

Question Bank for PG Course

অঙ্ক (Mathematics)

দ্বিতীয় (খ) পত্র (Paper - IIB)

Complex Analysis : PGM-T-IIB

1. Is the function $f(z) = |z|^4$ analytic at $z = 0$?
2. Given that $f(z)$ is analytic. Then find the value of $(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2})|f(z)|^2$.
3. Given that C is the circle $|z - 1| = 3$. Then find the value of $\oint_C \frac{e^z}{(z+1)^2} dz$.
4. Find the value of $\oint_C \frac{z}{(9-z^2)(z+i)} dz$ where C is the circle $|z| = 2$.
5. Find the radius of convergence of the power series $\sum_n \frac{(-1)^n}{n} (z - 2i)^n$.
6. Let $P(x)$ be a polynomial of real variable x of degree $k \geq 1$. Consider the power series $f(z) = \sum_{n=0}^{\infty} P(n)z^n$ where z is a complex variable. Then find the radius of convergence of $f(z)$.
7. Discuss the singularity of the function $f(z) = \log(z^2 + z - 2)$.
8. Given $f(z) = \frac{z^2-2}{z^3+3z+1}$. Discuss role of the point at infinity.
9. Find the residue of the function $f(z) = \frac{e^{iz}}{z^2+1}$ at $z = -i$.
10. Find the residue of the function $f(z) = z^3 \sin \frac{1}{z-1}$ at its singular point.
11. Discuss the effect of the transformation $f(z) = \frac{z-i}{z+i}$ maps on various half planes.
12. Find the bilinear transformation which maps points $z = 0, -1, -i$ into $w = i, 0, 1$.
13. Find the fixed points of the transformation $f(z) = \frac{2z+3}{z+4}$.
14. When do the roots of the equation $z^5 + az + 1 = 0$ lie within $|z| = r$?
15. If $f(z) = \frac{(z^2+1)^2}{(z^2+5z+6)^3}$ then find the value of $\int_{|z|=4} \frac{f'(z)}{f(z)} dz$.