# 17 Complex Number

1. The value of $(1 + i)^5 \times (1 - i)^5$ is
   (A) $-8$ (B) $8i$
   (C) 8 (D) 32
2. For the complex number $z$, are from $z + \bar{z}$ and $z\bar{z}$ is
   (A) a real number
   (B) an imaginary number
   (C) both are real
   (D) both are imaginary number
3. The product of two complex number each of unit modulus is also a complex number, of
   (A) unit modulus
   (B) less than unit modulus
   (C) greater than unit number
   (D) None of the above
4. The value of $x$ and $y$ satisfying the equation $\frac{(1+i)x-2i}{3+i}+\frac{(2-3i)y+i}{3-i}=i$ are
   (A) $x = -1, y = 3$ (B) $x = 3, y = -1$
   (C) $x = 0, y = 1$ (D) $x = 1, y = 0$
5. The complex number $z = x + iy$, which satisfy the equation $\left|\frac{z-5i}{z+5i}\right|=1$ lie on
   (A) real axis (B) the line $y = 5$
   (C) the line $y = 3$ (D) None of these
6. $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ will be real, if $\theta$ is
   (A) $2n\pi$ (B) $n\pi+\frac{\pi}{2}$
   (C) $n\pi$ (D) None of these
7. If $\alpha$ and $\beta$ are imaginary cube roots of unity, then $\alpha^4+\beta^4+\frac{1}{\alpha\beta}$ is equal to
   (A) 3 (B) 0
   (C) 1 (D) 2
8. The points represented by the complex numbers $1+i,-2+3i,\frac{5}{3}i$ on the Argand diagram are
   (A) vertices of an equilateral triangle
   (B) vertices of an isosceles triangle
   (C) collinear
   (D) None of the above
9. The amplitude of $\sin\frac{\pi}{5}+i\left(1-\cos\frac{\pi}{5}\right)$ is
   (A) $\frac{\pi}{5}$ (B) $\frac{2\pi}{5}$
   (C) $\frac{\pi}{10}$ (D) $\frac{\pi}{15}$
10. What is the argument of $(1 - \sin\theta) + i\cos\theta$? $\left(i=\sqrt{-1}\right)$
    (A) $\frac{\pi}{2}-\frac{\theta}{2}$ (B) $\frac{\pi}{2}+\frac{\theta}{2}$
    (C) $\frac{\pi}{4}-\frac{\theta}{2}$ (D) $\frac{\pi}{4}+\frac{\theta}{2}$
11. If $\alpha$ and $\beta$ are the complex cube roots of unity, then what is the value of $(1 + \alpha)(1 + \beta)(1 + \alpha^2)(1 + \beta^2)$?
    (A) $-1$ (B) 0
    (C) 1 (D) 4
12. If $z=1+\cos\frac{\pi}{5}+i\sin\frac{\pi}{5}$, then $|z|$ is equal to
    (A) $2\cos\frac{\pi}{5}$ (B) $2\sin\frac{\pi}{5}$
    (C) $2\cos\frac{\pi}{10}$ (D) $2\sin\frac{\pi}{10}$

13. If ω is the imaginary cube root of unity, then $(2 - \omega + 2\omega^2)^{27}$ is equal to

(A) $3^{27}\omega$ (B) $-3^{27}\omega^2$
(C) $3^{27}$ (D) $-3^{27}$

14. What is the value of $\left(\frac{\sqrt{3}+i}{\sqrt{3}-i}\right)^6$ ?

(A) – 1 (B) 0
(C) 1 (D) 2

15. If $x + iy = \begin{vmatrix} 6i & -3i & 1 \\ 4 & 3i & -1 \\ 20 & 3 & i \end{vmatrix}$, then what is the value of $(x - iy)$?

(A) $3 + i$ (B) $1 + 3i$
(C) $3i$ (D) 0

16. If $A + iB = \frac{4+2i}{1-2i}$, where $i = \sqrt{-1}$, then what is the value of $A$?

(A) – 8 (B) 0
(C) 4 (D) 8

17. If $x_r = \cos\left(\frac{\pi}{2^r}\right) + i\sin\left(\frac{\pi}{2^r}\right)$, then $x_1.x_2 \ldots \infty$ is

(A) – 3 (B) –2
(C) –1 (D) 0

18. If $x = a + b$, $y = a\alpha + b\beta$ and $z = a\beta + b\alpha$, where α and β are complex cube roots of unity, then $xyz$ is equal to

(A) $a^2 + b^2$ (B) $a^3 + b^3$
(C) $a^3b^3$ (D) $a^3 - b^3$

19. What is the value of $\left(-1 + i\sqrt{3}\right)^{48}$ ?

(A) 1 (B) 2
(C) $2^{24}$ (D) $2^{48}$

20. What is the value of $\begin{vmatrix} 1 & \omega & 2\omega^2 \\ 2 & 2\omega^2 & 4\omega^3 \\ 3 & 3\omega^3 & 6\omega^4 \end{vmatrix}$, where ω is the cube roots of unity?

(A) 0 (B) 1
(C) 2 (D) 3

21. If $x^2 + y^2 = 1$, then $\frac{1+x+iy}{1+x-iy}$ is equal to

(A) $x - iy$ (B) $x + iy$
(C) $2x$ (D) $-2iy$

22. What is the least positive integer $n$ for which $\left(\frac{1+i}{1-i}\right)^n = 1$ ?

(A) 16 (B) 12
(C) 8 (D) 4

23. If ω is a complex cube root of unity, then the value of $\omega^{99} + \omega^{100} + \omega^{101}$ is

(A) 1 (B) –1
(C) 3 (D) 0

24. What is the modulus of $\frac{1+2i}{1-(1-i)^2}$ ?

(A) 5 (B) 4
(C) 3 (D) 1