EXTENDED LECTURE OUTLINE

MAT 6221 Engineering Mathematics-II (3+0)

Unit1: Vector calculus:

- Definition of Scalar and vector functions.
- Definition and Problems on unit vector, angle between two vectors, Directional derivatives.
- Problems on Del, Gradient, Divergence and curl of a vector functions.
- Vector integrations: Green's Thereom, Stock's Thereom and Divergence Theorem (Without proof).
- Problems on Green's Theoreom, Stock's thereom and divergence thereom (verify and evaluate),
- Definitions of a complex numbers, limit, continuity and analytical function
- Cauchy-Reimann equations both Cartesian and polar form with proof
- Problems on Harmonic functions.

Unit 2: Fourier series:

- Definition Euler's formulae and problems on Periodic functions $(0,2\pi)$,$(0,\pi)$
- Problems on Even and Odd functions. $(0,2\pi)$,$(0,\pi)(0,2l)$
- Problems on half Range cosine and sine series.
- Problems on Arbitrary functions. $(0,2\pi)$,$(0,\pi)(0,2l)$
- Laplace transformations: Definition of laplace transformation functions.
- Properties on laplace transformation.
- Inverse laplace transformation.
- Problems on ordinary and simultaneous differential equations.

Unit 3: Numerical Methods:

- Formula for finite differences operators.
- Problems on Newton's forward and backward interpolation formula
- Problems on Newton's divided difference interpolation and Lagrange's interpolation.
- Numerical integration: Problems on Simson's Rule and weddeles rule.
- Problems on ODE by Taylor's series, Euler's and Modified Euler's method,
- Problems on Runge-kutta Method of fourth order.