



University of Kerala

Discipline	Mathematics				
Course Code	UK3DSCMAT207				
Course Title	Applications of Integration, Special Functions and Fourier Series				
Type of Course	DSC				
Semester	III				
Academic Level	200-299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical	Total Hours per week
	4	4	-	-	4
Pre-requisites	1. Integration 2. Differentiation				
Course Summary	This course provides applications of integration, beta and gamma functions and Fourier series				

Detailed Syllabus

Module	Unit	Contents	Hrs
I		Application of Integration	18
	1	Area Between Two Curves, Volumes by Slicing; Disks and Washers (<i>Chapter 5: Sections 5.1, 5.2 of Text [1]</i>)	
	2	Volumes by Cylindrical Shells (<i>Chapter 5: Section 5.3 of Text 1</i>)	
	3	Length of a Plane Curve, Area of revolution (<i>Chapter 5: Sections 5.4, 5.5 of Text [1]</i>)	
II		Work, Moments and Centroids	12
	4	Work (<i>Chapter 5: Section 5.6 of Text [1]</i>)	
	5	Moments, Centers of Gravity, and Centroids (<i>Chapter 5: Section 5.7 of Text [1]</i>)	
III		The Beta and Gamma Functions	10
	6	The Factorial Function, Definition of the Gamma Function; Recursion Relation (<i>Chapter 11: Sections 11.1, 11.2, 11.3 of Text [3]</i>)	

Module	Unit	Contents	Hrs
	7	The Gamma Function of Negative Numbers, Formulas Involving Gamma Functions (<i>Chapter 11: Sections 11.4, 11.5 of Text [3]</i>)	
	8	Beta Functions, Beta Functions in Terms of Gamma Functions (<i>Chapter 11: Sections 11.6, 11.7 of Text [3]</i>)	
IV	Fourier Series		20
	9	Basic Examples, Euler Formulas (proof is not required), Convergence and Sum of a Fourier Series, (<i>Chapter 11: Section 11.1 of Text [2]</i>)	
	10	Arbitrary Period, Even and Odd Functions, Half-Range Expansions: From Period 2π to any Period $p = 2l$ Simplifications: Even and Odd Functions, Half Range Expansions(<i>Chapter 11: Section 11.2 of Text [2]</i>)	

Textbooks

1. H Anton, I Bivens, S Davis, *Calculus*, 10th Edition, John Wiley & Sons, 2012.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, 10th Edition, Wiley Publishers, 2018.
3. Mary L Boas, *Mathematical Methods in Physical Science*, 3rd Edition, 2006.

References

1. Joel Hass, Maurice D. Weir, *Thomas' Calculus Early Transcendentals*, 12th Edition, Addison-Weseley Publishing Company, 2004.
2. Peter V. O. Neil, *Advanced Engineering Mathematics*, Thompson Publications, 2007.
3. J Stewart, *Calculus with Early Transcendental Functions*, 7th Edition, Cengage India Private Limited, 2008
4. G B Thomas, R L Finney, *Calculus*, 9th Edition, Addison-Weseley Publishing Company, 2004.

E-resources

1. <https://www.geogebra.org/m/AzVR5uU7>

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	Demonstrate various applications of integration	PSO 1, PO1, 6	U	F, C	L	
CO 2	Compute tangent lines to polar curves, arc length and area	PSO 2, 4, PO 6	Ap, An	P	L	
CO 3	Understand the concepts of factorial function, gamma function beta function and Fourier series	PSO 1, PO1, 6	U	F, C	L	
CO 4	Able to find Fourier series of different functions	PSO 3, 4, PO1, 2, 6	Ap, An	P	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	-	-
CO2	-	2	-	3	-	-	-	-	-	-	-	2	-	-
CO3	3	-	-	-	-	-	2	-	-	-	-	1	-	-
CO4	-	-	3	3	-	-	2	1	-	-	-	2	-	-

(- -Nil, 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	✓	✓		✓