



University of Sistan and

Baluchestan

Department of Mechanical Engineering

Advanced Engineering Mathematics

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COURSE OUTLINE

This is a course suitable for B.Tech / M.Tech students of various discipline. It deals with some advanced topics in Engineering Mathematics usually covered in a degree course.

COURSE DETAIL

Week	Class content	Class note
1	11.1 Fourier Series 11.2 Arbitrary Period. Even and Odd Functions. Half-Range Expansions	Ch.11
1	11.3 Forced Oscillations 11.4 Approximation by Trigonometric Polynomials 11.5 Sturm–Liouville Problems. Orthogonal Functions 11.6 Orthogonal Series. Generalized Fourier Series	Ch.11
2	11.7 Fourier Integral 11.8 Fourier Cosine and Sine Transforms 11.9 Fourier Transform. Discrete and Fast Fourier Transforms 11.10 Tables of Transforms	Ch.11
3	12.1 Basic Concepts of PDEs 12.2 Modeling: Vibrating String, Wave Equation 12.3 Solution by Separating Variables. Use of Fourier Series	Ch.12
4	12.4 D’Alembert’s Solution of the Wave Equation.	Ch.12

	<p>Characteristics</p> <p>12.5 Modeling: Heat Flow from a Body in Space. Heat Equation</p> <p>12.6 Heat Equation: Solution by Fourier Series. Steady Two-Dimensional Heat Problems. Dirichlet Problem</p> <p>12.7 Heat Equation: Modeling Very Long Bars. Solution by Fourier Integrals and Transforms</p>	
5	<p>12.8 Modeling: Membrane, Two-Dimensional Wave Equation</p> <p>12.9 Rectangular Membrane. Double Fourier Series</p> <p>12.10 Laplacian in Polar Coordinates. Circular Membrane. Fourier–Bessel Series</p> <p>12.11 Laplace’s Equation in Cylindrical and Spherical Coordinates. Potential</p> <p>12.12 Solution of PDEs by Laplace Transforms</p>	Ch.12
6	Exam I (covering Ch.11 and Ch.12)	
6	<p>13.1 Complex numbers and their geometric representation</p> <p>13.2 Polar form of complex numbers</p>	Ch.13
7	13.3 Derivative. Analytic function	Ch.13
7	<p>13.4 Cauchy-Riemann equations</p> <p>13.5 Exponential function</p>	Ch.13
8	<p>13.6 Trigonometric and hyperbolic functions</p> <p>13.7 Logarithm. Principle value</p>	Ch.13
9	<p>14.1 Line integral in complex plane</p> <p>14.2 Cauchy’s integral theorem</p>	Ch.14
10	14.3 Cauchy’s integral formula	Ch.14
11	<p>15.1 Sequences, series, convergence tests</p> <p>15.2 Power series</p>	Ch.15
12	Exam II (Ch.8.3-8.5, Ch.13 and Ch.14)	
12	<p>15.3 Functions given by power series</p> <p>15.4 Taylor and Maclaurin series</p>	Ch.15
13	<p>15.5 Uniform convergence</p> <p>16.1 Laurent series</p>	Ch.15 Ch.16
14	16.2 Singularities and zeros	Ch.16

	16.3 Residue integration method	
15	16.4 Residue integration and real integration Class review	Ch.16
	Final Exam	

REFERENCES

Advanced Engineering Mathematics 10th ed. / Erwin Kreyszig / John Wiley & Sons