SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
B.Sc. Maths - END SEMESTER EXAMINATIONS APRIL - 2024
SEMESTER - VI
20UMACT6014 - Complex Analysis

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Prove that if a set contains each of its accumulation points, then it must be a closed set.
2. Prove that a composition of continuous functions is itself continuous.
3. Prove that if a function f (z) = u(x,y)+iv(x,y) is analytic in a domain D, then its component functions u and v are harmonic in D.
4. Show that a function f(z) = u(x,y) + iv (x,y) and its conjugate $\overline{f(z)}$ are both analytic a domain D.
5. Evaluate $\int_c \frac{e^z}{z-2} dz$ if c is
   (i) a positively oriented circle $|z| = 3$.
   (ii) a positively oriented circle $|z| = 1$.
6. Summarize the detailed proof of Cauchy Integral formula.
7. If a function f is analytic at a given point, then show that its derivatives of all orders are analytic there.
8. Derive the Taylor Series representation $\frac{1}{1-z} = \sum_{n=0}^{\infty} \frac{(z-i)^n}{(1-i)^{n+1}}$ $(|z-i| < \sqrt{2})$

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Formulate the proof of Cauchy – Riemann equation after stating it.
10. Illustrate the proof of the statement that, if w(t) is a piecewise continuous complex valued function defined on an interval a $\leq$ t $\leq$ b, then $\left|\int_a^b w(t)dt\right| \leq \int_a^b |w(t)|\, dt$
11. State and prove Morera's theorem.
12. Devise a detailed proof of Liouvilles theorem after stating it.
13. Propose the statement of Laurent series and test its validity.

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