SRI CHANDRASEKHARENDRA SARASWATHI VISWA MAHAVIDYALAYA

(University u/s 3 of UGC Act 1956) Accredited

with "A" Grade by NAAC) Enathur,

Kanchipuram – 631 561. Tamilnadu,

www.kanchiuniv.ac.in

DEPARTMENT OF MATHEMATICS

B.E. / B.Tech. Engineering Syllabus

(Circuit & Non-Circuit Branches)

SRI CHANDRASEKHARENDRA SARASWATHI VISWA MAHAVIDYALAYA

Enathur, Kanchipuram-631561

Department of Mathematics
Faculty of Science

Minutes of Board of Studies in Mathematics

Date: 25-01-2018 **Time: 9:30 A.M** **Venue: Seminar Hall**

The Board of studies meeting in Mathematics held on 25.01.2018 by 9.30 am at the faculty of science seminar hall, SCSVMV campus. The following members attended the meeting.

S.No.	Name and Designation	Position
1.	Dr.K. Srinivasa Rao, Professor & Head, Dept of Mathematics, SCSVMV	Chairman
2.	Mrs.D. Vijayalakshmi, Assistant Professor of Mathematics,SCSVMV	Member
3.	Dr. E. Geetha Assistant Professor of Mathematics, SCSVMV	Member
4.	Dr. Gnanaraj Thomas (Rtd) Associate Professor of Mathematics Madras Christian College, Chennai	Co-opted Member
5.	Dr. S.J.Venkatesan Associate Professor of Mathematics Government Arts College for Men Nandanam, Chennai	Co-opted Member
6.	Dr.S. Balaji Dean(Faculty of Science) SCSVMV	Member

Minutes of the meeting

- The syllabus of Dynamics and Abstract Algebra offered to III B.Sc., (Mathematics) are revised and updated with effect from the academic year 2018-19 onwards.

- The syllabus of M.Sc Mathematics is scrutinized and accepted with minor changes by the committee for implementation with effect from the academic year 2018-19 onwards.

- Proposal for the change in exam pattern for M.Phil Mathematics from annual to semester is discussed and approved by the committee.

- Proposal for common Mathematics syllabus from I semester to V semester for B.E(ECE,EEE,EIE and Mechatronics) and B.E (Mechanical, Civil Engineering and Civil & Structural Engineering) is approved by the members for implementation with effect from the academic year 2018-19 onwards

- A minor change in Operations Research paper offered for VII semester B.E (Mechanical) and VI semester B.E (E&I , Mechatronics) is accepted and approved for implementation with effect from the academic year 2018-19 onwards

Attendance Sheet

S.No.	Name and Designation	Position	Signature
1.	Dr.K. Srinivasa Rao, Professor & Head, Dept of Mathematics, SCSVMV	Chairman	K Srinivasa Rao 25/1/18
2.	Mrs.D. Vijayalakshmi, Assistant Professor of Mathematics,SCSVMV	Member	D.Vijayalakshmi 25/1/18
3.	Dr. E. Geetha Assistant Professor of Mathematics, SCSVMV	Member	E. Geetha 25/1/18
4.	Dr. Gnanaraj Thomas (Rtd) Associate Professor of Mathematics Madras Christian College, Chennai	Co-opted Member	D. Gnanaraj Thomas 25/01/18
5.	Dr. S.J.Venkatesan Associate Professor of Mathematics Government Arts College for Men Nandanam, Chennai	Co-opted Member	S.J. Venkatesan 25/1/18
6.	Dr.S. Balaji Dean(Faculty of Science) SCSVMV	Member	S. Balaji 25/1/18

Circuit Branch

Subject name: Engineering Mathematics I

Aim:

The student will acquire basic knowledge and understand the key facts in fields of matrices, integral and differential calculus.

Objective:

- The syllabus is designed to provide a sound knowledge about differentiation and its calculus.
- This course aims at providing the necessary basic concepts of a few numerical methods and gives procedure for solving numerically different kinds of problems occurring in engineering and technology.
- This also let the students to have good base in matrices, which is in need by engineers for practical applications.
- This is a foundation course, plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

UNIT I

NUMERICAL SOLUTION OF ALGEBRAIC, TRANSCENDENTAL EQUATION

Solution of algebraic and transcendental equations - Bisection method – Method ofsuccessive approximation-Method of false position (Regula-Falsi Method) - Newton-Raphson method-Honer's method-Secant method. Matlab applications.

UNIT II
EIGEN VALUES, EIGEN VECTORS

Rank of matrix – Elementary transformation – Elementary matrices-solution of linear system of equations-Cramer's rule-Matrix inversion method-Consistency of linear system of equations; Linear Transformations – Linear dependence of vectors – Eigen values and Eigen vectors – Properties of Eigenvalues – Cayley Hamilton theorem (without proof). Matlab applications

UNIT III
DIFFERENTIAL CALCULUS AND DIFFERENT IAL EQUATION

Function of two or more variables – Partial derivatives – Total derivative – Taylor's expansion – Maxima and Minima of functions of two variables – Jacobians –Homogenous functions - Euler's

theorem for homogeneous function Operator D – Rules for finding Complementary function – Inverse operator – Rules for finding particular Integral – Working procedure to solve the equation. - Method of undetermined coefficients.

UNIT-IV
LINEAR DIFFERENTIAL EQUATIONS

Method of variation of parameters- Equations reducible to linear equations with constant coefficients: Cauchy's homogeneous linear equation , Legendre's linear equation - Linear dependence of solutions - Simultaneous linear equations with constant coefficients

UNIT V
VECTOR DIFFERENTIATION

Differentiation of vectors - Curves in space - Velocity and acceleration – Scalar and vector point functions –vector operator Del- Del applied to scalar point functions : Gradient - Del applied to vector point functions : Divergence and curl - Physical interpretation of divergence and curl- irrotational and solenoidal vectors – Del applied twice to point functions - Del applied to products of point functions-Conservative vector field.

Note: Questions are to be set on problem solving and not on the theoretical aspects.

PRESCRIBED TEXT BOOK:
Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers,
New Delhi, 2011.

REFERENCES
1. Alan Jeffrey, Advanced Engineering Mathematics, Academic Press
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
3. Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison-Wesley Publishing Company

Subject name: Engineering Mathematics II

Aim:

To provide students with mathematical knowledge in developing their skills in applying mathematical concepts to support their concurrent and subsequent engineering subjects.

Objective:

- To enable the students in applying the knowledge of simultaneous equations, quadratic forms in various fields.
- To use the knowledge of multiple integrals in finding the area and volume of any regions.
- To use Green's theorem to evaluate the line integrals along simple closed contours on the plane, Stoke's theorem to give a physical interpretation of the curl of the vector field.
- To understand the purpose of the Gamma and Beta functions and their uses.

UNIT I
NUMERICAL SOLUTION OF SIMULTANEOUS EQUATIONS

Solution of linear simultaneous equations - Direct methods of solution: Gauss elimination method , Inversion of a matrix using Gauss –Elimination method- Gauss – Jordan method – Method of Factorization-Crout's method, Iterative methods of solution : Jacobi's method , Gauss – Seidel method.

UNIT II
ORTHOGONAL REDUCTION

Orthogonal transformation-Reduction to diagonal form – Similarity matrices – Powers of a matrix - Reduction of quadratic form to canonical form – Nature of a quadratic form – Hermitian, Skew Hermitian and Unitary matrices – Outline of applications of Eigen values and Eigen vectors in engineering

UNIT III
INTEGRAL CALCULUS AND ITS APPLICATIONS

Reduction formulae – reduction formulae [without proof] and Bernoulli's formula. Definite integrals, length of the curve. Double integrals - Change of order of integration - Double integrals in polar coordinates - Areas enclosed by plane curves - Triple integrals – Volume as double integrals - Volume as triple integral.

UNIT IV
BETA AND GAMMA FUNCTIONS

Change of variables in double integrals and Triple integrals – Area of a curved surface. Beta function - Gamma function –Reduction formula for G(n) – Relation between Beta and Gamma functions – Outline of applications of multiple integrals

UNIT V
VECTOR INTEGRATION

Integration of vectors - Line integral-circulation-work - Surface integral - Green's theorem in the plane (without proof) - Stoke's theorem (without proof) - Volume integral - Gauss divergence theorem (without proof) - Irrotational fields – Outline of applications of vector calculus in engineering.

Note: Questions are to be set on problem solving and not on the theoretical aspects.

PRESCRIBED TEXT BOOK:

Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New Delhi, 2011.

REFERENCES

1. Alan Jeffrey, Advanced Engineering Mathematics, Academic Press
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
3. Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison- Wesley Publishing Company

Subject Name: **Engineering Mathematics III**
Aim:

To enable the students in applying mathematical methods in various engineering fields by making them to understand the method of Fourier series and Fourier Transform and Z-Transform.

Objective:

- To learn the concept of Interpolation and Numerical solution to approximate the function and estimate the errors.
- Generalize a periodic function as a sum of series of trigonometric functions using Fourier series.
- Explains the concept of Fourier series & Z transform and state the use of it in time varying signals (continuous).
- Special focus is put on the solution of differential equations using the Laplace transform

UNIT – 1
INTERPOLATION AND NIMUERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Interpolation with equal intervals – Newton's forward interpolation formula – Newton's backward interpolation formula - Interpolation with unequal intervals: Lagrange's interpolation formula, Newton's divided difference formula. Picard's method – Taylor series method - Modified Euler's method – Runge's method – Runge-Kutta method – Predictor-corrector methods: Milne's method, Outline of applications of numerical solutions of ordinary differential equations in engineering.

UNIT – II
FOURIER SERIES

Euler's Formulae (Without Proof) – Condition for Fourier expansion – Functions having points of discontinuity – Change of interval – Expansions of even and odd functions – Half Range series – Parseval's formula (without proof) – Root mean square value (without proof) – Typical waveforms (Definition Only): Square wave form, Saw toothed waveform, Modified saw toothed waveform, Triangular waveform, Half wave rectifier, Full wave rectifier - Outline of applications of Fourier series in engineering

UNIT – III
LAPLACE TRANSFORMS AND APPLICATIONS

Transforms of elementary functions : 1,t^n , e^{at} , sin *at*, cos *at*, sinh *at*, cosh *at* - Properties of Laplace transforms: Linearity Property, First shifting property, Change of scale property – Transforms of derivatives - Transforms of integrals - Multiplication by t^n - Division by t - Evaluation of integrals by Laplace transform - Inverse transforms: Method of partial fractions – Other methods of finding inverse - Convolution theorem (Without proof) - Unit step function – Unit Impulse Function - Application to differential equations – Outline of applications of Laplace transforms in engineering.

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UNIT-IV

Z – TRANSFORM AND APPLICATIONS

Standard z-transforms of 1, a^n, n^p– Linearity property – Damping rule – Shifting rules – Multiplication by n - Initial and final value theorems (without proof) – inverse z –transforms – Convolution theorem (without proof) – Convergence of z-transforms – Two sided z-transform – Evaluation of inverse z-transforms: Power series method, Partial fraction method, inversion integral method – Application to difference equations – Outline of applications of z-transform in engineering

UNIT –V

FOURIER TRANSFORMS AND APPLICATIONS

Fourier integral theorem (without proof) - Fourier Sine and Cosine integrals – Complex form of Fourier integral - Fourier integral representation of a function - Fourier transform – Fourier sine and Cosine transforms – Properties of Fourier Transforms: Linear property, Change of scale property, Shifting property - Parseval's identity for Fourier transforms (without proof) – Application of transforms to boundary value problems: Heat conduction, Vibrations of a string, Transmission lines.

Note: Questions are to be set on problem solving and not on the theoretical aspects.

PRESCRIBED TEXT BOOK:

Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New Delhi, 2011.

REFERENCES

1. Alan Jeffrey, Advanced Engineering Mathematics, Academic Press
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons

3. Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison-WesleyPublishing Company

Subject Name : Engineering Mathematics IV

(only for EEE,CSC,ECE,E&I and MECHATRONICS)

Aim:

To provide a definite idea about complex functions and their applications. To solve series solution of differential equation, higher order partial differential equations and difference equation.

Objectives:

- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence in application areas of engineering.
- To provide students with knowledge of ordinary differential equations required for solving real life engineering problems.
- The understanding of the mathematical principles on partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering
- To apply the finite difference method to obtain the solution of boundary value problems

UNIT - I
ANALYTIC FUNCTIONS

Limit and continuity of a complex function - Derivative of a complex function: Cauchy Riemann equations – Analytic functions – Harmonic functions - Orthogonal system – Applications to flow problems – Geometric representation of a complex function - Standard transformations: Translation, Magnification and rotation, Inversion and reflection, Bilinear transformation - Conformal transformation – Special conformal transformations : $e^z, z^2, z + \frac{1}{z}$ Outline of applications of analytic functions in engineering

UNIT- II
COMPLEX INTEGRATION

Integration of complex functions – Cauchy's theorem (without proof) – Cauchy's integral formula (without proof) – Taylor's series (without proof)– Laurent's series (without proof) – Zeros and Singularities of an analytic function – Residues – Residue theorem (without proof) – Calculation of residues – Evaluation of real definite integrals: Integration around the unit circle, Integration around a small semi-circle, Integration around rectangular contours, Indenting the contours having poles on the real axis – Outline of applications of complex integration in engineering.

UNIT - III
SERIES SOLUTION OF DIFFERENTIAL EQUATIONS

Validity of series solution - Series solution when x=0 is an ordinary point - Frobenius method (Series solution when x=0 is a regular singularity) - Bessel's equation (Bessels functions of the first and second kind) - Recurrence formulae for $J_n(x)$ - Expansions for J_0 and J_1 : Value of $J_{1/2}$ - Generating function for $J_n(x)$ - Equations reducible to Bessel's equation – Orthogonality of Bessel functions – Outline of applications of Bessel's functions in engineering.

UNIT – IV
PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations – Solution of a partial differential equation – Equations solvable by direct integration – Linear equations of first order – Non-linear equations of the first order – Charpit's method - Homogeneous linear equations with constant coefficients – Rules for finding complementary functions – Rules for finding particular integral – Solution of homogeneous linear equation of any order.

UNIT –V
DIFFERENCE EQUATIONS AND APPLICATIONS

Formation of difference equations – Linear difference equations – Rules for finding the complementary function – Rules for finding the particular integral – Simultaneous difference equations with constant coefficients – Outline of other applications of difference equations in

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REFERENCES

1. Alan Jeffrey, Advanced Engineering Mathematics, Academic Press

2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons

3. Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison-Wesley

Subject Name : Engineering Mathematics – V

Aim: The student can acquire the basic concepts of probabilities and statistical techniques for solving different kinds of engineering problems.

Objectives:

- To provide the required fundamental concepts of probability and statistics to the students.
- To apply the basic rules and theorems of probability in solving the engineering problems.
- To know how to use statistical tests in testing hypothesis on data.

UNIT –I
PROBABILITY THEORY

Random experiment – Mathematical, statistical and axiomatic definitions of probability – Conditional probability – Independent events - Theorem of total probability – Theorem of probability of causes: Baye's theorem – Bernoulli's trials – De Moivre-Laplace approximation – Generalization of Bernoulli's theorem multinomial distribution – Outline of applications of probability theory in engineering.

UNIT – II
DISTRIBUTIONS

Binomial distribution: Properties and constants of Binomial distribution – Fitting a Binomial distribution - The multinomial distribution – Negative Binomial distribution – Poisson distribution: Properties and constants of Poisson distribution – Fitting a Poisson distribution – Hyper-geometric distribution – Normal distribution: Properties and constants of Normal distribution – Fitting a normal curve – Outline of applications of theoretical distributions in engineering.

UNIT-III
COLLECTION AND ANALYSIS OF DATA

Classification and tabulation of data - Frequency tables - Graphical representation - Measures of central tendency : Averages, mean, median, mode, Geometric and harmonic means - Measures of dispersion : Range, quartile deviation, Mean deviation, Standard deviation - Relative distribution - Moments - Skewness - Kurtosis - Linear correlation - Coefficient of correlation - Grouped data : calculation of correlation coefficient - Rank correlation - Linear regression - Regression lines.

UNIT – IV
TESTING OF HYPOTHESIS

Tests of Hypothesis- Sampling distribution-Estimation and testing of hypothesis-Tests of hypothesis and tests of significance- Critical region and level of significance- Errors in testing of hypothesis- One-tailed and Two-tailed tests-Critical values – procedure of testing of hypothesisTests of significance for large samples–Tests of significance for small samples-Student's tDistribution-Snedecor's F-distribution-Chi-square distribution-Chi-square test of Goodness of fit.

UNIT –V
DESIGN OF EXPERIMENTS

Parameters and statistics – Sampling distribution – Tests of hypothesis and tests of significance – Critical region and level of significance – Errors in testing of hypothesis – One tailed and two tailed tests – Procedure for testing of hypothesis – Design of experiments – Completely randomized design: Analysis of variance for one factor of classification – Randomized block design: Analysis of variance for two factors of classification – Latin square design: Analysis of variance for three factors of classification – Outline of applications of design of experiments in engineering. Note: Questions are to be set on problem solving and not on the theoretical aspects.

Note: Questions are to be set on problem solving and not on the theoretical aspects.

TEXT BOOK

1. Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New Delhi, 2011.
2. Veerarajan. T., Probability, Statistics and Random Processes, Third Edition, Tata McGraw-Hill Publishers, New Delhi 2008.

REFERENCE BOOKS

1. Erwin Kreyszig, Advanced Engineering Mathematics , 10th Edition, John Wiley & Sons, 2010
2. Gerald C.F and Wheatley P.O, Applied Numerical Analysis, 7th Edition , Pearson Education India, 2007
3. Gupta S.P, Statistical Methods, 28th Edition, Sultan Chand &Sons., New Delhi, 1997.

Non-Circuit Branch

Subject name: Engineering Mathematics I

Aim:

The student will acquire basic knowledge and understand the key facts in fields of matrices, integral and differential calculus.

Objective:

- The syllabus is designed to provide a sound knowledge about differentiation and its calculus.
- This course aims at providing the necessary basic concepts of a few numerical methods and gives procedure for solving numerically different kinds of problems occurring in engineering and technology.
- This also let the students to have good base in matrices, which is in need by engineers for practical applications.
- This is a foundation course, plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

UNIT I

NUMERICAL SOLUTION OF ALGEBRAIC, TRANSCENDENTAL EQUATION

Solution of algebraic and transcendental equations - Bisection method – Method ofsuccessive approximation-Method of false position (Regula-Falsi Method) - Newton-Raphson method-Honer's method-Secant method. Matlab applications.

UNIT II
EIGEN VALUES, EIGEN VECTORS

Rank of matrix – Elementary transformation – Elementary matrices-solution of linear system of equations - Cramer's rule-Matrix inversion method-Consistency of linear system of equations; Linear Transformations – Linear dependence of vectors – Eigen values and Eigen vectors – Properties of Eigenvalues – Cayley Hamilton theorem (without proof). Matlab applications

UNIT III

DIFFERENTIAL CALCULUS AND DIFFERENT IAL EQUATION

Function of two or more variables – Partial derivatives – Total derivative – Taylor's expansion – Maxima and Minima of functions of two variables – Jacobians –Homogenous functions - Euler's theorem for homogeneous function Operator D – Rules for finding Complementary function – Inverse operator – Rules for finding particular Integral – Working procedure to solve the equation. - Method of undetermined coefficients.

UNIT-IV
LINEAR DIFFERENTIAL EQUATIONS

Method of variation of parameters- Equations reducible to linear equations with constant coefficients: Cauchy's homogeneous linear equation , Legendre's linear equation - Linear dependence of solutions - Simultaneous linear equations with constant coefficients

UNIT V
VECTOR DIFFERENTIATION

Differentiation of vectors - Curves in space - Velocity and acceleration – Scalar and vector point functions –vector operator Del- Del applied to scalar point functions : Gradient - Del applied to vector point functions : Divergence and curl - Physical interpretation of divergence and curl-irrotational and solenoidal vectors – Del applied twice to point functions - Del applied to products of point functions-Conservative vector field.

Note: Questions are to be set on problem solving and not on the theoretical aspects.

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New Delhi, 2011.

REFERENCES

1. Alan Jeffrey, Advanced Engineering Mathematics, Academic Press
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
3. Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison-Wesley Publishing Company

Subject name: Engineering Mathematics II

Aim:

To provide students with mathematical knowledge in developing their skills in applying mathematical concepts to support their concurrent and subsequent engineering subjects.

Objective:

- To enable the students in applying the knowledge of simultaneous equations, quadratic forms in various fields.
- To use the knowledge of multiple integrals in finding the area and volume of any regions.
- To use Green's theorem to evaluate the line integrals along simple closed contours on the plane, Stoke's theorem to give a physical interpretation of the curl of the vector field.
- To understand the purpose of the Gamma and Beta functions and their uses.

UNIT I
NUMERICAL SOLUTION OF SIMULTANEOUS EQUATIONS

Solution of linear simultaneous equations - Direct methods of solution: Gauss elimination method , Inversion of a matrix using Gauss –Elimination method- Gauss – Jordan method – Method of Factorization-Crout's method, Iterative methods of solution : Jacobi's method , Gauss – Seidel method.

UNIT II
ORTHOGONAL REDUCTION

Orthogonal transformation-Reduction to diagonal form – Similarity matrices – Powers of a matrix - Reduction of quadratic form to canonical form – Nature of a quadratic form – Hermitian, Skew Hermitian and Unitary matrices – Outline of applications of Eigen values and Eigen vectors in engineering

UNIT III
INTEGRAL CALCULUS AND ITS APPLICATIONS

Reduction formulae – reduction formulae [without proof] and Bernoulli's formula. Definite integrals, length of the curve. Double integrals - Change of order of integration - Double

integrals in polar coordinates - Areas enclosed by plane curves - Triple integrals – Volume as double integrals - Volume as triple integral.

UNIT IV
BETA AND GAMMA FUNCTIONS

Change of variables in double integrals and Triple integrals – Area of a curved surface. Beta function - Gamma function –Reduction formula for G(*n*) – Relation between Beta and Gamma functions – Outline of applications of multiple integrals

UNIT V
VECTOR INTEGRATION

Integration of vectors - Line integral-circulation-work - Surface integral - Green's theorem in the plane (without proof) - Stoke's theorem (without proof) - Volume integral - Gauss divergence theorem (without proof) - Irrotational fields – Outline of applications of vector calculus in engineering.

Note: Questions are to be set on problem solving and not on the theoretical aspects.

PRESCRIBED TEXT BOOK:

Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New Delhi, 2011.

REFERENCES

1. Alan Jeffrey, Advanced Engineering Mathematics, Academic Press
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
3. Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison- Wesley Publishing Company

Subject Name: **Engineering Mathematics III**
Aim:

To enable the students in applying mathematical methods in various engineering fields by making them to understand the method of Fourier series and Fourier Transform and Z-Transform.

Objective:

- To learn the concept of Interpolation and Numerical solution to approximate the function and estimate the errors.
- Generalize a periodic function as a sum of series of trigonometric functions using Fourier series.
- Explains the concept of Fourier series & Z transform and state the use of it in time varying signals (continuous).
- Special focus is put on the solution of differential equations using the Laplace transform

UNIT – 1
INTERPOLATION AND NIMUERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Interpolation with equal intervals – Newton's forward interpolation formula – Newton's backward interpolation formula - Interpolation with unequal intervals: Lagrange's interpolation formula, Newton's divided difference formula. Picard's method – Taylor series method - Modified Euler's method – Runge's method – Runge-Kutta method – Predictor-corrector methods: Milne's method, Outline of applications of numerical solutions of ordinary differential equations in engineering.

UNIT – II
FOURIER SERIES

Euler's Formulae (Without Proof) – Condition for Fourier expansion – Functions having points of discontinuity – Change of interval – Expansions of even and odd functions – Half Range series – Parseval's formula (without proof) – Root mean square value (without proof) – Typical waveforms (Definition Only): Square wave form, Saw toothed waveform, Modified saw toothed waveform, Triangular waveform, Half wave rectifier, Full wave rectifier - Outline of applications of Fourier series in engineering

UNIT – III
LAPLACE TRANSFORMS AND APPLICATIONS

Transforms of elementary functions : 1,t^n , e^{at} , sin *at*, cos *at*, sinh *at*, cosh *at* - Properties of Laplace transforms: Linearity Property, First shifting property, Change of scale property – Transforms of derivatives - Transforms of integrals - Multiplication by t^n - Division by t - Evaluation of integrals by Laplace transform - Inverse transforms: Method of partial fractions – Other methods of finding inverse - Convolution theorem (Without proof) - Unit step function – Unit Impulse Function - Application to differential equations – Outline of applications of Laplace transforms in engineering.

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UNIT-IV
Z – TRANSFORM AND APPLICATIONS

Standard z-transforms of 1, a^n, n^p– Linearity property – Damping rule – Shifting rules – Multiplication by n - Initial and final value theorems (without proof) – inverse z –transforms – Convolution theorem (without proof) – Convergence of z-transforms – Two sided z-transform – Evaluation of inverse z-transforms: Power series method, Partial fraction method, inversion integral method – Application to difference equations – Outline of applications of z-transform in engineering

UNIT –V
FOURIER TRANSFORMS AND APPLICATIONS

Fourier integral theorem (without proof) - Fourier Sine and Cosine integrals – Complex form of Fourier integral - Fourier integral representation of a function - Fourier transform – Fourier sine and Cosine transforms – Properties of Fourier Transforms: Linear property, Change of scale property, Shifting property - Parseval's identity for Fourier transforms (without proof) – Application of transforms to boundary value problems: Heat conduction, Vibrations of a string, Transmission lines.

Note: Questions are to be set on problem solving and not on the theoretical aspects.

PRESCRIBED TEXT BOOK:

Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New Delhi, 2011.

REFERENCES

1. Alan Jeffrey, Advanced Engineering Mathematics, Academic Press
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
3. Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison-Wesley Publishing Company

Subject Name : Engineering Mathematics IV

(only for Mechanical and Civil branches)

UNIT - I
ANALYTIC FUNCTIONS

Limit and continuity of a complex function - Derivative of a complex function: Cauchy-Riemann equations – Analytic functions – Harmonic functions - Orthogonal system – Applications to flow problems – Geometric representation of a complex function - Standard transformations: Translation, Magnification and rotation, Inversion and reflection, Bilinear transformation - Conformal transformation – Special conformal transformations : $e^z, z^2, z + \frac{1}{z}$ Outline of applications of analytic functions in engineering

UNIT - II
COMPLEX INTEGRATION

Integration of complex functions – Cauchy's theorem (without proof) – Cauchy's integral formula (without proof) – Taylor's series (without proof)– Laurent's series (without proof) – Zeros and Singularities of an analytic function – Residues – Residue theorem (without proof) – Calculation of residues – Evaluation of real definite integrals: Integration around the unit circle, Integration around a small semi-circle, Integration around rectangular contours, Indenting the contours having poles on the real axis – Outline of applications of complex integration in engineering.

UNIT- III
CALCULUS OF VARIATIONS

Functionals – Euler's Equation - Solutions of Euler's equation – Geodesics – Isoperimetric problems – Several dependant variables – Functionals involving higher order derivatives – Approximate solution of boundary value problems: Rayleigh-Ritz method.

UNIT – IV
PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations – Solution of a partial differential equation – Equations solvable by direct integration – Linear equations of first order – Non-linear equations of the first order – Charpit's method - Homogeneous linear equations with constant coefficients – Rules for finding complementary functions – Rules for finding particular integral – Solution of homogeneous linear equation of any order.

UNIT – V

APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

Method of separation of variables – Vibration of a stretched string: Wave equation – Solution of Wave equation - D'Alembert's solution of wave equation – One dimensional heat flow – Solution of heat equation – Two dimensional heat flow – Solution of Laplace equation: temperature distribution in long plates, Temperature distribution in finite plates.

Note: Questions are to be set on problem solving and not on the theoretical aspects.

PRESCRIBED TEXT BOOK:

Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New Delhi, 2011.

REFERENCES

1. Alan Jeffrey, Advanced Engineering Mathematics, Academic Press

2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons

3. Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison-Wesley

Subject Name : Engineering Mathematics – V

Aim: The student can acquire the basic concepts of probabilities and statistical techniques for solving different kinds of engineering problems.

Objectives:

- To provide the required fundamental concepts of probability and statistics to the students.
- To apply the basic rules and theorems of probability in solving the engineering problems.
- To know how to use statistical tests in testing hypothesis on data.

UNIT –I
PROBABILITY THEORY

Random experiment – Mathematical, statistical and axiomatic definitions of probability – Conditional probability – Independent events - Theorem of total probability – Theorem of probability of causes: Baye's theorem – Bernoulli's trials – De Moivre-Laplace approximation – Generalization of Bernoulli's theorem multinomial distribution – Outline of applications of probability theory in engineering.

UNIT – II

PORBABILITY DISTRIBUTIONS

Binomial distribution: Properties and constants of Binomial distribution – Fitting a Binomial distribution - The multinomial distribution – Negative Binomial distribution – Poisson distribution: Properties and constants of Poisson distribution – Fitting a Poisson distribution – Hyper-geometric distribution – Normal distribution: Properties and constants of Normal distribution – Fitting a normal curve – Outline of applications of theoretical distributions in engineering.

UNIT-III
COLLECTION AND ANALYSIS OF DATA

Classification and tabulation of data - Frequency tables - Graphical representation - Measures of central tendency : Averages, mean, median, mode, Geometric and harmonic means - Measures of dispersion : Range, quartile deviation, Mean deviation, Standard deviation - Relative distribution - Moments - Skewness - Kurtosis - Linear correlation - Coefficient of correlation - Grouped data : calculation of correlation coefficient - Rank correlation - Linear regression - Regression lines.

UNIT – IV
TESTING OF HYPOTHESIS

Tests of Hypothesis- Sampling distribution-Estimation and testing of hypothesis-Tests of hypothesis and tests of significance- Critical region and level of significance- Errors in testing of hypothesis- One-tailed and Two-tailed tests-Critical values – procedure of testing of hypothesisTests of significance for large samples–Tests of significance for small samples-Student's tDistribution-Snedecor's F-distribution-Chi-square distribution-Chi-square test of Goodness of fit.

UNIT –V
DESIGN OF EXPERIMENTS

Parameters and statistics – Sampling distribution – Tests of hypothesis and tests of significance – Critical region and level of significance – Errors in testing of hypothesis – One tailed and two tailed tests – Procedure for testing of hypothesis – Design of experiments – Completely randomized design: Analysis of variance for one factor of classification – Randomized block design: Analysis of variance for two factors of classification – Latin square design: Analysis of variance for three factors of classification – Outline of applications of design of experiments in engineering. Note: Questions are to be set on problem solving and not on the theoretical aspects.

Note: Questions are to be set on problem solving and not on the theoretical aspects.

TEXT BOOK

1. Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New Delhi, 2011.
2. Veerarajan. T., Probability, Statistics and Random Processes, Third Edition, Tata McGraw-Hill Publishers, New Delhi 2008.

REFERENCE BOOKS

1. Erwin Kreyszig, Advanced Engineering Mathematics , 10th Edition, John Wiley & Sons, 2010
2. Gerald C.F and Wheatley P.O, Applied Numerical Analysis, 7th Edition , Pearson Education India, 2007
3. Gupta S.P, Statistical Methods, 28th Edition, Sultan Chand &Sons., New Delhi, 1997.

Subject Name : Engineering Mathematics VII (Only for Mech)

Aim: To understand the tools of operations research in the engineering field

Objectives:

- The students will able to formulate and find the optimal solutions in the real life optimizing problems and assignment problems.
- To apply the concepts of PERT and CPM for decision making and optimally managing projects.
- To know the detailed knowledge of Inventory control

UNIT I
LINEAR PROGRAMMING AND SIMPLEX METHOD

Mathematical formulation of the problem - Graphical solution method - Exceptional cases - General linear programming problem - Canonical and standard forms of linear programming problem - The simplex method - Computational procedure : The simplex algorithm - Artificial variable techniques : Big M method, Two phase method - problem of degeneracy.

UNIT II
TRANSPORTATION, ASSIGNMENT AND ROUTING PROBLEMS

Mathematical formulation of the transportation problem - Triangular basis - Loops in a transportation table - Finding initial basic feasible solution (NWC, IBM and VAM methods) - Moving towards optimality - Degeneracy in transportation problems- Transportation algorithm (MODI method) - Unbalanced transportation problems - Mathematical formulation of the assignment problem - Assignment algorithm : Hungarian assignment method - Routing problems : Travelling salesman problem.

UNIT III
GAME THEORY AND SEQUENCING PROBLEMS

Two person zero sum games - Maxmin Minmax principle - Games without saddle points (Mixed strategies) - Solution of 2 X 2 rectangular games - Graphical method - Dominance property - Algebraic method for m x n games - Matrix oddments method for m x n games - Problem of sequencing - Problems with n jobs and 2 machines - Problems with n jobs and k machines - Problems with 2 jobs and k machines.

UNIT IV
INTEGER PROGRAMMING AND INVENTORY CONTROL

Gomory's All I.P.P method - Gomory's mixed integer method - Branch and bound method - Reasons for carrying inventory - Types of inventory - Inventory decisions - Economic order quantity - Deterministic inventory problem - EOQ problem with price breaks - Multi item deterministic problem.

UNIT V
REPLACEMENT PROBLEMS AND PERT/CPM

Replacement of equipment or asset that deteriorates gradually - Replacement of equipment that fails suddenly - Recruitment and promotion problem - Network and basic components - Rules of network construction - Time calculations in networks - Critical path method (CPM) - PERT - PERT calculations - Negative float and negative Slack - Advantages of network (PERT/CPM).

TEXT BOOK

1. Kanti Swarup, P.K.Gupta and Man Mohan, Operations Research, Eighth Edition, Sultan Chand & Sons, New Delhi, 1999.

REFERENCES

1. H.A.Taha, Operations Research, Sixth Edition, MacMillen.
2. Richard Bronson, Operations Research, (Schaum's Outline Series,