

University of Kerala  
Complementary Course in Mathematics  
for First Degree Programme in Statistics  
Semester III  
Mathematics III  
(Fourier series, Numerical Methods and ODE )  
Code: MM 1331.4

Instructional hours per week: 5

No. of Credits:4

**Module 1: Fourier Series**

(20 Hours)

Introduction, Eulers Formulae (without proof), Conditions for a Fourier Expansion, Functions Having Points of Discontinuity, Change of Interval, Even and Odd Functions, Half Range Series, Fourier Transforms, Properties of Fourier Transforms.

*The topics in this module can be found in chapter 10 [sections 10.1 to 10.7] and Chapter 22 [sections 22.4, 22.5] of the text.*

**Module 2 : Numerical Solutions**

(35 Hours)

Numerical Solution of Equations :-Introduction, Solution of Algebraic and Transcendental equations, Useful Deductions From the Newton-Raphson Formula, Solution of Linear Simultaneous Equations, Direct Methods of Solution(exclude Factorization Method), Iterative Methods of Solution(exclude relaxation method).

Finite Differences and Interpolation:-Finite Differences, To Find One or More Missing Terms(First method only), Newtons Interpolation Formulae, Lagranges Interpolation Formula.

Numerical Integration :-Numerical Integration, Trapezoidal Rule, Simpsons One-Third Rule, Simpsons Three-Eighth Rule, Weddles Rule.

Numerical Solution of Ordinary Differential Equations :-Taylors Series Method,Runge-Kutta Method, Predictor-Corrector Methods, Milnes Method

*The topics in this module can be found in chapter 28 [sections 28.1 to 28.3, 28.5 to 28.7], chapter 29 [Sections 29.1, 29.5, 29.6, 29.10], chapter 30 [sections 30.4, 30.6 to 30.8, 30.10] and chapter 32 [sections 32.3, 32.7 to 32.9] of the text*

**Module 3: Ordinary Differential Equations**

(35 Hours)

Differential Equations of the First Order :- Definitions, Solution of a Differential Equation, Equations of the First order and First Degree Variables Separable, Homogeneous Equations, Equations Reducible to Homogeneous Form, Linear Equations, Bernoullis Equation, Exact Differential Equations, Equations reducible to exact equations, Equations of the First Order and Higher Degree, Clairauts Equation.

Applications of Differential Equations of First Order :- Orthogonal Trajectories.

Linear Differential Equations :- Definitions, Theorem without proof, Operator D, Rules For Finding the Complementary Function, Inverse Operator, Rules for Finding the Particular Integral, Working Procedure to Solve the Equation, Two Other Methods of Finding P.I, Equations reducible to Linear equations with Constant Coefficients, Linear Dependence of Solutions.

*The topics in this module can be found in chapter 13, sections 13.1, 13.3, 13.4, 13.5, 13.8 and 13.9 of text*  
**Text**

Text : B.S. Grewal, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.

**References**

- I) K.F. Riley, M. P. Hobson, S .J. Bence. Mathematical Methods for Physics and Engineering, 3rd Edition, Cambridge University Press.
- II) H. Anton, I. Bivens, S. Davis. Calculus, 10th Edition, John Wiley & Sons.
- III) George. B. Afken, Hans. J. Weber, Frank .E. Harris. Mathematical Methods for Physicists, 7th Edition, Academic Press.
- IV) Erwin Kreyszig. Advanced Engineering Mathematics, 10th Edition, Wiley-India.
- V) Mary L. Boas. Mathematical Methods in the Physical Sciences, Third Edition, John Wiley & Sons.