DEPARTMENT OF MATHEMATICS

Semester : IV **Integrated M.Sc. Mathematics** **Academic Year : 2017-18**

Subject : 060090403 CC10 Numerical Analysis

Teaching Schedule

Course Objectives:

- To expose the student to the various numerical methods available for different kinds of problems.
- To develop appreciation of the applicability of numerical methods.

Unit	Sub Unit	No. of Lect.(s)	Topics	Reference Chapter/ Additional Reading	Teaching Methodology to be used
Unit 1: Curve Fitting					**[10]**
1	1.1	1	Introduction to curve fitting.	Ch#5 Numerical Method for Scientists and Engineers, K. Sankara Rao	Chalk & Talk
	1.2	1	Fitting a straight line		
	1.3	4	Non-linear curve fitting		
	1.4	1	Curve fitting by sum of exponentials		
	1.5	2	Weighted least square approximation – linear and non-linear.		
	1.6	1	Continuous Function		
Unit 2: Numerical Differentiation and Integration					**[15]**
2	2.1	1	Differentiation: Introduction	Ch#7 Numerical Method for Scientists and Engineers, K. Sankara Rao	Chalk & Talk
	2.2	2	Differentiation using Difference Operators		
	2.3	2	Differentiation using Interpolation		
	2.4	2	Cubic Spline Method		
	2.5	1	Numerical Integration		
	2.6	1	Trapezoidal Rule		
	2.7	1	Simpson's 1/3 Rule		
	2.8	1	Simpson's 3/8 Rule		
	2.9	1	Boole's and Weddle's Rule		
	2.10	1	Use of Cubic Spline		
	2.11	1	Romberg's Integration		
	2.12	1	Newton-Cotes Integration Formulae		
Unit 3: Numerical solution of Ordinary Differential Equation-Initial Value Problem					**[17]**
3	3.1	1	Introduction	Ch#8 Numerical Method for Scientists and Engineers, K. Sankara Rao	Chalk & Talk
	3.2	2	First order differential equation		
	3.3	2	Solution by Taylor's Series		
	3.4	2	Picard's method		
	3.5	2	Euler's Method		
	3.6	2	Runge-Kutta Method		
	3.7	2	Predictor Corrector Methods- Adam-Moulton Method		
	3.8	2	Milne's method		
	3.9	2	Cubic-Spline Method		
Unit 4: Numerical solution of Ordinary Differential Equation-Boundary Value Problem					**[10]**
4	4.1	1	Introduction	Ch#12	

	4.2	2	Finite difference method	Numerical Method for Scientists and Engineers, K. Sankara Rao	Chalk & Talk
	4.3	2	Finite element Methods		
	4.4	1	Relaxation Method		
	4.5	1	Shooting methods		
	4.6	2	Weighted Residual Methods		
	4.7	1	Cubic-Spline Method		

Text books:

1. Numerical Method for Scientists and Engineers, K. Sankara Rao , PHI Learning Private Limited.

Reference books:

1. Numerical Methods, S.S Sastry, PHI Learning Private Limited ,
2. Numerical Method s, Principles, Analyses and Algorithms. Srimata Pal, Oxford University Press.