PRACTICE QUESTIONS FOR COMPETITIVE EXAMINATIONS

TOPIC : COMPLEX NUMBERS

1. The value of the sum $\sum_{n=1}^{13}\left(i^n + i^{n+1}\right)$, where $i = \sqrt{-1}$, equals

(A) i (B) $i - 1$ (C) $-i$ (D) 0

2. The sequence $S = i + 2i^2 + 3i^3 + \ldots\ldots$ upto 100 terms simplifies to where $i = \sqrt{-1}$ -

(A) $50(1 - i)$ (B) $25i$ (C) $25(1 + i)$ (D) $100(1 - i)$

3. Let $i = \sqrt{-1}$. The product of the real part of the roots of $z^2 - z = 5 - 5i$ is -

(A) -25 (B) -6 (C) -5 (D) 25

4. If $z_1 = \frac{1}{a+i}$, $a \neq 0$ and $z_2 = \frac{1}{1+bi}$, $b \neq 0$ are such that $z_1 = \overline{z}_2$ then -

(A) $a = 1, b = 1$ (B) $a = 1, b = -1$ (C) $a = -1, b = 1$ (D) $a = -1, b = -1$

5. The inequality $|z - 4| < |z - 2|$ represents the following region -

(A) $Re(z) > 0$ (B) $Re(z) < 0$ (C) $Re(z) > 2$ (D) none of these

6. If $(1 + i)(1 + 2i)(1 + 3i) \ldots (1 + ni) = \alpha + i\beta$ then $2 . 5 . 10 \ldots (1 + n^2) =$

(A) $\alpha - i\beta$ (B) $\alpha^2 - \beta^2$ (C) $\alpha^2 + \beta^2$ (D) none of these

7. In the quadratic equation $x^2 + (p + iq)x + 3i = 0$, p & q are real. If the sum of the squares of the roots is 8 then :

(A) $p = 3, q = -1$ (B) $p = -3, q = -1$

(C) $p = 3, q = 1$ or $p = -3, q = -1$ (D) $p = -3, q = 1$

8. The curve represented by $Re(z^2) = 4$ is -

(A) a parabola (B) an ellipse

(C) a circle (D) a rectangular hyperbola

9. Real part of $e^{e^{i\theta}}$ is -

(A) $e^{\cos\theta}[\cos(\sin\theta)]$ (B) $e^{\cos\theta}[\cos(\cos\theta)]$ (C) $e^{\sin\theta}[\sin(\cos\theta)]$ (D) $e^{\sin\theta}[\sin(\sin\theta)]$

10. Let z and ω are two non-zero complex numbers such that $|z| = |\omega|$ and $\arg z + \arg \omega = \pi$, then z equal to -

(A) ω (B) $-\omega$ (C) $\overline{\omega}$ (D) $-\overline{\omega}$

11. Number of values of x (real or complex) simultaneously satisfying the system of equations $1 + z + z^2 + z^3 + \ldots\ldots + z^{17} = 0$ and $1 + z + z^2 + z^3 + \ldots\ldots + z^{13} = 0$ is -

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

12. If $|z_1| = 1$, $|z_2| = 2$, $|z_3| = 3$ and $|9z_1z_2 + 4z_1z_3 + z_2z_3| = 12$ then the value of $|z_1 + z_2 + z_3|$ is equal to-

(A) 2 (B) 3 (C) 4 (D) 6

13. A point 'z' moves on the curve $|z - 4 - 3i| = 2$ in an argand plane. The maximum and minimum values of $|z|$ are -

(A) 2, 1 (B) 6, 5 (C) 4, 3 (D) 7, 3

14. The set of points on the complex plane such that $z^2 + z + 1$ is real and positive (where $z = x + iy,\ x,\ y \in R$) is-

(A) Complete real axis only

(B) Complete real axis or all points on the line $2x + 1 = 0$

(C) Complete real axis or a line segment joining points $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ & $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$ excluding both.

(D) Complete real axis or set of points lying inside the rectangle formed by the lines.

$2x + 1 = 0$; $2x - 1 = 0$; $2y - \sqrt{3} = 0$ & $2y + \sqrt{3} = 0$

15. If ω is an imaginary cube root of unity, then $(1 + \omega - \omega^2)^7$ equals

(A) 128ω (B) -128ω (C) $128\omega^2$ (D) $-128\omega^2$

16. If $i = \sqrt{-1}$, then $4 + 5\left(-\frac{1}{2} + \frac{i\sqrt{3}}{2}\right)^{334} + 3\left(-\frac{1}{2} + \frac{i\sqrt{3}}{2}\right)^{365}$ is equal to :

(A) $1 - i\sqrt{3}$ (B) $-1 + i\sqrt{3}$ (C) $i\sqrt{3}$ (D) $-i\sqrt{3}$

17. The set of points on an Argand diagram which satisfy both $|z| \le 4$ & $\text{Arg } z = \frac{\pi}{3}$ are lying on -

(A) a circle & a line (B) a radius of a circle (C) a sector of a circle (D) an infinite part line

18. The origin and the roots of the equation $z^2 + pz + q = 0$ form an equilateral triangle if -

(A) $p^2 = 2q$ (B) $p^2 = q$ (C) $p^2 = 3q$ (D) $q^2 = 3p$

19. $\left[\frac{-1 + i\sqrt{3}}{2}\right]^6 + \left[\frac{-1 - i\sqrt{3}}{2}\right]^6 + \left[\frac{-1 + i\sqrt{3}}{2}\right]^5 + \left[\frac{-1 - i\sqrt{3}}{2}\right]^5$ is equal to -

(A) 1 (B) -1 (C) 2 (D) none of these

20. If z and ω are two non-zero complex numbers such that $|z\omega| = 1$, and $\text{Arg}(z) - \text{Arg}(\omega) = \pi/2$, then $\bar{z}\ \omega$ is equal to -

(A) 1 (B) -1 (C) i (D) $-i$

ANSWERS:

1.(B) 2.(A) 3.(B) 4.(B) 5.(D) 6.(C) 7.(C) 8.(D) 9.(A) 10.(D) 11.(A) 12.(A) 13.(D) 14.(B) 15.(D) 16.(C) 17.(C) 18.(C) 19.(A) 20.(D).