear Algebra", Prentice Hall of India, New Delhi, 4th Edition, 2004.

[2] Rosen. K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017.

[3] Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

REFERENCES:

[1] Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2013.

[2] Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.

[3] Veerarajan T., "Discrete Mathematics with Graph Theory and Combinatorics", McGraw Hill Pub. Co. Ltd., 1st Edition,2019.

[4] Kumaresan. S., "Linear Algebra – A Geometric Approach", Prentice – Hall of India, New Delhi, Reprint, 2010.

[5] Strang. G., "Linear Algebra and its applications", Thomson (Brooks/Cole), New Delhi, 2005.

CO's-PO's & PSO's MAPPING (COMPUTER SCIENCE AND ENGINEERING)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	0	0	0	0	0	0	0	0	2	0	1	0
CO2	3	3	2	0	0	0	0	0	0	0	0	2	0	1	0
CO3	3	3	1	0	0	0	0	0	0	0	0	2	0	1	0
CO4	3	3	1	0	0	0	0	0	0	0	0	2	0	0	0
CO5	3	3	1	0	0	0	0	0	0	0	0	2	0	0	0
AVG	3	3	1.2	0	0	0	0	0	0	0	0	2	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Department of Computer Science and Business Systems

Program Outcomes & Program Specific Outcomes

Autonomous Regulation – 2025

PROGRAM OUTCOMES (POs)

PO	Description
PO1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design solutions for the complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10	Communicate effectively on complex engineering activities with the Engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (POs)

PSO	Programme Specific Outcomes
PSO.1	To create, select, and apply appropriate techniques, resources, modern engineering and business tools including prediction and data analytics to complex engineering activities and business solutions.
PSO.2	To evolve computer science domain specific methodologies for effective decision making in several critical problem domains of the real world.
PSO.3	To be able to apply entrepreneurial skills and management tools for identifying, analyzing and creating business opportunities with smart business ideas.

Autonomous Regulation 2025

SEMESTER - I

MA1101 **CALCULUS FOR ENGINEERS** **L T P C**
3 1 0 4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To equip students with integral calculus techniques, including multiple integrals, for finding areas, volumes, and solving real-life problems.
- To introduce the concepts of vector calculus and apply integral theorems (Gauss, Green, Stokes) in physical and engineering contexts.

UNIT I   MATRICES   **9+3**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors –Cayley-Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms

UNIT II   DIFFERENTIAL CALCULUS   **9+3**

Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Maxima and Minima of functions of one variable.

UNIT III   FUNCTIONS OF SEVERAL VARIABLES   **9+3**

Partial differentiation – Jacobians – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV   INTEGRAL CALCULUS   **9+3**

Definite and Indefinite Integrals – Integration by parts – Double and Triple integrals in Cartesian form – Area and Volume in Cartesian form.

UNIT V   VECTOR CALCULUS   **9+3**

Gradient, Divergence, Curl, Solenoidal, Irrotational fields – Directional Derivative – Greens theorem (without proof): Applications of evaluating line and region – Gauss Divergence theorem and Stoke's theorem (without proof) – Applications to Cubes and Parallelopipeds

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Able to use differential calculus ideas on several variable functions

CO4: Apply the concepts of definite and indefinite integrals to solve problems in mathematics and related fields.

CO5: Apply fundamental theorems of vector calculus to relate different types of integrals.

TEXTBOOKS

1. Kreyszig, E. Advanced Engineering Mathematics. 10th Edition, John Wiley and Sons, New Delhi, 2016.
2. Grewal, B. S. Higher Engineering Mathematics. 44th Edition, Khanna Publishers, New Delhi, 2018.
3. Stewart, James. Calculus: Early Transcendentals. 8th Edition, Cengage Learning, New Delhi, 2015.

REFERENCES

1. Bali, N., Goyal, M., and Watkins, C. Advanced Engineering Mathematics. Firewall Media (An imprint of Lakshmi Publications Pvt. Ltd.), New Delhi, 7th Edition, 2009.

2. Jain, R. K., and Iyengar, S. R. K. Advanced Engineering Mathematics. Narosa Publications, New Delhi, 5th Edition, 2016.

3. Narayanan, S., and Manicavachagam Pillai, T. K. Calculus, Volumes I and II. S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

4. Ramana, B. V. Higher Engineering Mathematics. McGraw Hill Education Pvt. Ltd., New Delhi, 2016.

5. Veerarajan, T. Engineering Mathematics. 2nd Edition, Tata McGraw Hill Publishers, New Delhi, 2009.

6. Kavitha, S., Christopher, M., and Bhuvaneswari, N. Calculus for Engineers, VRB Publishers Pvt. Ltd., Chennai, 2025.

CO's-PO's & PSO's MAPPING (CS & BS)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO2	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO3	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
CO4	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO5	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
AVG	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - II

MA1201   **APPLIED STATISTICS AND NUMERICAL METHODS**   **L T P C**

                                                             3 1 0 4

COURSE OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the principles and techniques of design of experiments for conducting systematic and efficient experiments.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I   TESTING OF HYPOTHESIS   **9 + 3**

Sampling distributions - Tests for single mean, and difference of means (Large and small samples) – Chi square test for goodness of fit – Independence of attributes.

UNIT II   DESIGN OF EXPERIMENTS   **9 + 3**

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design.

UNIT III   SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS   **9 + 3**

Solution of algebraic and transcendental equations - Newton Raphson method- Solution of linear system of equations - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

UNIT IV   INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION   **9 + 3**

Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials at the starting value – Numerical single integration using Trapezoidal, Simpson's 1/3 and 3/8 rules.

UNIT V   NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS   **9 + 3**

Single step methods: Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step method: Milne's predictor corrector method for solving first order differential equations.

TOTAL (L:45+T:15)   **: 60 PERIODS**

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3: Apply numerical techniques to solve algebraic equations, linear systems, and eigenvalue problems.

CO4: Use interpolation, differentiation, and integration methods to approximate functions, derivatives, and definite integrals with numerical accuracy.

CO5: Apply single-step and multi-step numerical methods to obtain approximate solutions of first-order differential equations.

TEXT BOOKS:

[1] Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

[2] Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

[3] Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.

REFERENCES:

[1] Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
[2] Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
[3] Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
[4] Satheesh Babu. R., Saravanan. R., Janani. R., "Applied Statistics and Numerical Methods", VRB Publishers Pvt. Ltd., Chennai, 2025.
[5] Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
[6] Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

CO's-PO's & PSO's MAPPING (CS & BS)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO2	3	3	1	1	1	0	0	0	2	0	2	3	0	0	0
CO3	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO4	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO5	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
AVG	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - III

MA1301   **DISCRETE MATHEMATICS AND LINEAR ALGEBRA**   **L T P C**

3 1 0 4

COURSE OBJECTIVES:

- To introduce the basic notions of vector spaces, which will then be used to solve related problems.
- To understand the concepts of vector space, linear transformations, inner product spaces and orthogonalization.
- To extend students' logical and mathematical maturity and ability to deal with abstraction.
- To introduce most of the basic terminologies used in computer science courses and the application of ideas to solve practical problems.
- To understand the basic concepts of Combinatorics and graph theory

UNIT I   LOGIC AND PROOFS   9+3

Propositional logic - Propositional equivalences - Normal forms - Predicates and Quantifiers - Rules of inference.

UNIT II   GRAPH THEORY   9+3

Graphs: Types of graphs – Matrix representation of graphs – Connectivity - Graph isomorphism using adjacency matrix and circuits – Euler and Hamilton graph.

UNIT III   VECTOR SPACES   9+3

Vector spaces – Subspaces – Rank of a Matrix – Linear combinations – Linear independence and linear dependence – Bases and dimensions (simple problems)

UNIT IV   LINEAR TRANSFORMATION   9 + 3

Linear transformation – Range and Null spaces – Rank and Nullity - Dimension theorem - Matrix representation of a linear transformation

UNIT V   INNER PRODUCT SPACES   9+3

Inner product - Norms – Orthogonality: Definition and Simple problems - Gram Schmidt orthogonalization process (problems only) – Adjoint of linear operations - Least square approximation.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply logical equivalences and rules of inference to construct and simplify logical expressions.

CO2: Explain fundamental concepts of graphs, including types, representations, and basic properties

CO3: Explain the fundamental concepts of advanced algebra and their role in modern mathematics an applied contexts.

CO4: Determine the rank and nullity of a linear transformation and apply the Rank-Nullity Theorem.

CO5: Demonstrate accurate and efficient use of advanced algebraic techniques.

TEXT BOOKS:

[1] Friedberg. A.H., Insel. A.J. and Spence. L., "Linear Algebra", Prentice Hall of India, New Delhi, 4th Edition, 2004.

[2] Rosen. K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017.

[3] Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

REFERENCES:

[1] Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2013.

[2] Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.

[3] Veerarajan T., "Discrete Mathematics with Graph Theory and Combinatorics", McGraw Hill Pub. Co. Ltd., 1st Edition,2019.

[4] Kumaresan. S., "Linear Algebra – A Geometric Approach", Prentice – Hall of India, New Delhi, Reprint, 2010.

[5] Strang. G., "Linear Algebra and its applications", Thomson (Brooks/Cole), New Delhi, 2005.

CO's-PO's & PSO's MAPPING (CS & BS)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	0	0	0	0	0	0	0	0	2	0	1	0
CO2	3	3	2	0	0	0	0	0	0	0	0	2	0	1	0
CO3	3	3	1	0	0	0	0	0	0	0	0	2	0	1	0
CO4	3	3	1	0	0	0	0	0	0	0	0	2	0	0	0
CO5	3	3	1	0	0	0	0	0	0	0	0	2	0	0	0
AVG	3	3	1.2	0	0	0	0	0	0	0	0	2	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - IV

MA1401   **STATISTICS AND RANDOM VARIABLES**   **L T P C**

                                                         3 1 0 4

COURSE OBJECTIVES:

This course aims to provide the required skills to apply the statistical tools to engineering problems.

- To introduce the basic concepts of probability and random variables.
- To introduce the basic concepts of two-dimensional random variables.
- To acquaint the knowledge of testing hypotheses for small and large samples, which plays an important role in real-life problems.
- To introduce the basic concepts of classifications of design of experiments, which play very important roles in the field of agriculture and statistical quality control.

UNIT I   ESTIMATION THEORY   9+3

Unbiased estimators - Method of moments - Method of maximum Likelihood - Interval estimation of Means - Differences between means, variations and ratio of two variances

UNIT II   NON- PARAMETRIC TESTS   9+3

Introduction - The Sign test - The Signed-Rank test - Rank-sum tests - The U test - The H test - Tests based on Runs - Test of randomness.

UNIT III   STATISTICAL QUALITY CONTROL   9+3

Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits.

UNIT IV   RANDOM VARIABLES   9+3

Discrete and continuous random variables – Moment Generating functions - Binomial, Poisson, Uniform, Exponential and Normal distributions.

UNIT V   TWO- DIMENSIONAL RANDOM VARIABLES   9+3

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression

TOTAL (L:45+T:15): 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Understand the fundamental concepts of point estimation and interval estimation.

CO2: Apply appropriate non-parametric tests for analyzing data without assuming normality.

CO3: Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.

CO4: Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.

CO5: Understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.

TEXT BOOKS:

1. Johnson. R.A., Miller. I.R and Freund . J.E, " Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2016.

2. Lipschutz S.and Schiller J., "Introduction to Probability and Statistics", Tata Mc Graw Hill, 2018.

3. Elliot.A Tanis, "Mathematical Statistics", Pearson Education ,2009.

REFERENCES:

1. Gupta. S.C. and Kapoor. V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.

2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.

3. Anthony J, Hayter , "Probability and Statistics for Engineers ", Cengage Learning, New Delhi, 2009.

4. Ravichandran J, "Probability and Statistics for Engineers", Wiley-India, 2014.

5. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 9th Edition, 2010.

CO's-PO's & PSO's MAPPING (CS & BS)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	0	0	0	0	0	0	2	0	0	2	0	1	0
CO2	3	3	3	2	0	0	0	0	2	0	0	2	0	1	0
CO3	3	3	2	2	0	0	0	0	2	0	0	2	0	1	0
CO4	3	3	0	0	0	0	0	0	2	0	0	2	0	0	0
CO5	3	3	0	0	0	0	0	0	2	0	0	2	0	0	0
AVG	3	3	2.5	2	0	0	0	0	2	0	0	2	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Department of Artificial Intelligence and Data Science

Program Outcomes & Program Specific Outcomes

Autonomous Regulation – 2025

PROGRAM OUTCOMES (POs)

PO	Description
PO1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design solutions for the complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10	Communicate effectively on complex engineering activities with the Engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (POs)

PSO	**Programme Specific Outcomes**
PSO.1	Utilize foundational knowledge in AI, data science, and statistics to design efficient, domain-specific processes for effective decision-making in areas such as business, governance, and various industries.
PSO.2	Apply AI and data analytics to extract insights from data, create disruptive solutions, and address complex societal, environmental, and engineering challenges using cutting-edge technologies.
PSO.3	Develop skills in data analytics, knowledge engineering, and visualization to manage complex projects, collaborate in multidisciplinary teams, and continuously contribute to economic and societal progress through innovative solutions.

Autonomous Regulation 2025

SEMESTER - I

MA1101   **CALCULUS FOR ENGINEERS**   **L T P C**
3 1 0 4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To equip students with integral calculus techniques, including multiple integrals, for finding areas, volumes, and solving real-life problems.
- To introduce the concepts of vector calculus and apply integral theorems (Gauss, Green, Stokes) in physical and engineering contexts.

UNIT I   MATRICES   9+3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors –Cayley-Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms

UNIT II   DIFFERENTIAL CALCULUS   9+3

Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Maxima and Minima of functions of one variable.

UNIT III   FUNCTIONS OF SEVERAL VARIABLES   9+3

Partial differentiation – Jacobians – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV   INTEGRAL CALCULUS   9+3

Definite and Indefinite Integrals – Integration by parts – Double and Triple integrals in Cartesian form – Area and Volume in Cartesian form.

UNIT V   VECTOR CALCULUS   9+3

Gradient, Divergence, Curl, Solenoidal, Irrotational fields – Directional Derivative – Greens theorem (without proof): Applications of evaluating line and region – Gauss Divergence theorem and Stoke's theorem (without proof) – Applications to Cubes and Parallelopipeds

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Able to use differential calculus ideas on several variable functions

CO4: Apply the concepts of definite and indefinite integrals to solve problems in mathematics and related fields.

CO5: Apply fundamental theorems of vector calculus to relate different types of integrals.

TEXTBOOKS

1. Kreyszig, E. Advanced Engineering Mathematics. 10th Edition, John Wiley and Sons, New Delhi, 2016.
2. Grewal, B. S. Higher Engineering Mathematics. 44th Edition, Khanna Publishers, New Delhi, 2018.
3. Stewart, James. Calculus: Early Transcendentals. 8th Edition, Cengage Learning, New Delhi, 2015.

REFERENCES

1. Bali, N., Goyal, M., and Watkins, C. Advanced Engineering Mathematics. Firewall Media (An imprint of Lakshmi Publications Pvt. Ltd.), New Delhi, 7th Edition, 2009.

2. Jain, R. K., and Iyengar, S. R. K. Advanced Engineering Mathematics. Narosa Publications, New Delhi, 5th Edition, 2016.

3. Narayanan, S., and Manicavachagam Pillai, T. K. Calculus, Volumes I and II. S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

4. Ramana, B. V. Higher Engineering Mathematics. McGraw Hill Education Pvt. Ltd., New Delhi, 2016.

5. Veerarajan, T. Engineering Mathematics. 2nd Edition, Tata McGraw Hill Publishers, New Delhi, 2009.

6. Kavitha, S., Christopher, M., and Bhuvaneswari, N. Calculus for Engineers, VRB Publishers Pvt. Ltd., Chennai, 2025.

CO's-PO's & PSO's MAPPING (AI & DS)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0
CO2	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0
CO3	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
CO4	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0
CO5	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
AVG	3	3	1	1	0	0	0	0	2	0	1	3	1	0	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - II

MA1201   **APPLIED STATISTICS AND NUMERICAL METHODS**   **L T P C**

3 1 0 4

COURSE OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the principles and techniques of design of experiments for conducting systematic and efficient experiments.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I   TESTING OF HYPOTHESIS   9 + 3

Sampling distributions - Tests for single mean, and difference of means (Large and small samples) – Chi square test for goodness of fit – Independence of attributes.

UNIT II   DESIGN OF EXPERIMENTS   9 + 3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design.

UNIT III   SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS   9 + 3

Solution of algebraic and transcendental equations - Newton Raphson method- Solution of linear system of equations - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

UNIT IV   INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION   9 + 3

Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials at the starting value – Numerical single integration using Trapezoidal, Simpson's 1/3 and 3/8 rules.

UNIT V   NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS   9 + 3

Single step methods: Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step method: Milne's predictor corrector method for solving first order differential equations.

TOTAL (L:45+T:15)   : 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3: Apply numerical techniques to solve algebraic equations, linear systems, and eigenvalue problems.

CO4: Use interpolation, differentiation, and integration methods to approximate functions, derivatives, and definite integrals with numerical accuracy.

CO5: Apply single-step and multi-step numerical methods to obtain approximate solutions of first-order differential equations.

TEXT BOOKS:

[1] Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

[2] Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

[3] Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.

REFERENCES:

[1] Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
[2] Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
[3] Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
[4] Satheesh Babu. R., Saravanan. R., Janani. R., "Applied Statistics and Numerical Methods", VRB Publishers Pvt. Ltd., Chennai, 2025.
[5] Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
[6] Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

CO's-PO's & PSO's MAPPING (AI & DS)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
CO2	3	3	1	1	1	0	0	0	2	0	2	3	0	0	0
CO3	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
CO4	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
CO5	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0
AVG	3	3	1	1	1	0	0	0	2	0	2	3	1	0	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - III

MA1301   **DISCRETE MATHEMATICS AND LINEAR ALGEBRA**   **L T P C**

3 1 0 4

COURSE OBJECTIVES:

- To introduce the basic notions of vector spaces, which will then be used to solve related problems.
- To understand the concepts of vector space, linear transformations, inner product spaces and orthogonalization.
- To extend students' logical and mathematical maturity and ability to deal with abstraction.
- To introduce most of the basic terminologies used in computer science courses and the application of ideas to solve practical problems.
- To understand the basic concepts of Combinatorics and graph theory

UNIT I   LOGIC AND PROOFS   9+3

Propositional logic - Propositional equivalences - Normal forms - Predicates and Quantifiers - Rules of inference.

UNIT II   GRAPH THEORY   9+3

Graphs: Types of graphs – Matrix representation of graphs – Connectivity - Graph isomorphism using adjacency matrix and circuits – Euler and Hamilton graph.

UNIT III   VECTOR SPACES   9+3

Vector spaces – Subspaces – Rank of a Matrix – Linear combinations – Linear independence and linear dependence – Bases and dimensions (simple problems)

UNIT IV   LINEAR TRANSFORMATION   9 + 3

Linear transformation – Range and Null spaces – Rank and Nullity - Dimension theorem - Matrix representation of a linear transformation

UNIT V   INNER PRODUCT SPACES   9+3

Inner product - Norms – Orthogonality: Definition and Simple problems - Gram Schmidt orthogonalization process (problems only) – Adjoint of linear operations - Least square approximation.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply logical equivalences and rules of inference to construct and simplify logical expressions.

CO2: Explain fundamental concepts of graphs, including types, representations, and basic properties

CO3: Explain the fundamental concepts of advanced algebra and their role in modern mathematics an applied contexts.

CO4: Determine the rank and nullity of a linear transformation and apply the Rank-Nullity Theorem.

CO5: Demonstrate accurate and efficient use of advanced algebraic techniques.

TEXT BOOKS:

[1] Friedberg. A.H., Insel. A.J. and Spence. L., "Linear Algebra", Prentice Hall of India, New Delhi, 4th Edition, 2004.

[2] Rosen. K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017.

[3] Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

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[1] Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2013.

[2] Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.

[3] Veerarajan T., "Discrete Mathematics with Graph Theory and Combinatorics", McGraw Hill Pub. Co. Ltd., 1st Edition,2019.

[4] Kumaresan. S., "Linear Algebra – A Geometric Approach", Prentice – Hall of India, New Delhi, Reprint, 2010.

[5] Strang. G., "Linear Algebra and its applications", Thomson (Brooks/Cole), New Delhi, 2005.

CO's-PO's & PSO's MAPPING (AI & DS)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	0	0	0	0	0	0	0	0	2	1	0	0
CO2	3	3	2	0	0	0	0	0	0	0	0	2	1	0	0
CO3	3	3	1	0	0	0	0	0	0	0	0	2	1	0	0
CO4	3	3	1	0	0	0	0	0	0	0	0	2	0	0	0
CO5	3	3	1	0	0	0	0	0	0	0	0	2	0	0	0
AVG	3	3	1.2	0	0	0	0	0	0	0	0	2	1	0	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - IV

MA1401	**STATISTICS AND RANDOM VARIABLES**	**L T P C**
		3 1 0 4

COURSE OBJECTIVES:

This course aims to provide the required skills to apply the statistical tools to engineering problems.

- To introduce the basic concepts of probability and random variables.
- To introduce the basic concepts of two-dimensional random variables.
- To acquaint the knowledge of testing hypotheses for small and large samples, which plays an important role in real-life problems.
- To introduce the basic concepts of classifications of design of experiments, which play very important roles in the field of agriculture and statistical quality control.

UNIT I   ESTIMATION THEORY   9+3

Unbiased estimators - Method of moments - Method of maximum Likelihood - Interval estimation of Means - Differences between means, variations and ratio of two variances

UNIT II   NON- PARAMETRIC TESTS   9+3

Introduction - The Sign test - The Signed-Rank test - Rank-sum tests - The U test - The H test - Tests based on Runs - Test of randomness.

UNIT III   STATISTICAL QUALITY CONTROL   9+3

Control charts for measurements ($\underline{X}$ and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits.

UNIT IV   RANDOM VARIABLES   9+3

Discrete and continuous random variables – Moment Generating functions - Binomial, Poisson, Uniform, Exponential and Normal distributions.

UNIT V   TWO- DIMENSIONAL RANDOM VARIABLES   9+3

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression

TOTAL (L:45+T:15): 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Understand the fundamental concepts of point estimation and interval estimation.

CO2: Apply appropriate non-parametric tests for analyzing data without assuming normality.

CO3: Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.

CO4: Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.

CO5: Understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.

TEXT BOOKS:

1. Johnson. R.A., Miller. I.R and Freund . J.E, " Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2016.

2. Lipschutz S.and Schiller J., "Introduction to Probability and Statistics", Tata Mc Graw Hill, 2018.

3. Elliot.A Tanis, "Mathematical Statistics", Pearson Education ,2009.

REFERENCES:

1. Gupta. S.C. and Kapoor. V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.

2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.

3. Anthony J, Hayter , "Probability and Statistics for Engineers ", Cengage Learning, New Delhi, 2009.

4. Ravichandran J, "Probability and Statistics for Engineers", Wiley-India, 2014.

5. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 9th Edition, 2010.

CO's-PO's & PSO's MAPPING (AI & DS)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	0	0	0	0	0	0	2	0	0	2	1	0	0
CO2	3	3	3	2	0	0	0	0	2	0	0	2	1	0	0
CO3	3	3	2	2	0	0	0	0	2	0	0	2	1	0	0
CO4	3	3	0	0	0	0	0	0	2	0	0	2	0	0	0
CO5	3	3	0	0	0	0	0	0	2	0	0	2	0	0	0
AVG	3	3	2.5	2	0	0	0	0	2	0	0	2	1	0	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Department of Cyber Security

Program Outcomes & Program Specific Outcomes

Autonomous Regulation – 2025

PROGRAM OUTCOMES (POs)

PO	Description
PO1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design solutions for the complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

	Communicate effectively on complex engineering activities with the Engineering community and
PO10	with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (POs)

PSO	Programme Specific Outcomes
PSO.1	Exhibit design and programming skills to build and automate business solutions using cutting edge technologies.
PSO.2	Strong theoretical foundation leading to excellence and excitement towards research, to provide elegant solutions to complex problems.
PSO.3	Ability to work effectively with various engineering fields as a team to design, build and develop system applications.

Autonomous Regulation 2025

SEMESTER - I

MA1101   **CALCULUS FOR ENGINEERS**   **L T P C**

3 1 0 4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To equip students with integral calculus techniques, including multiple integrals, for finding areas, volumes, and solving real-life problems.
- To introduce the concepts of vector calculus and apply integral theorems (Gauss, Green, Stokes) in physical and engineering contexts.

UNIT I   MATRICES   **9+3**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors –Cayley-Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms

UNIT II   DIFFERENTIAL CALCULUS   **9+3**

Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Maxima and Minima of functions of one variable.

UNIT III   FUNCTIONS OF SEVERAL VARIABLES   **9+3**

Partial differentiation – Jacobians – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV   INTEGRAL CALCULUS   **9+3**

Definite and Indefinite Integrals – Integration by parts – Double and Triple integrals in Cartesian form – Area and Volume in Cartesian form.

UNIT V   VECTOR CALCULUS   **9+3**

Gradient, Divergence, Curl, Solenoidal, Irrotational fields – Directional Derivative – Greens theorem (without proof): Applications of evaluating line and region – Gauss Divergence theorem and Stoke's theorem (without proof) – Applications to Cubes and Parallelopipeds

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Able to use differential calculus ideas on several variable functions

CO4: Apply the concepts of definite and indefinite integrals to solve problems in mathematics and related fields.

CO5: Apply fundamental theorems of vector calculus to relate different types of integrals.

TEXTBOOKS

1. Kreyszig, E. Advanced Engineering Mathematics. 10th Edition, John Wiley and Sons, New Delhi, 2016.
2. Grewal, B. S. Higher Engineering Mathematics. 44th Edition, Khanna Publishers, New Delhi, 2018.
3. Stewart, James. Calculus: Early Transcendentals. 8th Edition, Cengage Learning, New Delhi, 2015.

REFERENCES

1. Bali, N., Goyal, M., and Watkins, C. Advanced Engineering Mathematics. Firewall Media (An imprint of Lakshmi Publications Pvt. Ltd.), New Delhi, 7th Edition, 2009.

2. Jain, R. K., and Iyengar, S. R. K. Advanced Engineering Mathematics. Narosa Publications, New Delhi, 5th Edition, 2016.

3. Narayanan, S., and Manicavachagam Pillai, T. K. Calculus, Volumes I and II. S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

4. Ramana, B. V. Higher Engineering Mathematics. McGraw Hill Education Pvt. Ltd., New Delhi, 2016.

5. Veerarajan, T. Engineering Mathematics. 2nd Edition, Tata McGraw Hill Publishers, New Delhi, 2009.

6. Kavitha, S., Christopher, M., and Bhuvaneswari, N. Calculus for Engineers, VRB Publishers Pvt. Ltd., Chennai, 2025.

CO's-PO's & PSO's MAPPING (CYBER SECURITY)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO2	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO3	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
CO4	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO5	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
AVG	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - II

MA1201   **APPLIED STATISTICS AND NUMERICAL METHODS**   **L T P C**

     3 1 0 4

COURSE OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the principles and techniques of design of experiments for conducting systematic and efficient experiments.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I   TESTING OF HYPOTHESIS   9 + 3

Sampling distributions - Tests for single mean, and difference of means (Large and small samples) – Chi square test for goodness of fit – Independence of attributes.

UNIT II   DESIGN OF EXPERIMENTS   9 + 3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design.

UNIT III   SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS   9 + 3

Solution of algebraic and transcendental equations - Newton Raphson method- Solution of linear system of equations - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

UNIT IV   INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION   9 + 3

Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials at the starting value – Numerical single integration using Trapezoidal, Simpson's 1/3 and 3/8 rules.

UNIT V   NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS   9 + 3

Single step methods: Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step method: Milne's predictor corrector method for solving first order differential equations.

TOTAL (L:45+T:15)   : 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3: Apply numerical techniques to solve algebraic equations, linear systems, and eigenvalue problems.

CO4: Use interpolation, differentiation, and integration methods to approximate functions, derivatives, and definite integrals with numerical accuracy.

CO5: Apply single-step and multi-step numerical methods to obtain approximate solutions of first-order differential equations.

TEXT BOOKS:

[1] Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

[2] Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

[3] Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.

REFERENCES:

[1] Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.

[2] Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.

[3] Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.

[4] Satheesh Babu. R., Saravanan. R., Janani. R., "Applied Statistics and Numerical Methods", VRB Publishers Pvt. Ltd., Chennai, 2025.

[5] Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.

[6] Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

CO's-PO's & PSO's MAPPING (CYBER SECURITY)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO2	3	3	1	1	1	0	0	0	2	0	2	3	0	0	0
CO3	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO4	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO5	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
AVG	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - III

MA1301   **DISCRETE MATHEMATICS AND LINEAR ALGEBRA**   **L T P C**

3 1 0 4

COURSE OBJECTIVES:

● To introduce the basic notions of vector spaces, which will then be used to solve related problems.

● To understand the concepts of vector space, linear transformations, inner product spaces and orthogonalization.

● To extend students' logical and mathematical maturity and ability to deal with abstraction.

● To introduce most of the basic terminologies used in computer science courses and the application of ideas to solve practical problems.

● To understand the basic concepts of Combinatorics and graph theory

UNIT I   LOGIC AND PROOFS   9+3

Propositional logic - Propositional equivalences - Normal forms - Predicates and Quantifiers - Rules of inference.

UNIT II   GRAPH THEORY   9+3

Graphs: Types of graphs – Matrix representation of graphs – Connectivity - Graph isomorphism using adjacency matrix and circuits – Euler and Hamilton graph.

UNIT III   VECTOR SPACES   9+3

Vector spaces – Subspaces – Rank of a Matrix – Linear combinations – Linear independence and linear dependence – Bases and dimensions (simple problems)

UNIT IV   LINEAR TRANSFORMATION   9 + 3

Linear transformation – Range and Null spaces – Rank and Nullity - Dimension theorem - Matrix representation of a linear transformation

UNIT V   INNER PRODUCT SPACES   9+3

Inner product - Norms – Orthogonality: Definition and Simple problems - Gram Schmidt orthogonalization process (problems only) – Adjoint of linear operations - Least square approximation.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply logical equivalences and rules of inference to construct and simplify logical expressions.

CO2: Explain fundamental concepts of graphs, including types, representations, and basic properties

CO3: Explain the fundamental concepts of advanced algebra and their role in modern mathematics an applied contexts.

CO4: Determine the rank and nullity of a linear transformation and apply the Rank-Nullity Theorem.

CO5: Demonstrate accurate and efficient use of advanced algebraic techniques.

TEXT BOOKS:

[1] Friedberg. A.H., Insel. A.J. and Spence. L., "Linear Algebra", Prentice Hall of India, New Delhi, 4th Edition, 2004.

[2] Rosen. K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017.

[3] Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

REFERENCES:

[1] Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2013.

[2] Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.

[3] Veerarajan T., "Discrete Mathematics with Graph Theory and Combinatorics", McGraw Hill Pub. Co. Ltd., 1st Edition,2019.

[4] Kumaresan. S., "Linear Algebra – A Geometric Approach", Prentice – Hall of India, New Delhi, Reprint, 2010.

[5] Strang. G., "Linear Algebra and its applications", Thomson (Brooks/Cole), New Delhi, 2005.

CO's-PO's & PSO's MAPPING (CYBER SECURITY)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	0	0	0	0	0	0	0	0	2	0	1	0
CO2	3	3	2	0	0	0	0	0	0	0	0	2	0	1	0
CO3	3	3	1	0	0	0	0	0	0	0	0	2	0	1	0
CO4	3	3	1	0	0	0	0	0	0	0	0	2	0	0	0
CO5	3	3	1	0	0	0	0	0	0	0	0	2	0	0	0
AVG	3	3	1.2	0	0	0	0	0	0	0	0	2	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Department of Information Technology

Program Outcomes & Program Specific Outcomes

Autonomous Regulation – 2025

PROGRAM OUTCOMES (POs)

PO	Description
PO1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design solutions for the complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10	Communicate effectively on complex engineering activities with the Engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (POs)

PSO	Programme Specific Outcomes
PSO.1	Have proficiency in programming skills to design, develop and apply appropriate techniques, to solve complex engineering problems.
PSO.2	Have knowledge to build, automate and manage business solutions using cutting edge technologies.
PSO.3	Have excitement towards research in applied computer technologies.

Autonomous Regulation 2025

SEMESTER - I

MA1101	CALCULUS FOR ENGINEERS	L T P C
		3 1 0 4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To equip students with integral calculus techniques, including multiple integrals, for finding areas, volumes, and solving real-life problems.
- To introduce the concepts of vector calculus and apply integral theorems (Gauss, Green, Stokes) in physical and engineering contexts.

UNIT I   MATRICES   9+3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors –Cayley-Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms

UNIT II   DIFFERENTIAL CALCULUS   9+3

Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Maxima and Minima of functions of one variable.

UNIT III   FUNCTIONS OF SEVERAL VARIABLES   9+3

Partial differentiation – Jacobians – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV   INTEGRAL CALCULUS   9+3

Definite and Indefinite Integrals – Integration by parts – Double and Triple integrals in Cartesian form – Area and Volume in Cartesian form.

UNIT V   VECTOR CALCULUS   9+3

Gradient, Divergence, Curl, Solenoidal, Irrotational fields – Directional Derivative – Greens theorem (without proof): Applications of evaluating line and region – Gauss Divergence theorem and Stoke's theorem (without proof) – Applications to Cubes and Parallelopipeds

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Able to use differential calculus ideas on several variable functions

CO4: Apply the concepts of definite and indefinite integrals to solve problems in mathematics and related fields.

CO5: Apply fundamental theorems of vector calculus to relate different types of integrals.

TEXTBOOKS

1. Kreyszig, E. Advanced Engineering Mathematics. 10th Edition, John Wiley and Sons, New Delhi, 2016.
2. Grewal, B. S. Higher Engineering Mathematics. 44th Edition, Khanna Publishers, New Delhi, 2018.
3. Stewart, James. Calculus: Early Transcendentals. 8th Edition, Cengage Learning, New Delhi, 2015.

REFERENCES

1. Bali, N., Goyal, M., and Watkins, C. Advanced Engineering Mathematics. Firewall Media (An imprint of Lakshmi Publications Pvt. Ltd.), New Delhi, 7th Edition, 2009.

2. Jain, R. K., and Iyengar, S. R. K. Advanced Engineering Mathematics. Narosa Publications, New Delhi, 5th Edition, 2016.

3. Narayanan, S., and Manicavachagam Pillai, T. K. Calculus, Volumes I and II. S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

4. Ramana, B. V. Higher Engineering Mathematics. McGraw Hill Education Pvt. Ltd., New Delhi, 2016.

5. Veerarajan, T. Engineering Mathematics. 2nd Edition, Tata McGraw Hill Publishers, New Delhi, 2009.

6. Kavitha, S., Christopher, M., and Bhuvaneswari, N. Calculus for Engineers, VRB Publishers Pvt. Ltd., Chennai, 2025.

CO's-PO's & PSO's MAPPING (INFORMATION TECHNOLOGY)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	2	0	1	3	0	0	1
CO2	3	3	1	1	0	0	0	0	2	0	1	3	0	0	1
CO3	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
CO4	3	3	1	1	0	0	0	0	2	0	1	3	0	0	1
CO5	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
AVG	3	3	1	1	0	0	0	0	2	0	1	3	0	0	1

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - II

MA1201   APPLIED STATISTICS AND NUMERICAL METHODS   **L T P C**

3 1 0 4

COURSE OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the principles and techniques of design of experiments for conducting systematic and efficient experiments.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I   TESTING OF HYPOTHESIS   9 + 3

Sampling distributions - Tests for single mean, and difference of means (Large and small samples) – Chi square test for goodness of fit – Independence of attributes.

UNIT II   DESIGN OF EXPERIMENTS   9 + 3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design.

UNIT III   SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS   9 + 3

Solution of algebraic and transcendental equations - Newton Raphson method- Solution of linear system of equations - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

UNIT IV   INTERPOLATION,   NUMERICAL   DIFFERENTIATION   AND   NUMERICAL INTEGRATION   9 + 3

Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials at the starting value – Numerical single integration using Trapezoidal, Simpson's 1/3 and 3/8 rules.

UNIT V   NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS   9 + 3

Single step methods: Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step method: Milne's   predictor corrector method for solving first order differential equations.

TOTAL (L:45+T:15)   : 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3: Apply numerical techniques to solve algebraic equations, linear systems, and eigenvalue problems.

CO4: Use interpolation, differentiation, and integration methods to approximate functions, derivatives, and definite integrals with numerical accuracy.

CO5: Apply single-step and multi-step numerical methods to obtain approximate solutions of first-order differential equations.

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[1] Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

[2] Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

[3] Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.

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[2] Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
[3] Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
[4] Satheesh Babu. R., Saravanan. R., Janani. R., "Applied Statistics and Numerical Methods", VRB Publishers Pvt. Ltd., Chennai, 2025.
[5] Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
[6] Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

CO's-PO's & PSO's MAPPING (INFORMATION TECHNOLOGY)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	0	0	1
CO2	3	3	1	1	1	0	0	0	2	0	2	3	0	0	0
CO3	3	3	1	1	1	0	0	0	2	0	2	3	0	0	1
CO4	3	3	1	1	1	0	0	0	2	0	2	3	0	0	1
CO5	3	3	1	1	1	0	0	0	2	0	2	3	0	0	1
AVG	3	3	1	1	1	0	0	0	2	0	2	3	0	0	1

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - III

MA1301   **DISCRETE MATHEMATICS AND LINEAR ALGEBRA**   **L T P C**

3 1 0 4

COURSE OBJECTIVES:

- To introduce the basic notions of vector spaces, which will then be used to solve related problems.
- To understand the concepts of vector space, linear transformations, inner product spaces and orthogonalization.
- To extend students' logical and mathematical maturity and ability to deal with abstraction.
- To introduce most of the basic terminologies used in computer science courses and the application of ideas to solve practical problems.
- To understand the basic concepts of Combinatorics and graph theory

UNIT I   LOGIC AND PROOFS   9+3

Propositional logic - Propositional equivalences - Normal forms - Predicates and Quantifiers - Rules of inference.

UNIT II   GRAPH THEORY   9+3

Graphs: Types of graphs – Matrix representation of graphs – Connectivity - Graph isomorphism using adjacency matrix and circuits – Euler and Hamilton graph.

UNIT III   VECTOR SPACES   9+3

Vector spaces – Subspaces – Rank of a Matrix – Linear combinations – Linear independence and linear dependence – Bases and dimensions (simple problems)

UNIT IV   LINEAR TRANSFORMATION   9 + 3

Linear transformation – Range and Null spaces – Rank and Nullity - Dimension theorem - Matrix representation of a linear transformation

UNIT V   INNER PRODUCT SPACES   9+3

Inner product - Norms – Orthogonality: Definition and Simple problems - Gram Schmidt orthogonalization process (problems only) – Adjoint of linear operations - Least square approximation.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply logical equivalences and rules of inference to construct and simplify logical expressions.

CO2: Explain fundamental concepts of graphs, including types, representations, and basic properties

CO3: Explain the fundamental concepts of advanced algebra and their role in modern mathematics an applied contexts.

CO4: Determine the rank and nullity of a linear transformation and apply the Rank-Nullity Theorem.

CO5: Demonstrate accurate and efficient use of advanced algebraic techniques.

TEXT BOOKS:

[1] Friedberg. A.H., Insel. A.J. and Spence. L., "Linear Algebra", Prentice Hall of India, New Delhi, 4th Edition, 2004.

[2] Rosen. K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017.

[3] Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

REFERENCES:

[1] Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2013.

[2] Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.

[3] Veerarajan T., "Discrete Mathematics with Graph Theory and Combinatorics", McGraw Hill Pub. Co. Ltd., 1st Edition,2019.

[4] Kumaresan. S., "Linear Algebra – A Geometric Approach", Prentice – Hall of India, New Delhi, Reprint, 2010.

[5] Strang. G., "Linear Algebra and its applications", Thomson (Brooks/Cole), New Delhi, 2005.

CO's-PO's & PSO's MAPPING (INFORMATION TECHNOLOGY)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	0	0	0	0	0	0	0	0	2	0	0	1
CO2	3	3	2	0	0	0	0	0	0	0	0	2	0	0	1
CO3	3	3	1	0	0	0	0	0	0	0	0	2	0	0	1
CO4	3	3	1	0	0	0	0	0	0	0	0	2	0	0	0
CO5	3	3	1	0	0	0	0	0	0	0	0	2	0	0	0
AVG	3	3	1.2	0	0	0	0	0	0	0	0	2	0	0	1

1: Low 2: Medium 3: High. If there is no correlation, "0"

Department of Artificial Intelligence and Machine Learning

Program Outcomes & Program Specific Outcomes

Autonomous Regulation – 2025

PROGRAM OUTCOMES (POs)

PO	Description
PO1	Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design solutions for the complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10	Communicate effectively on complex engineering activities with the Engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (POs)

PSO	Programme Specific Outcomes
PSO.1	Exhibit design and programming skills to build and automate business solutions using cutting edge technologies.
PSO.2	Strong theoretical foundation leading to excellence and excitement towards research, to provide elegant solutions to complex problems.
PSO.3	Ability to work effectively with various engineering fields as a team to design, build and develop system applications.

Autonomous Regulation 2025

SEMESTER - I

MA1101   **CALCULUS FOR ENGINEERS**   **L T P C**
                                                                 3 1 0 4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To equip students with integral calculus techniques, including multiple integrals, for finding areas, volumes, and solving real-life problems.
- To introduce the concepts of vector calculus and apply integral theorems (Gauss, Green, Stokes) in physical and engineering contexts.

UNIT I   MATRICES   9+3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors –Cayley-Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms

UNIT II   DIFFERENTIAL CALCULUS   9+3

Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Maxima and Minima of functions of one variable.

UNIT III   FUNCTIONS OF SEVERAL VARIABLES   9+3

Partial differentiation – Jacobians – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV   INTEGRAL CALCULUS   9+3

Definite and Indefinite Integrals – Integration by parts – Double and Triple integrals in Cartesian form – Area and Volume in Cartesian form.

UNIT V   VECTOR CALCULUS   9+3

Gradient, Divergence, Curl, Solenoidal, Irrotational fields – Directional Derivative – Greens theorem (without proof): Applications of evaluating line and region – Gauss Divergence theorem and Stoke's theorem (without proof) – Applications to Cubes and Parallelopipeds

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Able to use differential calculus ideas on several variable functions

CO4: Apply the concepts of definite and indefinite integrals to solve problems in mathematics and related fields.

CO5: Apply fundamental theorems of vector calculus to relate different types of integrals.

TEXTBOOKS

1. Kreyszig, E. Advanced Engineering Mathematics. 10th Edition, John Wiley and Sons, New Delhi, 2016.
2. Grewal, B. S. Higher Engineering Mathematics. 44th Edition, Khanna Publishers, New Delhi, 2018.
3. Stewart, James. Calculus: Early Transcendentals. 8th Edition, Cengage Learning, New Delhi, 2015.

REFERENCES

1. Bali, N., Goyal, M., and Watkins, C. Advanced Engineering Mathematics. Firewall Media (An imprint of Lakshmi Publications Pvt. Ltd.), New Delhi, 7th Edition, 2009.

2. Jain, R. K., and Iyengar, S. R. K. Advanced Engineering Mathematics. Narosa Publications, New Delhi, 5th Edition, 2016.

3. Narayanan, S., and Manicavachagam Pillai, T. K. Calculus, Volumes I and II. S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

4. Ramana, B. V. Higher Engineering Mathematics. McGraw Hill Education Pvt. Ltd., New Delhi, 2016.

5. Veerarajan, T. Engineering Mathematics. 2nd Edition, Tata McGraw Hill Publishers, New Delhi, 2009.

6. Kavitha, S., Christopher, M., and Bhuvaneswari, N. Calculus for Engineers, VRB Publishers Pvt. Ltd., Chennai, 2025.

CO's-PO's & PSO's MAPPING (AI & ML)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO2	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO3	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
CO4	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0
CO5	3	3	1	1	0	0	0	0	2	0	1	3	0	0	0
AVG	3	3	1	1	0	0	0	0	2	0	1	3	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - II

MA1201   APPLIED STATISTICS AND NUMERICAL METHODS   **L T P C**

3 1 0 4

COURSE OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the principles and techniques of design of experiments for conducting systematic and efficient experiments.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I   TESTING OF HYPOTHESIS   9 + 3

Sampling distributions - Tests for single mean, and difference of means (Large and small samples) – Chi square test for goodness of fit – Independence of attributes.

UNIT II   DESIGN OF EXPERIMENTS   9 + 3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design.

UNIT III   SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS   9 + 3

Solution of algebraic and transcendental equations - Newton Raphson method- Solution of linear system of equations - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

UNIT IV   INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION   9 + 3

Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials at the starting value – Numerical single integration using Trapezoidal, Simpson's 1/3 and 3/8 rules.

UNIT V   NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS   9 + 3

Single step methods: Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step method: Milne's   predictor corrector method for solving first order differential equations.

TOTAL (L:45+T:15)   : 60 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3: Apply numerical techniques to solve algebraic equations, linear systems, and eigenvalue problems.

CO4: Use interpolation, differentiation, and integration methods to approximate functions, derivatives, and definite integrals with numerical accuracy.

CO5: Apply single-step and multi-step numerical methods to obtain approximate solutions of first-order differential equations.

TEXT BOOKS:

[1] Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

[2] Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

[3] Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.

REFERENCES:

[1] Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
[2] Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
[3] Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
[4] Satheesh Babu. R., Saravanan. R., Janani. R., "Applied Statistics and Numerical Methods", VRB Publishers Pvt. Ltd., Chennai, 2025.
[5] Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
[6] Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

CO's-PO's & PSO's MAPPING (AI & ML)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO2	3	3	1	1	1	0	0	0	2	0	2	3	0	0	0
CO3	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO4	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
CO5	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0
AVG	3	3	1	1	1	0	0	0	2	0	2	3	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"

Autonomous Regulation 2025

SEMESTER - III

MA1301	DISCRETE MATHEMATICS AND LINEAR ALGEBRA	L T P C
		3 1 0 4

COURSE OBJECTIVES:

- To introduce the basic notions of vector spaces, which will then be used to solve related problems.
- To understand the concepts of vector space, linear transformations, inner product spaces and orthogonalization.
- To extend students' logical and mathematical maturity and ability to deal with abstraction.
- To introduce most of the basic terminologies used in computer science courses and the application of ideas to solve practical problems.
- To understand the basic concepts of Combinatorics and graph theory

UNIT I   LOGIC AND PROOFS   9+3

Propositional logic - Propositional equivalences - Normal forms - Predicates and Quantifiers - Rules of inference.

UNIT II   GRAPH THEORY   9+3

Graphs: Types of graphs – Matrix representation of graphs – Connectivity - Graph isomorphism using adjacency matrix and circuits – Euler and Hamilton graph.

UNIT III   VECTOR SPACES   9+3

Vector spaces – Subspaces – Rank of a Matrix – Linear combinations – Linear independence and linear dependence – Bases and dimensions (simple problems)

UNIT IV   LINEAR TRANSFORMATION   9 + 3

Linear transformation – Range and Null spaces – Rank and Nullity - Dimension theorem - Matrix representation of a linear transformation

UNIT V   INNER PRODUCT SPACES   9+3

Inner product - Norms – Orthogonality: Definition and Simple problems - Gram Schmidt orthogonalization process (problems only) – Adjoint of linear operations - Least square approximation.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to:

CO1: Apply logical equivalences and rules of inference to construct and simplify logical expressions.

CO2: Explain fundamental concepts of graphs, including types, representations, and basic properties

CO3: Explain the fundamental concepts of advanced algebra and their role in modern mathematics an applied contexts.

CO4: Determine the rank and nullity of a linear transformation and apply the Rank-Nullity Theorem.

CO5: Demonstrate accurate and efficient use of advanced algebraic techniques.

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[2] Rosen. K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017.

[3] Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

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[2] Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.

[3] Veerarajan T., "Discrete Mathematics with Graph Theory and Combinatorics", McGraw Hill Pub. Co. Ltd., 1st Edition,2019.

[4] Kumaresan. S., "Linear Algebra – A Geometric Approach", Prentice – Hall of India, New Delhi, Reprint, 2010.

[5] Strang. G., "Linear Algebra and its applications", Thomson (Brooks/Cole), New Delhi, 2005.

CO's-PO's & PSO's MAPPING (AI & ML)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	0	0	0	0	0	0	0	0	2	0	1	0
CO2	3	3	2	0	0	0	0	0	0	0	0	2	0	1	0
CO3	3	3	1	0	0	0	0	0	0	0	0	2	0	1	0
CO4	3	3	1	0	0	0	0	0	0	0	0	2	0	0	0
CO5	3	3	1	0	0	0	0	0	0	0	0	2	0	0	0
AVG	3	3	1.2	0	0	0	0	0	0	0	0	2	0	1	0

1: Low 2: Medium 3: High. If there is no correlation, "0"