DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. : 3

Topic :- COMPLEX NUMBERS AND QUADRATIC EQUATIONS

1. If $z^2 + z|z| + |z|^2 = 0$, then the locus of z is
   a) A circle
   b) A straight line
   c) A pair of straight lines
   d) None of these

2. If $|z - i| = 1$ and $\arg(z) = \theta$, where $0 < \theta < \frac{\pi}{2}$, then $\cot\theta - \frac{2}{z}$ equals
   a) $2i$
   b) $-i$
   c) i
   d) $1 + i$

3. If for complex numbers z_1 and z_2, $\arg(z_1) - \arg(z_2) = 0$, then $|z_1 - z_2|$ is equal to
   a) $|z_1| + |z_2|$
   b) $|z_1| - |z_2|$
   c) $||z_1| - |z_2||$
   d) 0

4. If x,y,z are real and distinct, then $x^2 + 4y^2 + 9z^2 - 6yz - 3zx - 2xy$ is always
   a) Non-negative
   b) Non-positive
   c) Zero
   d) None of these

5. The locus of the centre of the circle which touches the circles $|z - z_1| = a$ and $|z - z_2| = b$ externally (z, z_1 and z_2 are complex numbers) will be
   a) An ellipse
   b) A hyperbola
   c) A circle
   d) None of these

6. The modulus and amplitude of $(1 + i\sqrt{3})^8$ are respectively
   a) 256 and $\frac{\pi}{3}$
   b) 256 and $\frac{2\pi}{3}$
   c) 2 and $\frac{2\pi}{3}$
   d) 256 and $\frac{8\pi}{3}$

7. The solution set of the inequation $x^2 + (a + b)x + ab < 0, a < b$, is
   a) (a,b)
   b) $(-\infty,a) \cup (b,\infty)$
   c) $(-b, -a)$
   d) $(-\infty, -b) \cup (-a,\infty)$

8. If ω is an imaginary cube root of unity and $x = a + b$, $y = a\omega + b\omega^2$, $z = a\omega^2 + b\omega$, then $x^2 + y^2 + z^2$ is equal to
   a) $6ab$
   b) $3ab$
   c) $6a^2b^2$
   d) $3a^2b^2$

9. The square roots of $-7, -24\sqrt{-1}$ are
   a) $\pm(4 + 3\sqrt{-1})$
   b) $\pm(3 + 4\sqrt{-1})$
   c) $\pm(3 - 4\sqrt{-1})$
   d) $\pm(4 - 3\sqrt{-1})$

10. A real value of x will satisfy the equation $\left(\frac{3 - 4ix}{3 + 4ix}\right) = \alpha - i\beta$ (α,β are real), if
    a) $\alpha^2 - \beta^2 = -1$
    b) $\alpha^2 - \beta^2 = 1$
    c) $\alpha^2 + \beta^2 = 1$
    d) $\alpha^2 - \beta^2 = 2$

11. If $\omega(\neq 1)$ is a cube root of unity and $(1+\omega)^7 = A + B\omega$, then A and B are respectively

a) 0, 1 b) 1, 1 c) 1, 0 d) $-1, 1$

12. If the equation $x^2 + 9y^2 - 4x + 3 = 0$ is satisfied values of x and y, then

a) $1 \le x \le 3$ b) $2 \le x \le 3$ c) $-\frac{1}{3} < y < 1$ d) $0 < y < \frac{2}{3}$

13. If the sum of the roots of the equation $(a+1)x^2 + (2a+3)x + (3a+4) = 0$ is -1, then the product of the roots is

a) 0 b) 1 c) 2 d) 3

14. The roots of the equation $2^{x+2}3^{3x/(x-1)} = 9$ are given by

a) $1 - \log_2 3, 2$ b) $\log_2\left(\frac{2}{3}\right), 1$ c) $2, -2$ d) $-2, 1 - \frac{\log 3}{\log 2}$

15. If $a + b + c = 0$ and $a \neq c$ then the roots of the equation $(b + c - a)x^2 + (c + a - b)x + (a + b - c) = 0$, are

a) Real and unequal
b) Real and equal
c) Imaginary
d) None of these

16. If α,β are the roots of the equation $x^2 + \sqrt{\alpha}\, x + \beta = 0$, then the values of α and β are

a) $\alpha = 1, \beta = -1$ b) $\alpha = 1, \beta = -2$ c) $\alpha = 2, \beta = 1$ d) $\alpha = 2, \beta = -2$

17. If $b > a$, then the equation $(x-a)(x-b) - 1 = 0$ has

a) Both roots in $[a,b]$
b) Both roots in $(-\infty, a)$
c) Roots in $(-\infty, a)$ and other in (b,∞)
d) Both roots in (b,∞)

18. The value of $\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right)\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)\left(\cos\frac{\pi}{8} + i\sin\frac{\pi}{8}\right)\ldots\infty$ is

a) 1 b) 0 c) -1 d) None of these

19. The value of the expression
$2\left(1+\frac{1}{\omega}\right)\left(1+\frac{1}{\omega^2}\right) + 3\left(2+\frac{1}{\omega}\right)\left(2+\frac{1}{\omega^2}\right) + \ldots + (n+1)\left(n+\frac{1}{\omega}\right)\left(n+\frac{1}{\omega^2}\right)$ is

a) $\left[\frac{n(n+1)}{2}\right]^2$ b) $\left[\frac{n(n+1)}{2}\right]^2 - n$ c) $\left[\frac{n(n+1)}{2}\right]^2 + n$ d) None of these

20. One of the square root of $6 + 4\sqrt{3}$ is

a) $\sqrt{3}(\sqrt{3}+1)$ b) $-\sqrt{3}(\sqrt{3}-1)$ c) $\sqrt{3}(-\sqrt{3}+1)$ d) None of these