

Mathematics
Topics for Internal Test
TYBSc/BA Sem V 2020-21

Paper I (RUSMAT501/RUAMAT501) Integral Calculus

Unit I Multiple Integrals

Definition of double integral of a function bounded on a rectangle Geometric interpretation as area and volume. Fubini's Theorem over rectangles and any closed bounded sets, Iterated Integrals. Basic properties of double integrals proved using the Fubini's theorem such as; Integrability of the sums, scalar multiples, products, and (under suitable conditions) quotients of integrable functions, Formulae for the integrals of sums and scalar multiples of integrable functions, Integrability of continuous functions. Problems based on type I & type II region of integration.

Unit II Line Integrals (full unit)

Paper II (RUSMAT502/RUAMAT502) Algebra-II

Unit I- Group Theory (full unit)

Unit-II Definition of Normal subgroup, example

Paper III (RUSMAT503/RUAMAT503) Topology of Metric Spaces

Unit-1 Metric Spaces (full unit)

Unit-II Closed sets, Limit points and sequences in metric spaces

Paper IV (RUSMATE504-I/RUAMATE504-I) Graph Theory

Unit-1 Basics of Graphs (full unit)

Unit-II up to binary trees (that is Cut edges and cut vertices and relevant results, Characterization of cut edge, Definition of a tree and its characterizations, Spanning tree, Recurrence relation of spanning trees and Cayley formula for spanning trees of Binary trees, Cayley formula for spanning trees of complete graph.

Applied Component

RUSACMAT501 (Computer Programming and System Analysis)

Unit-1 Introduction to Python

Unit-III SageMath as a calculator and calculus using SageMath

SYBSc/BA Sem III 2020-21

Paper I (RUSMAT301) Calculus-III

Unit I-

Partition of an interval, Upper/Lower Riemann sums and properties, Upper/Lower integrals.

Concept of Riemann integration, criterion for Riemann integrability, ; Integrability of the sums, scalar multiples, products, and (under suitable conditions) quotients of integrable functions.

Unit-II Applications of Integration (Full unit)

Paper II (RUSMAT302/RUAMAT301) Linear Algebra-II

Unit I- Kernel, Image of linear transformation, basis set, dimensions of $\text{Ker } T$, $\text{Im } T$. Rank nullity theorem, injective, surjective linear transformations, Isomorphism, Isomorphic vector spaces, elementary matrices.

Unit-II Determinants (full unit)

Paper II of SYBA (RUAMAT302) Discrete Mathematics

Unit-I Preliminary Counting (full unit)

Unit-2 Permutation of objects, S_n composition of permutations, results such as every permutation is product of disjoint cycles, every cycle is product of transpositions, even and odd permutations, rank and signature of permutation, cardinality S_n , A_n .

