

Mathematics-2 (15B11MA211) (New)

Convergence of sequences and series, second order linear differential equations, solution in series, Bessel and Legendre functions, partial differential equations, one dimensional wave and heat conduction equations, functions of a complex variable, analytic functions, Cauchy-Riemann equations, conformal mapping, poles and singularities, complex integration, Taylor's and Laurent's series, Cauchy residue theorem and applications, bilinear transformation.

Course Description

Course Code	15B11MA211	Semester Even	Semester II Session 2020-21
Course Name	Mathematics 2		
Credits	4	Contact Hours	3-1-0
Faculty (Names)	Coordinator(s)		
	Teacher(s) (Alphabetically)		
COURSE OUTCOMES			COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:			
C106.1	apply different methods for solving ordinary differential equations of second order.	Applying Level (C3)	
C106.2	explain different tests/methods of convergence for infinite series.	Understanding Level (C2)	
C106.3	find the series solution of differential equations and use it to construct Legendre's polynomials and Bessel's functions.	Applying Level (C3)	
C106.4	classify the partial differential equations and apply Fourier series to find their solution.	Applying Level (C3)	
C106.5	explain Taylor's & Laurent's series expansion, singularities, residues and transformations.	Understanding Level (C2)	
C106.6	apply the concept of complex variables to solve the problems of complex differentiation and integrations.	Applying Level (C3)	
Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Second Order Linear Differential Equations	Linear Differential Equations of Second Order with constant coefficients and with variable coefficients, Change of Variable, Variation of Parameters.	5
2.	Convergence of Series	Convergence of series, Tests of convergence, Alternating Series, Absolute & Conditional Convergence, Uniform Convergence.	7

3.	Series Solution and Special Functions	Series Solutions, Bessel Function, Recurrence Relations and Orthogonality. Legendre functions, Recurrence relations and Orthogonality.	7
4.	Fourier Series and Partial Differential Equations	Fourier Series. Classification and Solution of PDE, Equation of vibrating string, Solution of one dimensional wave & heat equations.	5
5.	Complex Variables	Limit, Continuity and Differentiability of Functions of Complex Variables, Analytic Functions, Cauchy's Riemann Equations.	3
6.	Complex Integration	Cauchy Integral Theorem, Cauchy Integral Formula and Applications.	4
7.	Series Expansion	Taylor and Laurent Series Expansion, Poles and Singularities.	4
8.	Contour Integration	Residues, Cauchy's residue theorem and its applications.	5
9.	Conformal Mapping	Bilinear transformation	2
Total number of Lectures			42

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, Tutorials)
Total	100

Project based learning: Each student in a group of 3-4 will apply the concepts of Fourier Series, partial differential equations and contour integration to solve practical problems.

Recommended Reading material:

1.	Jain, R. K. & Iyenger, S. R. K. , Advanced Engineering Mathematics, 5 th Ed., Narosa Publishing House, New Delhi, 2016.
2.	Brown, J.W. & Churchill, R.V. , Complex Variables and Applications, 6th Ed., McGrawHill, 1996.
3.	Prasad, C. , (a) Mathematics for Engineers (b) Advanced Mathematics for Engineers, Prasad Mudranalaya, 1982.
4.	Kreyszig, E. , Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, Inc., 2015.
5.	Simmons, G. F. , Differential Equations with Applications and Historical Notes, 2nd Ed. McGraw Hill, 1991.
6.	Spiegel, M.R. , Complex Variables, Schaum's outline series, Mac Graw-Hill, 2009.
7.	Grewal, B. S. , Higher Engineering Mathematics, 44 th Edition, Khanna Publisher, 2018.

CO-PO-PSO Mapping:

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C106.1	3	3	2	2								2		
C106.2	3	2	2	1								1		
C106.3	3	3	2	2								2		
C106.4	3	3	2	2								2		
C106.5	3	2	2	1								2		
C106.6	3	3	2	1								2		