A–1041

Total Pages : 3 **Roll No. ....**

MT-601

M.A./M.Sc. Mathematics (MAMT/MSCMT)

Analysis and Advanced Calculus-I

Examination, 2026 (Feb.)

Time : 2:00 Hrs. Max. Marks : 70

Note **:–** This paper is of Seventy (70) marks divided into Two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given therein. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.***

Section–A

Long Answer Type Questions 2×19=38

Note **:–** Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

1. Prove that C [a, b] is a Banach space.

2. State and prove the Open Mapping Theorem.

3. Let X and Y be Normed Liner spaces. Show that a liner transformation T on X into Y is bounded iff T is continuous at a point $x \in X$.

4. State and Prove Schwarz inequality.

5. If M and N are closed linear subspaces of a Hilbert space H s.t. $M \perp N$. then M + N is also closed.

Section–B

Short Answer Type Questions 4×8=32

***Note* :–** Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. Prove that an Orthogonal set of vectors is linearly independent.

2. Prove that an inner product space is normed vector space.

3. If T is a normal operator on Hilbert space H and λ be any scalar, then prove that T-λ I is also normal operator.

4. Suppose T is a liner operator on Hilbert space. Then, show that T is normal iff its real and imaginary parts commute.

5. Show that every finite dimensional normed linear space is a Banach space.

6. Give an example of a bounded linear operator which is not compact.

7. State Hahn—Banach Theorem and give one of its important consequences.

8. Show that every subset of separable normed space is separable.

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