

Total Pages : 2

K-1047

**M.A./M.Sc. (Previous) Main
Examination, 2022**

MATHEMATICS

(Complex Analysis)

[Paper : Fourth]

Time Allowed : Three Hours

Maximum Marks : 100

Minimum Passing Marks : 36

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

1. State and prove Cauchy Goursat theorem.
2. State and prove Liouville's theorem.

3. State and prove Maximum Modulus theorem.
4. Use Rouché's theorem to show that the equation $Z^2 + 15Z + 1 = 0$ has one root in the disc $|Z| < \frac{3}{2}$ and four roots in the annulus $\frac{3}{2} < |Z| < 2$.
5. State and prove Hurwitz's theorem.
6. Define Gamma function.

Prove that :

$$\overline{\Gamma}(z) = \lim_{n \rightarrow \infty} \frac{n! n^z}{z(z+1)\dots(z+n)}$$

7. State and prove Monodromy theorem.
8. State and prove Jensen's inequality.
9. State and prove Borel's theorem.
10. State and prove Great Picard theorem.

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