Shiksha Classes Bhandara

Mathematics **Topic : Complex Numbers** **MM 100**

Q.1 ω is an imaginary cube root of unit. If $(1 + \omega^2)^m = (1 + \omega^4)^m$ then least positive integral value of m is –
(A) 6 (B) 5
(C) 4 (D) 3

Q.2 $1 + i^2 + i^4 + i^6 + ... + i^{2n}$ is –
(A) positive (B) negative
(C) 0 (D) cannot be determined

Q.3 The product of cube root of –1 is equal to –
(A) –1 (B) 0
(C) –2 (D) 4

Q.4 $\frac{1-2i}{2+i} + \frac{4-i}{3+2i} =$
(A) $\frac{24}{13} + \frac{10}{13}i$ (B) $\frac{24}{13} - \frac{10}{13}i$
(C) $\frac{10}{13} + \frac{24}{13}i$ (D) $\frac{10}{13} - \frac{24}{13}i$

Q.5 The square roots of 7 + 24i are
(A) ± (3 + 4i) (B) ± (3 – 4i)
(C) ± (4 + 3i) (D) ± (4 – 3i)

Q.6 The smallest positive integer n for which $(1 + i)^{2n} = (1 – i)^{2n}$ is –
(A) 4 (B) 8
(C) 2 (D) 12

Q.7 Z ∈ C satisfies the condition | z | ≥ 3. Then the least value of $\left|z + \frac{1}{z}\right|$ is
(A) 3/8 (B) 8/5
(C) 8/3 (D) 5/8

Q.8 If | z | = 5, then the points representing the complex number $-i + \frac{15}{z}$ lies on the circle –
(A) whose centre is (0, 1) and radius = 3
(B) whose centre is (–1, 0) and radius = 15
(C) whose centre is (1, 0) and radius = 15
(D) whose centre is (0, –1) and radius = 3

Q.9 The equation $Z^3 + iZ – 1 = 0$ has
(A) three real roots (B) one real root
(C) no real roots (D) no real or complex roots

Q.10 $Z_1 \neq Z_2$ are two points in an Argand plane. If a $|Z_1| = b|Z_2|$, then the point $\frac{aZ_1 - bZ_2}{aZ_1 + bZ_2}$ is
(A) in the I quadrant (B) in the III quadrant
(C) on the real axis (D) on the imaginary axis

Q.11 The conjugate complex number of $\frac{2-i}{(1-2i)^2}$ is –
(A) $\left(\frac{2}{25}\right) + \left(\frac{11}{25}\right)i$ (B) $\left(\frac{2}{25}\right) - \left(\frac{11}{25}\right)i$
(C) $\left(-\frac{2}{25}\right) + \left(\frac{11}{25}\right)i$ (D) $\left(-\frac{2}{25}\right) - \left(\frac{11}{25}\right)i$

Q.12 The solution of the equation 2z = | z | + 2i, where z is a complex number, is –
(A) $z = \frac{\sqrt{3}}{3} - i$ (B) $z = \frac{\sqrt{3}}{3} + i$
(C) $z = \frac{\sqrt{3}}{3} \pm i$ (D) None of these

Q.13 For any two non zero complex numbers z_1, z_2, the value of $(|z_1| + |z_2|)\left|\frac{z_1}{|z_1|} + \frac{z_2}{|z_2|}\right|$ is
(A) less than $2(|z_1| + |z_2|)$
(B) greater than $2(|z_1| + |z_2|)$
(C) greater than or equal to $2(|z_1| + |z_2|)$
(D) less than or equal to $2(|z_1| + |z_2|)$

Q.14 The value of i^i is –
(A) ω (B) $-\omega^2$
(C) π/2 (D) None of these

Q.15 Principal argument of the complex number $z = \frac{2(1-i\sqrt{3})(1+i)}{(\sqrt{3}-i)^3(-1+i)^4}$ is –
(A) $\frac{\pi}{4}$ (B) $\frac{-5\pi}{12}$
(C) $\frac{2\pi}{3}$ (D) $-\frac{7\pi}{12}$

Q.16 If $\frac{z-(1+i)}{z+(1+i)}$ is pure imaginary, then z lies on –
(A) a circle (B) a straight line
(C) a line segment (D) none of these

Q.17 If α, β are the complex cube roots of unity, then $\alpha^3 + \beta^3 + \alpha^{-2}\beta^{-2} =$
(A) 0 (B) 3
(C) –3 (D) None of these

Q.18 If z_1 and z_2 are two complex numbers such that $|z_1| = |z_2| + |z_1 - z_2|$, then
(A) $\text{Im}\left(\frac{z_1}{z_2}\right) = 0$ (B) $\text{Re}\left(\frac{z_1}{z_2}\right) = 0$
(C) $\text{Re}\left(\frac{z_1}{z_2}\right) = \text{Im}\left(\frac{z_1}{z_2}\right)$ (D) none of these

Q.19 The value of $\frac{4(\cos 75^\circ + i \sin 75^\circ)}{0.4(\cos 30^\circ + i \sin 30^\circ)}$ is –
(A) $\frac{10}{\sqrt{2}}(1+i)$ (B) $\frac{10}{\sqrt{2}}(1-i)$
(C) $\frac{5}{\sqrt{2}}(1+i)$ (D) None of these

Q.20 The points represented by the complex numbers 1 + i, – 2 + 3i, (5/3) i on the Argand diagram are
(A) Vertices of an equilateral triangle
(B) Vertices of an isosceles triangle
(C) Collinear
(D) None of these

For Q.21-Q.25 :

The answer to each question is a NUMERICAL VALUE.

Q.21 If ω is an imaginary cube root of unity, then $(1 - \omega)(1 - \omega^2)(1 - \omega^4)(1 - \omega^5)$ is equal to –

Q.22 The smallest positive integral value of n for which the complex number $\left(1+\sqrt{3}\,i\right)^{n/2}$ is real, is

Q.23 Let z be a complex number of constant non zero modulus such that z^2 is purely imaginary, then the number of possible values of z is

Q.24 The polynomial $f(x) = x^4 + ax^3 + bx^2 + cx + d$ has real coefficients and $f(2i) = f(2 + i) = 0$. The value of $(a + b + c + d)$ equals

Q.25 The value of $\left(\frac{1+i}{\sqrt{2}}\right)^8 + \left(\frac{1-i}{\sqrt{2}}\right)^8$ is equal to


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