

SYLLABUS

UNIT – I: FOURIER SERIES

[12 Periods]

Introduction – Euler’s formulae – Conditions for a Fourier expansion – Functions having points of discontinuity – Change of interval – Even and odd functions – Half range series – Parseval’s formula.

Sections: 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7 and 10.9.

UNIT – II: FOURIER TRANSFORMS

[12 Periods]

Introduction – Definition – Fourier integral theorem (without proof) – Fourier sine and cosine integrals – Fourier transforms – Properties of Fourier transforms – Convolution theorem – Parseval’s identity for Fourier transforms – Relation between Fourier and Laplace transforms – Fourier transforms of the derivatives of a function – Applications of transforms to boundary value problems.

Sections: 22.1, 22.2, 22.3, 22.4, 22.5, 22.6, 22.7, 22.8, 22.9 and 22.11.

UNIT - III: FUNCTIONS OF A COMPLEX VARIABLE:

[12 Periods]

Complex function – Real and Imaginary parts of complex function – Limit – Continuity and derivative of a complex function – Cauchy-Riemann equations – Analytic function, entire function, singular point, conjugate function – Cauchy-Riemann equations in polar form – Harmonic functions – Milne-Thomson method – Simple applications to flow problems – Applications to flow problems – some standard transformations (Translation, Inversion and Reflection – Bilinear transformations and its fixed points).

Sections: 20.1, 20.2, 20.3, 20.4, 20.5, 20.6 and 20.8.

UNIT – IV: COMPLEX INTEGRATION & SERIES OF COMPLEX TERMS

[12 Periods]

Complex integration – Cauchy’s theorem – Cauchy’s integral formula – Series of complex terms: Taylor’s series – Maclaurin’s series expansion – Laurent’s series (without proofs) –

Zeros of analytic function – Singularities of a complex function : Isolated singularity, Removable singularity, Poles – Pole of order m – Simple pole – Essential singularity – Residues – Residue theorem – Calculation of residues – Residue at a pole of order m .

Evaluation of real definite integrals: Integration around the unit circle – Integration around a semicircle.

Sections: 20.12, 20.13, 20.14, 20.16, 20.17, 20.18, 20.19 and 20.20.

UNIT - V: Z-TRANSFORMS

[12 Periods]

Introduction – Definition - Some standard Z-transforms – Linearity property – Damping rule – Some standard results – Shifting U_n to the right/left – Multiplication by n – Two basic theorems (Initial value theorem and Final value theorem) – Convolution theorem.

Evaluation of inverse Z - transforms – Applications to difference equations.

Sections: 23.1, 23.2, 23.3, 23.4, 23.5, 23.6, 23.7, 23.8, 23.9, 23.12, 23.15 and 23.16.

TEXT BOOK:

B. S. Grewal, *Higher Engineering Mathematics*, 43rd edition, Khanna publishers, 2017.

REFERENCE BOOKS:

- 1, **N P. Bali and Manish Goyal**, *A text book of Engineering mathematics*, Laxmi publications, Latest edition.
2. **Erwin Kreyszig**, *Advanced Engineering Mathematics*, 10th edition, John Wiley & Sons, 2011.
3. **R. K. Jain and S. R. K. Iyengar**, *Advanced Engineering Mathematics*, 3rd edition, Alpha Science International Ltd., 2002.
4. **George B. Thomas, Maurice D. Weir and Joel Hass, Thomas**, *Calculus*, 13th edition, Pearson Publishers.