

RK VISION ACADEMY

MATRIC PRACTICE PAPER (2024)

(Mathematics)

Grade: XII
Chapter: Complex Numbers

Marks: 40 marks
Time: 60 minutes

SECTION A

(10*1=10)

- The value of $\sum_{i=1}^{13}(i^n+i^{n-1})$ is
(a) 0 (b) $1+i$ (c) i (d) 1
- $\arg(0)$ is
(a) ∞ (b) 0 (c) π (d) undefined
- The value of $(\frac{1+i}{\sqrt{2}})^8 + (\frac{1-i}{\sqrt{2}})^8$ is
(a) 8 (b) 4 (c) 2 (d) 6
- If $|z|=1$, then the value of $\frac{1+z}{1-z}$ is
(a) $\frac{1}{z}$ (b) z (c) 1 (d) \bar{z}
- If $(1+i)(1+2i)(1+3i)\dots(1+ni) = x+iy$, then the value of $2.5.10\dots(1+n^2)$ is
(a) x^2+y^2 (b) 1 (c) $1+n^2$ (d) i
- The value of $\sum_{i=1}^{12} i^n$ is
(a) 0 (b) 1 (c) -1 (d) i
- If $z=x+iy$ is a complex number such that $|z+2|=|z-2|$, then the locus of z is
(a) Real axis (b) imaginary axis (c) ellipse (d) circle
- The product of all four values of $(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3})^{\frac{3}{4}}$ is
(a) -2 (b) -1 (c) 1 (d) 2
- If $\omega \neq 1$ is a cubic root of unity and $(1+\omega)^7 = A+B\omega$, then (A,B) equals
(a) (1,0) (b) (-1,1) (c) (0,1) (d) (1,1)
- The principal argument of $(\sin 40^\circ + i \cos 40^\circ)$ is
(a) -110° (b) -70° (c) 70° (d) 110°

SECTION B**(3*2=6)**

11. Prove that $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3 = -2i$.
12. If $|z|=2$, show that $3 \leq |z+3+4i| \leq 7$.
13. Express $e^{\cos\theta + i\sin\theta}$ in $a+ib$ form.

SECTION C**(3*3=9)**

14. Show that the points $1, -\frac{1}{2} + i\frac{\sqrt{3}}{2}, -\frac{1}{2} - i\frac{\sqrt{3}}{2}$ are the vertices of an equilateral triangle.
15. Represent the complex number $1+i\sqrt{3}$ in polar form.
16. State and prove Triangle Inequality.

SECTION D**(3*5=15)**

17. Solve the equation $z^3+27=0$.
18. If $z = (\cos\theta + i\sin\theta)$, show that $z^n + \frac{1}{z^n} = 2\cos n\theta$ and $z^n - \frac{1}{z^n} = 2i\sin n\theta$.
19. If $z = x+iy$ and $\arg\left(\frac{z-1}{z+2}\right) = \frac{\pi}{4}$, then show that $x^2+y^2+3x-3y+2=0$.