

Question Bank for PG Course

অঙ্ক (Mathematics)

নবম (ক ১) পত্র (Paper - IXA(i))

Advanced Complex Analysis : PGM-T-IXA(i)

1. If $f(z) = u + iv$ is analytic in a region R , then find the value of $\frac{\partial(u,v)}{\partial(x,y)}$.
2. Given that $f(z)$ is analytic at $z = \alpha$ and $f'(\alpha) = f''(\alpha) = f'''(\alpha) = 0$ but $f^{(iv)}(\alpha) \neq 0$. Then find the magnifies angles of $f(z)$ at $z = \alpha$.
3. What is the sufficient condition for convexity of a function (x) ?
4. Find the order of the function $f(z) = e^{z^n}$ (n is a positive integer)
5. Find the exponent of convergence of the zeros of $f(z) = \cos z$.
6. Given that $f(z)$ is analytic in $|z| < 1$, with a zero of order n at the origin. Also $|f(z)| \leq 1$ for all z in $|z| < 1$. Then which of the following inequalities holds
 1. $|f(z)| \leq |z|^n, |z| > 1$
 2. $|f(z)| \geq |z|^n, |z| < 1$
 3. $|f(z)| \geq |z|^n, |z| > 1$
 4. $|f(z)| \leq |z|^n, |z| < 1$
7. Find the canonical product of the function $f(z) = \sin z$.
8. What is Legendre's duplication formula ?
9. Given that $f(z)$ is an entire function which never vanishes. Then there exists an entire function $g(z)$ such that
 1. $f(z) = g(z)$ for all z
 2. $f(z) = \frac{1}{g(z)}$ for all z
 3. $f(z) = e^{g(z)}$ for all z
 4. $f(z) = e^{-g(z)}$ for all z .
10. An entire function $f(z)$ is said to be of finite order if for some k and some $R > 0$ and for all z with $|z| \geq R$
 1. $|f(z)| \geq \exp(|z|^k)$
 2. $|f(z)| \leq \exp(|z|^k)$
 3. $|f(z)| \geq \exp(|z|^{2k})$
 4. $|f(z)| \leq \exp(|z|^{2k})$
11. Find the branch points of the function $f(z) = (z^3 - z)^{1/3}$
12. Which of the following function is single valued?
 1. $\left(\frac{1}{z^2}\right)^3$
 2. $(z^3)^{\frac{1}{2}}$
 3. $(z^2)^{\frac{1}{2}}$
 4. $(z^{1/2})^2$

13. Given that $f(z)$ is a nonconstant analytic function in a domain D . Then examine the harmonicity of $|f(z)|$.
14. Find the harmonic conjugate of the function $u(x,y) = \log \sqrt{x^2 + y^2}$
15. Find the branch points of the function $f(z) = \sin z^{1/2}$