Roll No. | | | | | | | | | | | | | **Total No. of Pages: 01**

Total No. of Questions: 07

Master of Science (Mathematics)(Sem. – 4)

ADVANCED COMPLEX ANALYSIS

Subject Code: MSM505-18

M Code: 77875

Date of Examination : 20-12-2022

Time: 3 Hrs. **Max. Marks: 70**

INSTRUCTIONS TO CANDIDATES:

1. **SECTION-A is COMPULSORY consisting of FIVE questions carrying TWO marks each.**
2. **SECTION-B contains THREE questions carrying FIFTEEN marks each and students have to attempt any TWO questions.**
3. **SECTION-C contains THREE questions carrying FIFTEEN marks each and students have to attempt any TWO questions.**

SECTON-A

1. Write briefly:

   a) Obtain Sin $2Z = 2\,\text{Sin}\,Z\,\text{Cos}\;Z$ for all complex Z from the corresponding identity when Z is real.

   b) Show that the function $u = \cos x \cosh y$ harmonic and find its harmonic conjugate.

   c) Define Entire function.

   d) What are subharmonic and super harmonic functions?

   e) What is subordination principle? Give an example.

SECTION-B

2. State and prove Hadamard factorization theorem.
3. State and prove the maximum principle for analytic functions.
4. State and prove Schwarz's Lemma.

SECTION-C

5. State and prove Riemann mapping theorem.
6. If u is harmonic in a disk, then it has a conjugate function there. Prove it.
7. a) Prove the mean value property of harmonic functions.

   b) Prove a maximum principle for continuous functions satisfying the mean value property.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.