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Daily Practice Problems

JEE MATHS

Topic: Complex Number

Q.1 If $|z_1| = |z_2| = ... = |z_n| = 1$, then $\left|\frac{z_1 + z_2 + ...+ z_n}{z_1^{-1} + z_2^{-1} + ...+ z_n^{-1}}\right|$ equals-

(A) 1/n (B) n

(C) 1 (D) $|z_1 + z_2 + ...+ z_n|$

Q.2 If $\alpha = \cos\theta + i \sin\theta$, then $\frac{1+\alpha}{1-\alpha}$ equals -

(A) $\cot\theta$ (B) $i \tan\frac{\theta}{2}$

(C) $i \cot\frac{\theta}{2}$ (D) $\cot\frac{\theta}{2}$

Q.3 If $(1 + i)(1 + 2i).....(1 + ix) = a + ib$, then $2.5..... (1 + x^2)$ equals -

(A) a + b (B) a – b

(C) $a^2 + b^2$ (D) $a^2 – b^2$

Q.4 If $z + \sqrt{2} | z + 1 | + i = 0$, then z equals-

(A) 2 + i (B) – 2 + i

(C) $-\frac{1}{2} + i$ (D) – 2 – i

Q.5 If $(2 + i)r^{-1} = \{4i + (1 + i)^2\}(\cos\theta + i \sin\theta)$, then value of | r | is -

(A) $\sqrt{(5/6)}$ (B) $\sqrt{5}/6$

(C) 5/6 (D) None of these

Q.6 Modulus of $1 + i \tan\alpha$ ($\frac{\pi}{2} < \alpha < \pi$) is -

(A) cosec α (B) sec α

(C) $-\frac{1}{\cos\alpha}$ (D) None of these

Q.7 If $-3 + ix^2y$ is the conjugate of $x^2 + y + 4i$, then real values of x and y are-

(A) $x = \pm 1, y = 1$ (B) $x = -1, y = -4$

(C) $x = 1, y = -4$ (D) $x = \pm 1, y = -4$

Q.8 If $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ is purely imaginary, then θ is equal to-

(A) $2n\pi \pm \pi/3$ (B) $n\pi \pm \pi/3$

(C) $n\pi \pm \pi/6$ (D) $2n\pi \pm \pi/6$

Q.9 If $\sqrt{a+ib} = (\alpha + i\beta)$ then $\sqrt{-a-ib} =$

(A) $-(\alpha + i\beta)$ (B) $i(\alpha - i\beta)$

(C) $\pm(\beta - i\alpha)$ (D) $\pm(\alpha + i\beta)$

Q.10 For any two non zero complex numbers z_1 and z_2 if $z_1\bar{z}_2 + \bar{z}_1 z_2 = 0$, then amp (z_1) – amp(z_2) is -

(A) 0 (B) $\pi/4$ (C) $\pi/2$ (D) π

Q.11 $(x + iy)^{1/3} = a + ib$, then $\frac{x}{a} + \frac{y}{b}$ is equal to-

(A) 0 (B) – 1

(C) 1 (D) None of these

Q.12 If z_1, z_2 are complex numbers such that

$|z_1 + z_2|^2 = |z_1|^2 + |z_2|^2$, then z_1 / z_2 is-

(A) zero (B) purely imaginary

(C) purely real (D) None of these

Q.13 If $z = \sqrt{2i}$, then z is equal to-

(A) $\pm\frac{1}{\sqrt{2}}(1 + i)$ (B) $\pm\frac{1}{\sqrt{2}}(1 - i)$

(C) $\pm(1 - i)$ (D) $\pm(1 + i)$

Q.14 Vector z = 3 – 4i is rotated at 180º angle in

anti clockwise direction and its length is increased to two and half times. In new position, z is -

(A) (15/2) + 10i (B) –(15/2) + 10i

(C) – 15 + 10i (D) None of these

Q.15 If the first term and common ratio of a G.P. is $\frac{1}{2}(\sqrt{3}+i)$, then the modulus of its nth term will be-

(A) 1 (B) 2^{2n} (C) 2^{n} (D) 2^{3n}

Q.16 The least positive value of n for which $\left[\frac{i(i+\sqrt{3})}{1-i^2}\right]^n$ is a positive integer is -

(A) 2 (B) 1 (C) 3 (D) 4

Q.17 If $\frac{z^2}{(z-1)}$ is always real, then locus of z is -

(A) real axis (B) circle

(C) imaginary axis (D) real axis or a circle

Q.18 If z (≠ 2) be a complex numbers such that

$\log_{1/2} | z - 2| > \log_{1/2} |z|$, then z satisfies -

(A) Re(z) < 1 (B) Re (z) > 1

(C) Im (z) = 1 (D) Im (z) < 1

Q.19 If $\left|\frac{z-a}{z+\bar{a}}\right| = 1$, Re(a) ≠ 0, then locus of z is-

(A) x = |a| (B) imaginary axis

(C) real axis (D) None of these

Q.20 If z = x + iy, then the equation $\left|\frac{2z-i}{z+1}\right| = k$ will be a straight line, where -

(A) k = 1 (B) k = 1/2

(C) k = 2 (D) k = 3

Q.21 The slope of the line $|z - 1| = |z + i|$ is-

(A) 2 (B) 1/2 (C) – 1 (D) 0

Q.22 If $z_1, z_2 \in C$ such that $\left|\frac{z_1 + z_2}{z_1 - z_2}\right| = 1$, then z_1/z_2 is-

(A) negative real number

(B) positive real number

(C) zero or purely imaginary

(D) None of these

Q.23 If $z = x + iy$ and $|z - 1 + 2i| = |z + 1 - 2i|$, then the locus of z is -

(A) $x + y = 0$ (B) $x = y$

(C) $x = 2y$ (D) $x + 2y = 0$

Q.24 If $z = x + iy$ and $\text{amp}\left(\frac{z-1}{z+1}\right) = \frac{\pi}{3}$, then locus of z is -

(A) a parabola (B) a straight line

(C) a circle (D) x–axis

Q.25 If $|z - i| = 1$ and $\text{amp}(z) = \pi/2$ $(z \neq 0)$, then z is-

(A) – 2i (B) (2, 0) (C) 2i (D) 1 + i

Q.26 The locus of a point z in complex plane satisfying the condition $\arg\left(\frac{z-2}{z+2}\right) = \frac{\pi}{2}$ is -

(A) a circle with centre (0, 0) and radius 2

(B) a straight line

(C) a circle with centre (0, 0) and radius 3

(D) None of these

Q.27 If z is a complex number, then $\text{amp}\left(\frac{z-1}{z+1}\right) = \frac{\pi}{2}$ will be-

(A) $|z| = 1, R(z) > 0$ (B) $|z| = 1$

(C) $|z| = 1, I(z) < 0$ (D) $|z| = 1, I(z) > 0$

Q.28 If $z = x + iy$, then $1 \leq |z| \leq 3$ represents-

(A) a circular region

(B) region between two lines parallel to imaginary axis

(C) region between two lines parallel to real axis

(D) region between two concentric circles

Q.29 The triangle formed by z, iz and i^2z is-

(A) right-angled

(B) equilateral

(C) isosceles

(D) right-angled isosceles

Q.30 The centre of a square is at the origin and one of the vertex is $1 – i$. The extremities of diagonal not passing through this vertex are-

(A) $1 + i, –1 – i$ (B) $–1 + i, –1 –i$

(C) $1 + i, –1 + i$ (D) None of these

ANSWER KEY

Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ans.	C	C	C	D	B	C	D	B	C	C
Que.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	D	B	D	B	A	C	D	B	B	C
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Ans.	C	C	C	C	C	A	D	D	D	A