Important Questions 2010
Class-XII- Maths
Complex Nos. & Quadratic Equations

Q.1. Show that:
(a) 1 + i2 + i4 + i6 = 0
(b) (1 + i)8 (1 + 1/i)8 = 256

Q.2. Prove that: $(1+i)^4\left(1+\frac{1}{i}\right)^4 = 16$

Q.3. Simplify:
(a) $4\sqrt{-9}+5\sqrt{25}-3\sqrt{-9}$
(b) $\sqrt{-25}+3\sqrt{-36}+\sqrt{-49}-\sqrt{-225}$

Q.4. Express each one of the following in the standard form a + ib.
(i) $\frac{5+4i}{4+5i}$ (ii) $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$ (iii) $\frac{1}{1-\cos q+2i\sin q}$

Q.5. Express $\frac{1}{1-\cos\theta+2i\sin\theta}$ in the form A +iB

Q.6. Represent $\frac{(\cos x+i\sin x)(\cos y+i\sin y)}{(\cos u+i)(1+i\tan u)}$ in the from A +iB.

Q.7. Express the following expression in the form of (a + ib):
$\frac{(3+i\sqrt{5})(3-i\sqrt{5})}{(\sqrt{3}+\sqrt{2}i)-(\sqrt{3}-i\sqrt{2})}$

Q.8. Prove that the following complex numbers are purely real:
(i) $\left(\frac{2+3i}{3+4i}\right)\left(\frac{2-3i}{3-4i}\right)$
(ii) $\left(\frac{3+2i}{2-3i}\right)+\left(\frac{3-2i}{2+3i}\right)$

Q.9. Reduce $\left(\frac{1}{1-2i}+\frac{3}{1+i}\right)\left(\frac{3+4i}{2-4i}\right)$ to the standard form.

Q.10. Express the following complex numbers in the standard form. Also, find their conjugate:
(i) $\frac{(1+i)^2}{3-i}$ (ii) $\frac{(2+3i)^2}{2-i}$

Q.11. Find the conjugates of the following complex numbers:
(i) $\frac{1}{3+5i}$ (ii) $\frac{(3-i)^2}{2+i}$ (iii) $\frac{(1+i)(2+i)}{3+1}$

Q.12. Write the following complex numbers in the polar form:
(i) $-3\sqrt{2}+3\sqrt{2}i$ (ii) -1 – i

Q.13. Find the modulus and principal argument of – 2 i.

Q.14. Find the modulus of $\frac{1+i}{1-i}-\frac{1-i}{1+i}$.

Q.15. Find the modulus and argument of the following complex numbers and hence express each of them in the polar form:
(i) $\frac{1+2i}{1-3i}$ (ii) $\frac{1-3i}{1+2i}$

Q.16. Find conjugate and modulus of $\frac{(1+i)^{2n+1}}{(1-i)^{2n-1}}$

Q.17. Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$

Q.18. Find the conjugate of (3 - 2t) (2 + 3t) / (1 + 2t) (2 - t)

Q.19. Show that if $\left|\frac{z-3i}{z+3i}\right|=1$, than z is a real number

Q.20. If Z is any non-zero complex number, prove that the multiplicative inverse of z is $\frac{\bar{z}}{|z|^2}$. Hence find the multiplicative inverse of $4-\sqrt{-9}$.

Q.21. Find the multiplicative inverse of the following complex numbers:
(i) 1 – i (ii) $(1+i\sqrt{3})^2$

Q.22. Find multiplicative inverse of 2 + $\sqrt{3}i$

Q.23. Find the square root of – 15 – 8*i*.

Q.24. Find Modulus and Argument of :
(1) Z = -1 - $\sqrt{3}i$ (2) Z = $\frac{(1+i)^{13}}{(1-i)^{n}}$

Q.25. Find the value of x and y if
$\frac{(1+i)x-2i}{3+i}+\frac{(2-3i)y+i}{3-i}=i$

Q.26. If Z = $-2-\sqrt{-3}$, find value of $2z^4+5z^3+7z^2-z+41$

Q.27. If $x+iy=\frac{a+ib}{a-ib}$, prove that x2 + y2 =1.

Q.28. If $x+iy=\frac{\sqrt{1+i}}{\sqrt{1-i}}$, prove that x2 + y2 = 1

Q.29. If (x + iy)3 = u + iv, then show that $\frac{u}{x}+\frac{v}{y}=4(x^2 - y^2)$

Q.30. If $(\cos\theta - i\sin\theta)^2 = x - iy$, prove that $x^2+y^2=1$

Q.31. Put the following in the form r (cos q + sin q), where r is a positive real number and - p < q £ p :
$\frac{(1+7i)}{(2-i)^2}$

Q.32. Represent the complex number Z = 1 + i $\sqrt{3}$ in the Polar form.

Q.33. Express the following number in polar form: $\frac{1+2i}{1-3i}$

Q.34. Convert the complex number $\frac{-16}{1+i\sqrt{3}}$ into polar form.

Q.35. Convert the complex number Z = $\frac{i-1}{\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}}$ in the Polar form.

Q.36. Convert the complex number $-\sqrt{3}+i$ in the polar form and represent them in Argand plane.

Q.37. If $\left(\frac{1+i}{1-i}\right)^m = 1$, then find the least integral value of m.

Q.38. Let Z1 = 2 – i, Z2 = -2+ i, find Re$\left(\frac{Z_1 Z_2}{\bar{Z}_1}\right)$.

Q.39. If z1 and z2 are 1 – i and -2 + 4i find: Im$\left[\frac{z_1 . z_2}{\bar{z}_1}\right]$

Q.40 . If Z1= 4+ 7i, Z2=1- i, find Im(Z1.Z2)

Q.41. Solve: 2x2 – (3 + 7i)x – (3 – 9i) = 0

Q.42. Solve the equation:2z = $|z| + \overline{2i}$.

Q.43 . Solve : $\sqrt{5}x^2 + x + \sqrt{5} = 0$.

Q.44. Solve for $x \in C$

(i) $x^2 + 4ix - 4 = 0$

(ii) $-x^2 + x - 2 = 0$

Q.45. For any two complex numbers Z1 and Z2 Prove that:
Re (Z1Z2) =Re(Z1)Re(Z2)– Im(Z1)Im(Z2)

Q.46. If z is the complex number then prove that:
(a) $z+\bar{z}=2\operatorname{Re}(z)$
(b) $z-\bar{z}=2\operatorname{Im}(z)$

Q.47. Find the number of non - zero integral solutions of the equation | 1 - t | x = 2x

Q.48. If Z is a complex number such that $\frac{z-1}{z+1}$ is purely imaginary, then prove that $|z|=1$.

Q.49. Find the complex number, z satisfying the equations:
$\frac{|z-4|}{|z-8|}=1$ and $\frac{|z-12|}{|z-8i|}=\frac{5}{3}$

Q.50. Show that if $\left|\frac{z-3i}{z+3i}\right|=1$, then z is a real number

Q.51. If a + ib = $\frac{c+i}{c-i}$, where a, b, c are real, prove that, $a^2+b^2=1$ and $\frac{b}{a}=\frac{2c}{c^2-1}$.

Q.52. If $|z_1|=|z_2|=1$, prove that $\left|\frac{1}{z_1}+\frac{1}{z_2}\right|=|z_1+z_2|$

Q.53. Find the real value of such that $\frac{3+2i\sin\theta}{1-2i\sin\theta}$ is (i) purely real (ii) purely imaginary.

Q.54. If a and b are different complex numbers with | b| = 1, find $\left|\frac{\beta-\alpha}{1-\overline{\alpha}\beta}\right|$.