Title of The Paper: NUMERICAL ANALYSIS

LEARNING OBJECTIVES

The aim of this course is to develop numerical methods to solve algebraic equations and approximate values of the functions and to find the values of definite integrals

LEARNING OUTCOMES

- Ability to find solutions for algebraic equations, ordinary differential equations
- Calculating the errors and approximations in numerical methods
- Analysis of finite differences

UNIT- I: (10hours)

ErrorsinNumericalcomputations:ErrorsandtheirAccuracy,MathematicalPreliminaries,Errors andtheirAnalysis,Absolute,RelativeandPercentageErrors,Ageneralerrorformula,Errorinaser iesapproximation.

UNIT– II:(12hours)

SolutionofAlgebraicandTranscendentalEquations:Thebisectionmethod,Theiterationmethod, Themethodoffalseposition,NewtonRaphsonmethod,GeneralizedNewtonRaphsonmethod. Muller'sMethod.

UNIT– III:(12hours)Interpolation-I

Interpolation :Errorsinpolynomialinterpolation,FiniteDifferences,Forwarddifferences,Backwarddifferen ces,CentralDifferences,Symbolicrelations,DetectionoferrorsbyuseofDifferencesTables, Differencesofapolynomial.

UNIT– IV: (12hours)Interpolation-II

Newton'sformulaeforinterpolation.CentralDifferenceInterpolationFormulae,Gauss'scentral differenceformulae, Stirling'scentraldifferenceformula, Bessel'sFormula, Everett'sFormula.

UNIT– V :(14hours)Interpolation-III

Interpolation with unevenlyspacedpoints,Lagrange'sformula,ErrorinLagrange'sformula,Divideddifferences andtheirproperties,Relationbetweendivided differences andforwarddifferences,Relationbetween divideddifferencesandbackwarddifferencesRelationbetweendivideddifferencesand central differences,Newton'sgeneralinterpolationFormula, Inverseinterpolation

ReferenceBooks:

1.NumericalAnalysisbyS.S.Sastry,publishedbyPrenticeHallofIndiaPvt.Ltd.,NewDelhi.(Late stEdition)
2.NumericalAnalysisbyG.SankarRaopublishedby New AgeInternationalPublishers,New– Hyderabad.
3.FiniteDifferencesandNumericalAnalysisbyH.CSaxenapublishedbyS.ChandandCompan y,Pvt.Ltd.,NewDelhi.
4.Numericalmethodsforscientificandengineeringcomputationby M.K.Jain,S.R.K.Iyengar,R. K.Jain.

Title of The Paper: INTEGRAL TRANSFORMS

LEARNING OBJECTIVES

The aim of this course is to provide essential mathematical applications of integral transforms and its variety of applications in mathematics.

LEARNING OUTCOMES

- Able to gain wide range of applications of integral methods
- Be able to understand the applications of complex variable theory.
- Be able to get the knowledge of applications of integral transforms in solving various differential equations

UNIT – 1 (12 hrs) Application of Laplace Transform to solutions of Differential Equations : -

Solutions of ordinary Differential Equations.

Solutions of Differential Equations with constants co-efficient

Solutions of Differential Equations with Variable co-efficient

UNIT – 2 (12 hrs) Application of Laplace Transform : -

Solution of simultaneous ordinary Differential Equations.

Solutions of partial Differential Equations.

UNIT – 3 (12 hrs) Application of Laplace Transforms to Integral Equations : -

Definitions : Integral Equations-Abel's, Integral Equation-Integral Equation of Convolution Type, Integro Differential Equations.Application of L.T. to Integral Equations.

UNIT –4 (12 hrs) Fourier Transforms-I : -

Definition of Fourier Transform – Fourier's in Transform – Fourier cosine Transform – Linear Property of Fourier Transform – Change of Scale Property for Fourier Transform – sine Transform and cosine transform shifting property – modulation theorem.

UNIT – 5 (12 hrs) Fourier Transform-II : -

Convolution Definition – Convolution Theorem for Fourier transform – parseval'sIndentify – Relationship between Fourier and Laplace transforms – problems related to Integral Equations.

Finte Fourier Transforms : -

Finte Fourier Sine Transform – Finte Fourier Cosine Transform – Inversion formula for sine and

cosine Transforms only statement and related problems.

Reference Books :-

1. Integral Transforms by A.R. Vasistha and Dr. R.K. Gupta Published by Krishna Prakashan Media Pvt. Ltd.
Meerut.
2. A Course of Mathematical Analysis by ShanthiNarayana and P.K. Mittal, Published by S. Chand and

Company pvt. Ltd., New Delhi.

3. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Company Pvt. Ltd.,
New Delhi.
4. Lapalce and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by Pragathi Prakashan,
Meerut.
5. Integral Transforms by M.D. Raising hania, - H.C. Saxsena and H.K. Dass Published by S.Chand and
Company pvt. Ltd., New Delhi.

Title of The Paper: ADVANCED NUMERICAL ANALYSIS

LEARNING OBJECTIVES

The aim of this course is to develop numerical methods to solve algebraic equations and approximate values of the functions and to find the values of definite integrals

LEARNING OUTCOMES

- Ability to find solutions for algebraic equations, ordinary differential equations
- Calculating the errors and approximations in numerical methods
- Analysis of finite differences

Unit– I(10Hours)

CurveFitting:Least–Squares curvefittingprocedures,fittingastraightline,nonlinearcurvefitting, Curvefittingbyasumofexponentials

UNIT-II:(12hours)

Numerical Differentiation: Derivatives using Newton's forward difference formula, Newton's backward differenceformula, Derivatives using central difference formula, stirling'sinterpolationformula, Newton'sdivideddifferenceformula, Maximumandminimumvaluesofatabulatedfunction.

UNIT-III:(12hours)

NumericalIntegration:Generalquadratureformulaonerrors,Trapozoidalrule,Simpson's1/3–rule, Simpson's3/8–rule,andWeddle'srules,Euler–MaclaurinFormulaofsummationandquadrature, The Eulertransformation.

UNIT– IV: (14hours)

SolutionsofsimultaneousLinearSystemsofEquations:Solutionoflinearsystems–Directmethods, Matrixinversionmethod,Gaussianeliminationmethods,Gauss-JordanMethod,Methodoffactorization, SolutionofTridiagonalSystems,.Iterativemethods.Jacobi'smethod,Gauss-siedal method.

UNIT– V (12Hours)

Numerical solutionof ordinarydifferentialequations: Introduction,SolutionbyTaylor'sSeries, Picard'smethodof successiveapproximations, Euler'smethod, Modified Euler'smethod,Runge–Kuttamethods.

ReferenceBooks:

1. NumericalAnalysisbyS.S.Sastry,publishedbyPrenticeHallIndia(LatestEdition).
2. NumericalAnalysisbyG.SankarRao,publishedbyNewAgeInternationalPublishers,New– Hyderabad.
3. FiniteDifferencesandNumericalAnalysisbyH.CSaxenapublishedbyS.ChandandCompany, Pvt.Ltd.,NewDelhi.
4. NumericalmethodsforscientificandengineeringcomputationbyM.K.Jain,S.R.K.Iyengar,R. K.Jain