M.Sc DEGREE EXAMINATION,APRIL 2019
II Year III Semester
Complex Analysis

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Define an entire function.
2. State fundamental theorem of algebra.
3. Define an essential singularity.
4. State Schwarz's lemma.
5. Define Riemann Zeta function.
6. Define Gamma function.
7. Define Laplace's equation.
8. Define Green's function .
9. Define Genus of an entire function.
10. State Bloch's theorem.
11. Define an index of a closed curve.
12. State Little Picard's theorem.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. State and prove Gourat's theorem.
14. Show that for a> 1 $\int_0^{\pi} \frac{d\theta}{a + cos\theta} = \frac{\pi}{\sqrt{a^2 - 1}}$.
15. If $|Z| \leq 1$ and p$\geq$ 0. Prove that $|1 - E_p(z)| \leq |z|^{p+1}$
16. State and prove Mean Value theorem.
17. State and prove Jensen's formula.
18. State and prove Rouche's theorem.
19. Show that $\int_{-\infty}^{\infty} \frac{x^2}{1 + x^4}$ dx $=\frac{\pi}{\sqrt{2}}$

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. State and prove Cauchy's integral formula.
21. Let G be a region in C and f be an analytic function on G. Suppose there is a constant M such that $lim_{z \to a} \quad sup|f(Z)| \leq \quad M$. Prove that $|f(Z)| \leq M \quad \forall Z \in G$.
22. State and prove Riemann Mapping Theorem
23. State and prove Harnack's Theorem
24. If f is an entire function of finite order λ. Prove that f has finite genus $\mu \leq \lambda$

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