University of Sistan and

Baluchestan

Department of Mechanical Engineering

Engineering Mathematics

Hamed Farzaneh – 1397 (2019)

COURSE OUTLINE

This is a course suitable for B.Tech / M.Tech students of various discipline. It deals with some topics in Engineering Mathematics usually covered in a degree course. It is intended to introduce students of engineering, physics, mathematics,computer science, and related fields to those areas of *applied mathematics* that are most relevant for solving practical problems. A course in elementary calculus is the sole prerequisite

COURSE DETAIL

Module No.	Topic/s	Lectures
1	**Fourier Analysis. Partial Differential Equations (PDEs)** 1. Fourier Series 2. Arbitrary Period. Even and Odd Functions. Half-Range Expansions 3. Forced Oscillations 4. Fourier Integral 5. Fourier Cosine and Sine Transforms 6. Fourier Transform. Discrete and Fast Fourier Transforms	7

		7. Tables of Transforms	
2	**Partial Differential Equations (PDEs)**		7
	1. Basic Concepts of PDEs		
	2. Modeling: Vibrating String, Wave Equation		
	3. Solution by Separating Variables. Use of Fourier Series		
	4. D'Alembert's Solution of the Wave Equation. Characteristics		
	5. Modeling: Heat Flow from a Body in Space. Heat Equation		
	6. Heat Equation: Solution by Fourier Series. Steady Two-Dimensional Heat Problems. Dirichlet Problem		
	7. Heat Equation: Modeling Very Long Bars. Solution by Fourier Integrals and Transforms		
	8. Modeling: Membrane, Two-Dimensional Wave Equation		
	9. Rectangular Membrane. Double Fourier Series		
	10. Laplacian in Polar Coordinates. Circular Membrane. Fourier–Bessel Series		
	11. Laplace's Equation in Cylindrical and Spherical Coordinates. Potential		
	12. Solution of PDEs by Laplace Transforms		
3	**Complex Analysis**		4
	1. Complex Numbers and Their Geometric Representation		
	2. Polar Form of Complex Numbers. Powers and Roots		
	3. Derivative. Analytic Function		
	4. Cauchy–Riemann Equations. Laplace's Equation		
	5. Exponential Function		

	6. Trigonometric and Hyperbolic Functions. Euler's Formula		
	7. Logarithm. General Power. Principal Value		
4	**Power Series, Taylor Series**	2
	1. Sequences, Series, Convergence Tests		
	2. Power Series		
	3. Functions Given by Power Series		
	4. Taylor and Maclaurin Series		
	5. Uniform Convergence. Optional		

PREREQUISITES

Basic Course in Calculus / Real Analysis

REFERENCES

Kreyszig, : Engineering Mathematics

ADDITIONAL READINGS

R.S.L.Srivastava :- Engineering Mathematics , Tata Mc-Graw Hill