COMPLEX NUMBERS

Single Correct Answer Type:

1. If $a<0, b>0$, then $\sqrt{a}.\sqrt{b}$ is equal to

(A) $-\sqrt{|a|.b}$ (B) $\sqrt{|a|.b}.i$ (C) $\sqrt{|a|b}$ (D) $\sqrt{a.b}.i$

2. If $(a+ib)^5=\alpha+i\beta$, then $(b+ia)^5$ is equal to

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

3. $\sin^{-1}\left\{\frac{1}{i}(z-1)\right\}$, where z is non-real, can be the angle of a triangle, if

(A) $\text{Re}(z)=1, \text{Im}(z)=2$ (B) $\text{Re}(z)=1, -1\le \text{Im}(z)\le 1$

(C) $\text{Re}(z)+\text{Im}(z)=0$ (D) $\text{Re}(z)=1, \text{Im}(z)=1$

4. $\frac{(\cos\theta-i\sin\theta)^4}{(\sin\theta+i\cos\theta)^5}$ is equal to

(A) $\cos\theta-i\sin\theta$ (B) $\cos 9\theta-i\sin 9\theta$ (C) $\sin 9\theta-i\cos 9\theta$ (D) $\sin\theta-i\cos\theta$

5. If $x^2-x+1=0$, then the value of $\sum_{n=1}^{5}\left(x^n+\frac{1}{x^n}\right)^2$ is

(A) 8 (B) 10 (C) 12 (D) 14

6. Let z_1 and z_2 be two non-real complex cube roots of unity and $|z-z_1|^2+|z-z_2|^2=\lambda$ be the equation of a circle with z_1, z_2 as ends of a diameter, then the value of λ is

(A) 4 (B) 3 (C) 2 (D) $\sqrt{2}$

7. Given that $\alpha_1, \alpha_2, \alpha_3, \ldots\ldots., \alpha_{100}$ are 100th roots of unity. The numerical value of $\sum_{1\le i<j\le 100}(\alpha_i\alpha_j)^5$ is

(A) 20 (B) 100 (C) $(20)^{1/20}$ (D) None of these

8. If ω is complex cube root of unity satisfying $\frac{1}{a+\omega}+\frac{1}{b+\omega}+\frac{1}{c+\omega}=2\omega^2$ and $\frac{1}{a+\omega^2}+\frac{1}{b+\omega^2}+\frac{1}{c+\omega^2}=2\omega$, then the value of $\frac{1}{a+1}+\frac{1}{b+1}+\frac{1}{c+1}$ is

(A) 2 (B) – 2 (C) $-1+\omega^2$ (D) $1-\omega^2$

9. If $z=i\log(2-\sqrt{3})$, then cos z is equal to

(A) i (B) 2i (C) 1 (D) 2

10. Let z be a complex number having the argument θ, $0<\theta<\frac{\pi}{2}$ and satisfying $|z-3i|=3$, then $\text{Arg}\left(\cot\theta-\frac{6}{z}\right)$ is

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{3}$

11. Let z be a complex number satisfying the equation $\left(z^3+3\right)^2=-16$, the value of $|z|$ is

(A) $5^{1/2}$ (B) $5^{1/3}$ (C) $5^{2/3}$ (D) 5

12. If z_1, z_2, z_3 represent the vertices of an equilateral triangle such that $|z_1|=|z_2|=|z_3|$, then

(A) $z_1+z_2=z_3$ (B) $z_1+z_2+z_3=0$ (C) $z_1z_2=\frac{1}{z_3}$ (D) $z_1-z_2=z_3-z_2$

13. Let z and w be two non-zero complex numbers such that $|z|=|w|$ and $\arg(z)+\arg(w)=\pi$, then z equals

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

14. $e^{2mi\cot^{-1}p}.\left(\frac{pi+1}{pi-1}\right)^m$ is equal to

(A) e (B) 1 (C) – 1 (D) 1 / e

15. The maximum value of $|z|$ when z satisfies the condition $\left|z+\frac{2}{z}\right|=2$ is

(A) $\sqrt{3}-1$ (B) $\sqrt{3}+1$ (C) $\sqrt{3}$ (D) $\sqrt{2}+\sqrt{3}$

16. If $\text{amp}(z_1z_2)=0$ and $|z_1|=|z_2|=1$, then

(A) $z_1+z_2=0$ (B) $z_1z_2=1$ (C) $z_1=\overline{z}_2$ (D) $z_1z_2=-1$

17. If z_1, z_2 are n^{th} roots of unity which subtends a right angle at the origin then 'n' must be in the form of

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

18. If $z\neq 0$, $\int_0^{100}\arg(-|z|)\,dx$ equals

(A) 0 (B) not defined (C) 100 (D) 100π

19. If $A(z_1), B(z_2), C(z_3)$ are the vertices of an equilateral triangle ABC, value of $\arg\left(\frac{z_2+z_3-2z_1}{z_3-z_2}\right)$ is equal to

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{6}$

20. If $|z|=1$ and $|\omega-1|=1$, where z, $\omega\in C$, the largest set of values of $|2z-1|^2+|2\omega-1|^2$ is

(A) $[1, 9]$ (B) $[2, 6]$ (C) $[2, 12]$ (D) $[2, 18]$

Numerical Based:

21. If z_1, z_2 are complex numbers such that $|z_1|=12$ and $|z_2-3-4i|=5$ then the minimum value of $|z_1-z_2|$ is _____

22. The least positive integer n for which $\left(\frac{1+i}{1-i}\right)^n=\frac{2}{\pi}\sin^{-1}\frac{1+x^2}{2x}$, where x > 0 is _____

23. If $z=(3+7i)(p+iq), p, q\in I-\{0\}$ is purely imaginary number, the minimum value of $|z|^2$ is _____

24. If a complex number z satisfying $z+|z|=1+7i$, the value of $|z|^2$ is _____

25. $\frac{2^{1008}}{(1+i)^{2016}}+\frac{(1+i)^{2016}}{2^{1008}}$ simplifies to _____

KEY

1.	B	2.	A	3.	B	4.	D	5.	A
6.	B	7.	D	8.	A	9.	D	10.	C
11.	B	12.	B	13.	D	14.	B	15.	B
16.	B	17.	C	18.	D	19.	B	20.	D
21.	2	22.	4	23.	3364	24.	625	25.	2

❇ *Wish You all the Best* ❇