ABOUT INSTRUCTOR:
Dr. P.N. Agrawal is a Professor in the Department of Mathematics, IIT Roorkee. His area of research includes approximation Theory and Complex Analysis. He delivered 13 video lectures on Engineering Mathematics in NPTEL Phase I and recently completed Pedagogy project on Engineering Mathematics jointly with Dr. Uaday Singh in the same Department. Further he has completed online certification course “Mathematical methods and its applications” jointly with Dr. S.K. Gupta and two more courses namely “Integral equations and calculus of variations and its applications” and “Numerical Linear Algebra” with Dr. D. N. Pandey of the same department.

COURSE PLAN:

Week 01: Analytic Functions, Cauchy-Riemann Equations, Harmonic Functions, Harmonic Conjugates and Milne's Method, Applications to the problems of potential flow-I, II

Week 02: Complex integration, Cauchy's theorem-I, II, Cauchy's Integral Formula for the Derivatives of an Analytic Function, Morera's theorem, Liouville's theorem and Fundamental Theorem of Algebra

Week 03: Winding Number and Maximum Modulus Principle, Sequences and Series, Uniform Convergence of Series, Power Series, Taylor series

Week 04: Laurent Series, Zeros and Singularities of an Analytic Function, residue at a singularity, Residue theorem, Meromorphic functions

Week 05: Evaluation of real integrals using residues-I, II, III, IV, V

Week 06: Bilinear Transformations, Cross ratio, Conformal Mapping-I, II, Conformal mappings from half plane to disk and half plane to half plane-I

Week 07: Conformal mappings from disk to disk and angular region to disk, Application of Conformal mapping to potential theory, Review of Z-transforms-I, II, III

Week 08: Review of bilateral Z-transforms, Finite Fourier transforms, Fourier integrals and Fourier transforms, Fourier Series, Discrete Fourier transforms-I

Week 09: Discrete Fourier transforms-II, Basic concepts of probability, Conditional probability, Bayes theorem and Probability networks, Discrete probability distribution

Week 10: Binomial distribution, Negative binomial distribution and Poisson distribution, Continuous probability distribution. Poisson Process, Exponential distribution

Week 11: Normal distribution, Joint distribution-I, II, III, Correlation and regression-I

Week 12: Correlation and regression-II, Testing of hypotheses-I, II, III, Application to Queueing Theory and Reliability Theory