

Assignment-1

Chapter-2

Complex Number

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SECTION-B JEE MAIN / AIEEE

- 14) If $z^2 + z + 1 = 0$, where z is an imaginary number, then the value of $\left(z + \frac{1}{z}\right)^2 + \left(z^2 + \frac{1}{z^2}\right)^2 + \left(z^3 + \frac{1}{z^3}\right)^2 + \dots + \left(z^6 + \frac{1}{z^6}\right)^2$ is (1) [2006]
- a) 18 b) 54 c) 6 d) 12
- 15) If $|z + 4| \leq 3$, then the maximum value of $|z + 1|$ is [2007]
- a) 6 b) 0 c) 4 d) 10
- 16) The conjugate of a complex is $\frac{1}{i-1}$ then that complex number is [2008]
- a) $\frac{-1}{i-1}$ b) $\frac{1}{i+1}$ c) $\frac{-1}{i+1}$ d) $\frac{1}{i-1}$
- 17) Let \mathbb{R} be the real line. Consider the following subsets of the real plane:
- $S = \{(x, y) : y = x + 1 \text{ and } 0 < x < 2\}$ (2)
- $T = \{(x, y) : x - y \text{ is an integer}\}$ (3)
- Which one of the following is true ? [2008]
- a) Neither S nor T is an equivalence relation on \mathbb{R}
b) Both S and T are equivalence relation on \mathbb{R}
c) S is an equivalence relation on \mathbb{R} but T is not
d) T is an equivalence relation on \mathbb{R} but S is not
- 18) The number of complex numbers z such that $|z - 1| = |z + 1| = |z - i|$ equals [2010]
- a) 1 b) 2 c) ∞ d) 0
- 19) Let α, β be real and z be a complex number. If $z^2 + z\alpha + \beta = 0$ has two distinct roots on the line $\operatorname{Re} z = 1$, then it is necessary that: [2011]
- a) $\beta \in (-1, 0)$ b) $|\beta| = 1$
c) $\beta \in (1, \infty)$ d) $\beta \in (0, 1)$
- 20) If $\omega (\neq 1)$ is the cube root of unity, and $(1 + \omega)^7 = A + B\omega$. Then (A, B) equals : [2011]
- a) (1, 1) b) (1, 0)
c) (-1, 1) d) (0, 1)
- 21) If $z \neq 1$ and $\frac{z^2}{z-1}$ is real, then the point represented by the complex number z lies: [2012]
- a) either on the real axis or on a circle not passing through the origin
b) on a circle with centre at the origin
c) either on the real axis or on a circle not passing through the origin
d) on imaginary axis
- 22) If z is a complex number of unit modulus and argument θ , then the $\arg\left(\frac{1+z}{1+\bar{z}}\right)$ equals: [JEE M 2013]
- a) $-\theta$ b) $\frac{\pi}{2} - \theta$ c) θ d) $\pi - \theta$
- 23) If z is a complex number such that $|z| \geq 2$, then the minimum value of $\left|z + \frac{1}{z}\right|$: [JEE M 2014]
- a) is strictly greater than $\frac{5}{2}$
b) is strictly greater than $\frac{3}{2}$ but less than $\frac{5}{2}$ is equal to $\frac{5}{2}$
c) lies in the interval (1, 2)
- 24) A complex number z is said to be unimodular if $|z| = 1$. Suppose z_1 and z_2 are complex numbers such that $\frac{z_1 - 2z_2}{2 - z_1\bar{z}_2}$ is unimodular and z_2 is not unimodular. Then the point z_1 lies on a: [JEE M 2016]
- a) circle of radius 2
b) circle of radius $\sqrt{2}$
c) straight line parallel to x-axis
d) straight line parallel to y-axis
- 25) A value of θ for which $\frac{2+3i\sin(\theta)}{1-2i\sin(\theta)}$ is purely imaginary is : [JEE M 2016]

a) $\sin^{-1}\left(\frac{\sqrt{3}}{4}\right)$ b) $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$

c) $\frac{\pi}{3}$ d) $\frac{\pi}{6}$

- 26) Let $\{ A = \theta \in \left(\frac{\pi}{2}, \pi\right) : \frac{3+2i\sin(\theta)}{1-2i\sin(\theta)} \text{ is purely imaginary. Then the sum of element in } A \text{ is:}$
[JEE M 2019-9 Jan (M)]

a) $\frac{5\pi}{6}$ b) π c) $\frac{3\pi}{4}$ d) $\frac{2\pi}{3}$

- 27) let α and β be two roots of the equation $x^2 + 2x + 2 = 0$, then $\alpha^{15} + \beta^{15}$ is equal to : [JEE M 2019-Jan (M)]

a) -256 b) 512 c) -512 d) 256

- 28) All the points in the set $(S = \left\{ \frac{\alpha-i}{\alpha+i} : \alpha \in \mathbb{R} \right\}$
[JEE M 2019-9 April (M)]

- a) straight line whose slope is 1
b) circle whose radius is 1
c) circle whose radius is $\sqrt{2}$
d) straight line whose slope is -1