

V .2: ANALYSIS- III (RIEMANN INTEGRATION & SERIES OF FUNCTIONS)

Total marks: 100 (Theory: 75, Internal Assessment: 25)

5 Periods (4 lectures +1 students' presentation),

1 Tutorial (per week per student)

1st Week

Riemann integration; inequalities of upper and lower sums; Riemann conditions of integrability.

[1] Chapter 6 (Art. 32.1 to 32.7)

2nd & 3rd Week

Riemann sum and definition of Riemann integral through Riemann sums; equivalence of two definitions; Riemann integrability of monotone and continuous functions, Properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. Intermediate Value theorem for Integrals; Fundamental theorems of Calculus.

[1] Chapter 6 (Art. 32.8, 32.9, 33.1, 33.2, 33.3, 33.4 to 33.8, 33.9, 34.1, 34.3)

4th Week.

Improper integrals; Convergence of Beta and Gamma functions.

[3] Chapter 7 (Art. 7.8)

5th, 6th & 7th Week

Pointwise and uniform convergence of sequence of functions. Theorems on continuity, derivability and integrability of the limit function of a sequence of functions.

[2] Chapter 8, Section 8.1, Section 8.2 (8.2.1 – 8.2.2), Theorem 8.2.3, Theorem 8.2.4 and Theorem 8.2.5

8th & 9th Week

Series of functions; Theorems on the continuity and derivability of the sum function of a series of functions; Cauchy criterion for uniform convergence and Weierstrass M-Test

[2] Chapter 9, Section 9.4 (9.4.1 to 9.4.6)

10th, 11th& 12th Week

Limit superior and Limit inferior. Power series, radius of convergence, Cauchy Hadamard Theorem, Differentiation and integration of power series; Abel's Theorem; Weierstrass Approximation Theorem.

[1] Chapter 4, Art. 26 (26.1 to 26.6), Theorem 27.5

REFERENCES:

1. K.A. Ross, Elementary Analysis: The Theory of Calculus, Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint, 2004.
2. R.G. Bartle D.R. Sherbert, Introduction to Real Analysis (3rd edition), John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2002.
3. Charles G. Denlinger, Elements of Real Analysis, Jones and Bartlett (Student Edition), 2011.