University of Kerala

Discipline	Mathematics				
Course Code	UK1DSCMAT102				
Course Title	Differentiation, Sequence and Series				
Type of Course	DSC				
Semester	I				
Academic Level	100-199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours per week
	4	4	-	-	4
Pre-requisites	1. Functions and limits 2. Arithmetic and geometric progression				
Course Summary	This course provides a detailed study of differentiation and convergence of sequence and series				

Detailed Syllabus

Module	Unit	Contents	Hrs
I		**Differentiation**	**20**
	1	Tangent lines and limits (review only), One sided limits (review only), Limits at infinity, Infinite limits, Continuity (up to continuity of composite functions) *(Chapter 1 Sections 1.1, 1.3, 1.4 and 1.5 of Text 1)*	
	2	Tangent lines and rate of change, The derivative function *(Chapter 2 Sections 2.1, 2.2 of Text 1)*	
	3	Introduction to Techniques of Differentiation, The Product and Quotient Rules, Derivatives of Trigonometric Functions (review only)	
	4	The Chain Rule, Implicit Differentiation *(Chapter 2 Sections 2.6, 2.7 of Text 1)*	
II		**Differentiation of exponential and logarithmic functions**	**10**
	5	Exponential and logarithmic functions (review only) *(Chapter 6 Section 6.1 of Text [1])*	

Module	Unit	Contents	Hrs
	6	Derivatives involving Exponential and logarithmic functions *(Chapter 6 Section 6.2 of Text [1])*	
	7	L'Hôpital's rule *(Chapter 6 Section 6.5 of Text [1])*	
III		**Sequences and Series**	**12**
	8	Sequences, their limits, convergence and related theorems (without proof). *(Chapter 9 Sections 9.1, 9.2 of Text 1)*	
	9	Infinite series, their convergence and sums, geometric Series and harmonic series *(Chapter 9 Section 9.3 of Text [1])*	
IV		**Convergence and Divergence tests**	**18**
	10	Algebraic properties of infinite series, Integral test, p-series *(Chapter 9 Section 9.4 of Text [1] (avoid proofs of theorems))*	
	11	Comparison test, limit comparison test, Ratio test, Root test*(Chapter 9 Section 9.5 of Text [1])*	
	12	Alternating Series - Absolute and conditional Convergence, Ratio test for absolute convergence, Power series, Maclaurin and Taylor Polynomials Maclaurin and Taylor series *(Chapter 9 Sections 9.6, 9.7 of Text [1] (avoid proofs of theorems))*	

Textbooks

1. Howard Anton, Irl Bivens, Stephens Davis, *Calculus* 10th Edition ,Wiley, 2012.

References

1. Joel Hass, Maurice D. Weir, *Thomas Calculus Early Transcendentals*, 12th Edition, Addison-Weseley Publishing Company, 2004.

2. Mary L Boas, *Mathematical Methods in Physical Science*, 3rd Edition, 2006.

3. K. F. Riley, .M. P. Hobson, S. J. Bence, *Mathematical Methods for Physics and Engineering*, Third Edition, Cambridge University Press, 2006.

4. J Stewart, *Calculus with Early Transcendental Functions*, 7th Edition, Cengage India Private Limited, 2008.

5. G B Thomas, R L Finney, *Calculus*, 9th Edition, Addison-Weseley Publishing Company, 2004.

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	Understand the fundamental concepts of Differentiation	PSO1, 2, PO1, 3, 6, 7, 8	U	F,C	L	
CO 2	Explore Differentiation techniques to functions involving vectors and matrices	PSO 2,4, PO1, 3, 6, 7, 8	An, C	C, M	L	
CO 3	Develop problem-solving skills through the application of differentiation concepts and systems of linear equations	PSO 2,3, PO1, 3, 6, 7, 8	An, C	P, M	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	1	2	2	3	3	3	-	1	-	-	2	1	1
CO2	1	3	1	2	1	1	1	1	3	-	-	2	1	1
CO3	1	3	2	3	2	3	1	3	3	-	-	3	1	1

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

Assessment Rubrics

- Quiz/Assignment/Discussion/Seminar

- Midterm Exam

- Programming Assignments

- End Semester Exam

Mapping of COs to Assessment Rubrics

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