1. If α, β, γ are the roots of equation $x^3 - 3x^2 + 3x + 7 = 0$ and ω is cube roots of unity then the value of $\frac{\alpha-1}{\beta-1} + \frac{\beta-1}{\gamma-1} + \frac{\gamma-1}{\alpha-1}$ is-
(a) ω^2 (b) $2\omega^2$ (c) $3\omega^2$ (d) $-3\omega^2$

2. Let $A_0\ A_1\ A_2\ A_3\ A_4\ A_5$ be a regular hexagon inscribed in a circle of unit radius. Then the product of the lengths of the line segments $A_0 A_1$, $A_0 A_2$ and $A_0 A_4$ is-
(a) $\frac{3}{4}$ (b) $3\sqrt{3}$ (c) 3 (d) $\frac{3\sqrt{3}}{2}$

3. The locus of z (= x + iy) which satisfies the inequality $\log_{0.3} |z - 1| > \log_{0.3} |z - i|$ is given by -
(a) $x + y < 0$ (b) $x - y > 0$ (c) $x + y > 0$ (d) $x - y < 0$

4. Radius of circle which touches the line $iz + \bar{z} + 1 + i = 0$ and the lines $(2 - i) z = (2 + i) \bar{z}$ and $(2 + i) z + (i - 2) \bar{z} - 4i = 0$ are the normal's to the circles -
(a) $3\sqrt{2}$ (b) $\frac{1}{2\sqrt{2}}$ (c) $\frac{3}{2\sqrt{2}}$ (d) None of these

5. The curve represented by $Re(z^2) = 4$ is
(a) A parabola (b) An ellipse
(c) A circle (d) A rectangular hyperbola

6. If $z = (\alpha + 3) + i\sqrt{5-\alpha^2}$, then the locus of z is
(a) An ellipse (b) A circle
(c) A parabola (d) A straight line

7. Find the maximum distance of points moving on following circles $|z| = 2$ and $|z - 3 - 3i| = 1$
(a) $3(1 + \sqrt{2})$ (b) 3
(c) $3\sqrt{2}$ (d) None of these

8. If 1, ω, ω^2 are the cube root of unity, then $(1 + \omega)^3 - (1 + \omega^2)^3$ is equal to -
(a) 0 (b) 1 (c) ω (d) ω^2

9. If $(1 + i)(1 + 2i)(1 + 3i) .....(1 + ni) = \alpha + i\beta$, then 2.5, 10, ...$(1 + n^2)$ =
(a) $\alpha - i\beta$ (b) $\alpha^2 - \beta^2$ (c) $\alpha^2 + \beta^2$ (d) None of these

10. If $z = \frac{\sqrt{3}+i}{2}$, then $(z^{101} + i^{103})^{105}$ is equal to
(a) z (b) z^2 (c) z^3 (d) None of these

11. If z is any complex number such that $|z + 4| \le 3$, then the least value and greatest value of $|z + 1|$ are
(a) 1, 6 (b) 0, 6 (c) 2, 8 (d) None of these

12. $\frac{1+7i}{(2-i)^2} =$
(a) $\sqrt{2}\left(\cos\frac{3\pi}{4} + i\sin\frac{3\pi}{4}\right)$ (b) $\sqrt{2}\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$
(c) $\left(\cos\frac{3\pi}{4} + i\sin\frac{3\pi}{4}\right)$ (d) None of these

13. 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) $e^{\sin\theta}[\sin(\sin\theta)]$

14. The locus of z satisfying the inequality $\log_{1/3}|z+1| > \log_{1/3}|z-1|$ is
(a) $R(z) < 0$ (b) $R(z) > 0$ (c) $I(z) < 0$ (d) None

15. If $z_1 = 2 + 5i, z_2 = 3 - i$ then projection of z_1 on z_2 is
(a) 1/10 (b) $1/\sqrt{10}$ (c) $-7/10$ (d) None of these

16. The line joining the origin and the point represented by the complex number z = 1 + i is rotated through an angle $3\pi/2$ in anticlockwise direction about the origin and stretched by additional $\sqrt{2}$ unit. In the new position, the point is represented by the complex number
(a) $-\sqrt{2} - \sqrt{2}$ I (b) $\sqrt{2} - \sqrt{2}i$
(c) $2 - \sqrt{2}$ I (d) None of these

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

18. If 'z' is complex number then the locus of 'z' satisfying the condition $|2z - 1| = |z - 1|$ is
(a) Perpendicular bisector of line segment joining $\frac{1}{2}$ and 1
(b) Circle
(c) Parabola
(d) None of the above curves

19. If z_1, z_2, z_3 are three distinct complex numbers and a, b, c are three positive real numbers such that $\frac{a}{|z_2 - z_3|} = \frac{b}{|z_3 - z_1|} = \frac{c}{|z_1 - z_2|}$, then $\frac{a^2}{(z_2 - z_3)} + \frac{b^2}{(z_3 - z_1)} + \frac{c^2}{(z_1 - z_2)} =$
(a) 0 (b) Abc (c) 3abc (d) A + b + c

20. $i^2 + i^4 + i^6$ ……… (2n + 1) terms is equal to
(a) I (b) - I (c) - 1 (d) i

21. If $(1 + i\sqrt{3})^{300} = a + ib$, then a and b is equal to-
(a) a = 0, b = 1 (b) $a = 2^{300}, b = 0$
(c) a = 0 and b = 0 (d) None of these

22. If $|z - 25i| \le 15$, then | maximum arg (z) - minimum arg (z) | equals -
(a) $\frac{\pi}{2} + \cos^{-1}\left(\frac{3}{5}\right)$ (b) $\sin^{-1}\left(\frac{3}{5}\right) - \cos^{-1}\left(\frac{3}{5}\right)$
(c) $2\cos^{-1}\left(\frac{4}{5}\right)$ (d) $2\cos^{-1}\left(\frac{3}{5}\right)$

23. If z_1, z_2, z_3 are the vertices of an equilateral triangle with z_0 as its circumcentre then changing origin to z_0, then (where z_1, z_2, z_3 are new complex numbers of the vertices)

(a) $z_1^2 + z_2^2 + z_3^2 = 0$ (b) $z_1z_2 + z_2z_3 + z_3z_1 = 0$

(c) Both (a) and (b) (d) None of these

24. If $\alpha, \beta, \gamma, \delta$ are four complex numbers such that $\frac{\gamma}{\delta}$ is real and $\alpha\delta - \beta\gamma \neq 0$, then $z = \frac{\alpha + \beta t}{\gamma + \delta t}$, $t \in R$ represents a

(a) Circle (b) Parabola (c) Ellipse (d) Straight line

---

25. Let z_1 and z_2 be two non-zero complex numbers such that $\frac{z_1}{z_2} + \frac{z_2}{z_1} = 1$, then the origin and points represented by z_1 and z_2 -

(a) Lie on a straight line (b) Form a right triangle

(c) Form an equilateral triangle (d) None of these