MANGALORE UNIVERSITY

DEPARTMENT OF MATHEMATICS

MSC MATHEMATICS

MTH 552	Complex Analysis -II	4 Credits (48 hours)

Course Outcome: Students will have the knowledge and skills touse complex analysis techniques to get asymptotics, to be rational and get real, solve analytic combinatorics viz,. the calculus of residues, Poisson's formula, Schwarz's theorem, the reflection principle, the Fourier development,the Weierstrass $\wp$ function. Complex analysis has several applications to the study of Banach algebras in Functional analysis, Holomorphic functional calculus, and Control theory.

Course Specific Outcome: At the end of the course Students will have the knowledge and skills to understand, explain in depth and apply in various situations the concepts -

- Evaluation of definite integrals.
- Harmonic Functions, Poisson's formula, Schwarz's theorem, The reflection principle. Power series expansions - Weierstrass's theorem, The Taylor series
- The Laurent series. Partial fractions, Infinite products
- The Gamma function, Jensen's formula, Product development of Riemann Zeta function.
- Elliptic Functions

Unit I

The Calculus of Residues: The Residue theorem, The argument principle, Evaluation of definite integrals.

Harmonic Functions: Definition and basic properties, The mean value property, Poisson'sformula, Schwarz's theorem, The reflection principle.

(12 Hours)

Unit II - Series and Product Developments:

Power series expansions - Weierstrass's theorem, The Taylor series, The Laurent series.

(12 Hours)

Unit III - Partial Fractions and Factorization:

Partial fractions, Infinite products, Canonical products, The Gamma function, Jensen's formula, Product development of Riemann Zeta function.
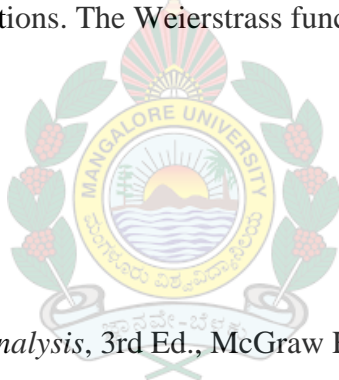
(12 Hours)

Unit IV

Elliptic Functions: Simply periodic functions - Representation by exponentials, The Fourier development, Function of finite order.

Doubly Periodic Functions: The period module, Unimodular transformation, Generalproperties of elliptic functions. The Weierstrass function.

(12 Hours)

References

[1] Lars V. Ahlfors, *Complex Analysis*, 3rd Ed., McGraw Hill, 1979.

[2] B. R. Ash, *Complex Variables*, 2nd Ed., Dover Publications, 2007.

[3] R. V. Churchill, J. W. Brown and R. F. Verlag, *Complex Variables and Applications*, 8th Ed., McGraw Hill, 2009.

[4] J. B. Conway, *Functions of one Variable*, Narosa, New Delhi, 1996.

S. Ponnuswamy and H. Silverman, *Complex Variables with Applications*, Birkauser, 2006.