

Date: 7-03-2022

Registration number:

ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27

M.Sc. Statistics - I SEMESTER

SEMESTER EXAMINATION: OCTOBER 2021

(Examination conducted in January-March 2022)

**ST 7421 – Mathematical Analysis and Linear Algebra**

Time- 2 ½ hrs Max Marks-70

This question paper contains TWO printed pages and TWO parts

­­

**Part A**

**Answer any 6 questions 6X3=18**

1. Define Cauchy criteria for convergence of a series.
2. Give two properties of R-S integrals?
3. Define Weierstrass-M test.
4. State Leibnitz rule.
5. Distinguish Pointwise and uniform convergence
6. State Caley Hamilton theorem.
7. Define Vector spaces and subspaces.
8. Explain Moore Penrose inverse of a matrix.

**Part B**

**Answer any 4 questions 4X13=52**

1. A) State and prove fundamental theorem of integral calculus. (6)

B) If is continuous on [a, b] and α is monotonic function on [a, b], show that . (7)

1. A) Define Beta and Gamma integrals and their properties (6)
2. Prove that If p is a limit point of a set E, then every neighborhood of p contains infinitely many points of E. (7)
3. A) Find the maximum value of the function . (6)

B) Prove that If is a sequence of continuous functions on E and if converges uniformly on E, then f is continuous on E. (7)

1. A) State and prove Dirichlet’s test for the convergence of improper integrals. (7)

B) Prove that Converges if p>1 and diverges if (6)

1. A) Eshtablish the equivalence relation and congruence of a matrices and set of all nXn matrices over field (6)

B) Prove That on [a,b], m is continuous on [m, M] and on [a, b], then on [a, b] (7)

1. A) Discuss the orthonormality of a matrix and diagonalization of a matrix. (6)

B) If two functions f, g defined on [a, b] are

* 1. Continuous on [a, b],
  2. Derivable on ]a, b[ and
  3. g’(x) /= 0, for any x ]a, b[

Then there exists one real number c between a and b such that (7)