Faculty of Engineering & Technology

Transformation and Numerical Analysis (Math 4)

Information :

Course Code :	MTH 212	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours
Department :	Department of Electrical Engineering				

Area Of Study :

ÅDemonstrate a conscious understanding of the concepts of integral transforms, Laplace and Fourier transforms.
ÅDevelop studentsô mathematical skills for the methods of solution of initial and boundary values problems by using Laplace and Fourier Transforms, Fourier series, and Fourier integrals.
ÅAcquire skills for the application of Numerical methods to the solution of electrical engineering problems.

Description :

Laplace Transforms. Definitions. Properties and theorems. Inverse Laplace transforms. Calculating of Laplace transforms, Periodic functions, unit-step functions, and Dirac delta functions. Calculating of Inverse Laplace Transforms. Solution of Initial value problems and integral equations by Laplace transforms. Fourier series. Periodic and non-periodic Functions. Series of odd and even functions. Convergence Theorem. Definitions and properties of Fourier integrals and transforms. Finite Fourier transforms and Applications. Numerical solution of nonlinear equations, Newton's method. Secant method. Numerical solution of Initial Value problems. Euler, Modified Euler, and Runge Kutta methods. Least Squares methods. Interpolation.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	State Laplace Transform and its inverse for the one variable functions.
2 -	Define Fourier series and Transforms.
3 -	Explain different types of interpolation by numerical methods.
b.Intellectual Skills: :	
1 -	Solve Laplace Transforms of algebraic and transcendental functions.
2 -	Use Fourier series to Approximate functions.
3 -	Apply Rung-Kutta and Euler methods for the solution of initial value problems.
4 -	Construct functions by using Least squares method.
5 -	Formulate interpolation by Lagrange polynomials.
c.Professional and Practical Skills: :	
1 -	Use the unit step function to calculate electrical system response.
2 -	Use Fourier Transforms to analyze electrical signals.
d.General and Transferable Skills: :	
1 -	Communicate effectively

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Laplace Transforms. Definition. Properties and theorems. Inverse Laplace transforms.	10	6	4
Calculating of Laplace transforms, Periodic functions, unit-step functions, and Dirac delta functions. Laplace Transforms of derivatives.	10	6	4
Calculating of Inverse Laplace Transforms. Solution of Initial value problems and integral equations by Laplace transforms.	10	6	4
Integral equations by Laplace transform, Fourier series. Periodic and non-periodic Functions	10	6	4
Series of odd and even functions. Half intervals Fourrier Series Convergence Theorem.	10	6	4
Fourier Integrals and Fourier Transforms. Definitions and properties of Fourier integrals and transforms. Finite Fourier transforms. Applications.	10	6	4
Numerical solution of Initial Value problems. Euler, Modified Euler, and Runge Kutta methods.	10	6	4
Least Squares methods. Interpolation.	5	3	2

Teaching And Learning Methodologies :

- Interactive Lecture
- Discussion
- Problem-based Learning
- Report

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignments	5.00		
Final Exam	40.00		
Lab.Compter	5.00		
Mid- Exam I	15.00		
Mid- Exam II	25.00		
Quizzes	10.00		

Course Notes :

Handouts

Recommended books :

ÅWARREN S. WRIGHT, DENNIS G. ZILL, ñAdvanced Engineering Mathematics ñ¸ Jones &Bartlett Learning Publisher Fourth Edition, 2009.
ÅEARL W. SWOKOWSKI, ñCalculus with Analytic Geometryò¸ PWS Publishers, alternate Edition, 1983.

Periodicals :

www.sosmath.com, www.math.hmc.edu,
www.tutorial.math.lamar.edu,
www.web.mit.edu