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# 4305

Register Number:

Name of the Candidate:

## M.Sc. DEGREE EXAMINATION, May 2021

## (MATHEMATICS)

### (SECOND YEAR)

### 210: COMPLEX ANALYSIS

Time: Three hours | Maximum: 100 marks

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**SECTION – A** **(8 × 5 = 40)**

**Answer any EIGHT questions**

1. Prove that if all zeros of a polynomial P(z) lie in a half plane, then all zeros of the derivative P ′(z) lie in the same half plane.
2. Prove that the set of all linear transformations form a non-abelian group for the composition of product of transformations.
3. Prove that if f(z) is analytic on a rectangle R, then $\int_{\partial R} f(z)dz = 0$ where $\partial R$ denotes the boundary curve of R.
4. State and prove classical form of Weierstrass theorem.
5. State and prove mean value property theorem.
6. Derive the Poisson's formula in Cartesian co-ordinates.
7. Prove that the infinite product $\pi(1+a_n)$ converges iff Σ log $(1+a_n)$ converges.
8. Derive Jensen's formula.
9. Prove that the sum of the residues of an elliptic function is zero.
10. Derive the first order differential equation $p'(z)^2 = 4p(z)^3 - g_2 p(z) - g_3$.

**SECTION – B** **(3 × 20 = 60)**

**Answer any THREE questions**

11. State and prove Abel's Limit theorem.
12. State and prove the general statement of Cauchy's Theorem.
13. State and prove the Schwarz's theorem.
14. Prove the Hadamard's theorem.
15. Prove that any bases of the same module are connected by a unimodular transformation.

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