University of Kerala

Discipline	Mathematics				
Course Code	UK3DSCMAT203				
Course Title	Numerical Analysis				
Type of Course	DSC				
Semester	III				
Academic Level	200-299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours per week
	4	4	-	1	5
Pre-requisites	1. Differentiation 2. Integration				
Course Summary	This course enable the students to gain a thourough understanding of various numerical methods used for solving mathematical problems				

Detailed Syllabus

Module	Unit	Contents	Hrs
I	**Solution of Algebraic and Transcendental equations**		**15**
	1	Introduction, Bisection Method, Method of false position. Chapter 2: Section 2.1 to 2.3 of Text[1]	
	2	Iteration Method, Newton-Raphson method. Chapter 2: section 2.4 to 2.5 of Text[1]	
	3	Ramanujan's method, Secant method, Muller's method. Chapter 2: Section 2.6 to 2.8 of Text[1]	
II	**Interpolation**		**15**
	4	Finite differences. Chapter 3: Section 3.3	
	5	Newton's formulae for interpolation. Chapter 3: Section 3.6 of Text[1]	
	6	Interpolation with unevenly spaced points. Chapter 3: Section 3.9 of Text[1]	

Module	Unit	Contents	Hrs
	7	Divided differences and their properties. Chapter 3: Section 3.10 of Text[1]	
III	**Numerical Differentiation and Integration**		**15**
	8	Numerical differentiation. Chapter 6: Section 6.2 (excluding 6.2.1 and 6.2.2) of Text[1]	
	9	Maximum and Minimum values of a tabulated function. Chapter 6: Section 6.3 of Text[1]	
	10	Numerical integration Chapter 6: Section 6.4.1 to 6.4.4 of Text[1]	
IV	**Numerical Solution of Ordinary Differential equations**		**15**
	11	Solution by Taylor's series Chapter 8: Section 8.2 of Text[1]	
	12	Picard's method of Successive Approximations. Chapter 8: Section 8.3 of Text[1]	
	13	Euler's method Chapter 8: Section 8.4 of Text[1]	
	14	Runge- Kutta Methods.Chapter 8: Section 8.5 of Text[1]	
Practical	Practical sessions can be given using suitable software like sagemath (not meant for examination purpose)		**15**

Textbook

1. S.S. Sastry, *Introductory Methods of Numerical Analysis* , Fifth edition, PHI Learning Pvt. Ltd, 2012

References

1. A. C. Faul, *A Concise Introduction to Numerical Analysis* , CRC Press, 2016.
2. George A Anastassiou, Razvan A Mezei, *Numerical Analysis Using Sage*, Springer, 2015.
3. Richard L. Burden, J. Douglas Faires, *Numerical Analysis* , Ninth Edition, Cengage Learning, 2011.
4. Timo Heister, Leo G. Rebholz, Fei Xue, *Numerical Analysis An Introduction* , De Gruyter, 2019
5. Timothy Sauer, *Numerical Analysis*, Third Edition, Perason Education, 2018

E- resources

1. https://www.sagemath.org/help.html

Course Outcomes

CO No.	Upon completion of the course the graduate will be able to	PO/PSO	Cognitive Level	Knowledge Category	Lecture(L) Tutorial (T)	Practical (P)
CO 1	Find the solution of algebraic and transcendental equation using numerical methods	PO 2, PSO1, 2,3	U, Ap	F,C	L	
CO 2	Apply numerical techniques to interpolate data points effectively	PO1, PSO1, 2,3	U, Ap	F,C	L	
CO 3	Apply numerical techniques for differentiation and integration	PO2, PSO1, 2,3	U, Ap	F,C	L	
CO 4	Find the solution of ordinary differential equations using numerical methods	PO2, PSO1, 2,3	U, Ap	F,C	L	

(R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create)
(F-Factual, C-Conceptual, P-Procedural, M-Metacognitive)

Mapping of CO with PSOs and POs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2					3						
CO2	3	3	2				3							
CO3	3	3	2					3						
CO4	3	3	2					3						

(- -Nill, 1-Slightly/Low, 2-Moderate/Medium, 3-Substantial/High)

Assessment Rubrics

- Quiz/Assignment/Discussion/Seminar
- Midterm Exam

- Programming Assignments
- Final Exam

Mapping of COs to Assessment Rubrics

	Internal Examination	Assignment	Project Evaluation	End Semester Exam
CO1	✓	✓		
CO2	✓	✓		✓
CO3	✓	✓		✓
CO4	✓	✓		✓