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N-5343

M.A./M.Sc. (IVth Semester)

Examination, 2021

MATHEMATICS

(Complex Variable)

Time Allowed : Three Hours

Maximum Marks : 70

Note : Attempt any five questions. All questions carry equal marks.

Q. 1. Let f(z) be analytic within and on the boundary C of a simple connected region D and let z_0 be any point within C, then :

$$f'(z_0) = \frac{1}{2\pi i}\int_C \frac{f(z)}{(z-z_0)^2}dz$$

Q. 2. State and prove Liouvill's theorem.

Q. 3. State and prove Schwarz's Lemma.

Q. 4. State and prove Laurent's theorem.

Q. 5. State and prove inverse function theorem.

Q. 6. State and prove open mapping theorem.

Q. 7. State and prove Runges theorem.

Q. 8. State and prove Weierstras factorization theorem.

Q. 9. State and prove Schuartz's reflection principle.

Q. 10. Prove that :

$$\sqrt{\pi}\,\Gamma\left(2^{z}\right) = 2^{2z+1}\,\Gamma(z)\,\Gamma\left(z+\frac{1}{2}\right)$$