MATHEMATICS CLASS XI
CHAPTER – 5 COMPLEX NUMBERS AND QUADRATIC EQUATIONS

Q.1. Express the given complex number in the form *a* + *ib*: $(5i)\left(-\frac{3}{5}i\right)$

Q.2. Express the given complex number in the form *a* + *ib*: $i^9 + i^{19}$

Q.3. Express the given complex number in the form *a* + *ib*: i^{-39}

Q.4. Express the given complex number in the form *a* + *ib*: 3(7 + *i*7) + *i*(7 + *i*7)

Q.5. Express the given complex number in the form *a* + *ib*: (1 – *i*) – (–1 + *i*6)

Q.6. Express the given complex number in the form *a* + *ib*: $\left(\frac{1}{5}+i\frac{2}{5}\right)-\left(4+i\frac{5}{2}\right)$

Q.7. Express the given complex number in the form *a* + *ib*:

$$\left[\left(\frac{1}{3}+i\frac{7}{3}\right)+\left(4+i\frac{1}{3}\right)\right]-\left(-\frac{4}{3}+i\right)$$

Q.8. Express the given complex number in the form *a* + *ib*: $(1 - i)^4$

Q.9. Express the given complex number in the form *a* + *ib*: $\left(\frac{1}{3}+3i\right)^3$

Q.10. Express the given complex number in the form *a* + *ib*: $\left(-2-\frac{1}{3}i\right)^3$

Q.11. Find the multiplicative inverse of the complex number 4 – 3*i*

Q.12. Find the multiplicative inverse of the complex number $\sqrt{5}+3i$

Q.13. Find the multiplicative inverse of the complex number –*i*

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Q.14. 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.15. Find the modulus and the argument of the complex number

$z = -1 - i\sqrt{3}$

Q.16. Find the modulus and the argument of the complex number $z = -\sqrt{3} + i$

Q.17. Convert the given complex number in polar form: 1 – *i*

Q.18. Convert the given complex number in polar form: – 1 + *i*

Q.19. Convert the given complex number in polar form: – 1 – *i*

Q.20. Convert the given complex number in polar form: –3

Q.21. Convert the given complex number in polar form: $\sqrt{3} + i$

Q.22. Convert the given complex number in polar form: *i*

Q.23. Solve the equation $x^2 + 3 = 0$

Q.24. Solve the equation $2x^2 + x + 1 = 0$

Q.25. Solve the equation $x^2 + 3x + 9 = 0$

Q.26. Solve the equation $-x^2 + x - 2 = 0$

Q.27. Solve the equation $x^2 + 3x + 5 = 0$

Q.28. Solve the equation $x^2 - x + 2 = 0$

Q.29. Solve the equation $\sqrt{2}x^2 + x + \sqrt{2} = 0$

Q.30. Solve the equation $\sqrt{3}x^2 - \sqrt{2}x + 3\sqrt{3} = 0$

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Q.31. Solve the equation $x^2 + x + \frac{1}{\sqrt{2}} = 0$

Q.32. Solve the equation $x^2 + \frac{x}{\sqrt{2}} + 1 = 0$

Q.33. Evaluate: $\left[i^{18} + \left(\frac{1}{i} \right)^{25} \right]^3$

Q.34. For any two complex numbers z_1 and z_2, prove that

Re $(z_1 z_2)$ = Re z_1 Re z_2 – Im z_1 Im z_2

Question 3:

Reduce $\left(\frac{1}{1-4i} - \frac{2}{1+i} \right)\left(\frac{3-4i}{5+i} \right)$ **to the standard form.**

Q.35. If $x - iy = \sqrt{\frac{a-ib}{c-id}}$ **prove that** $\left(x^2 + y^2\right)^2 = \frac{a^2 + b^2}{c^2 + d^2}$ **.**

Q.36. Convert the following in the polar form:

(i) $\frac{1+7i}{(2-i)^2}$ **, (ii)** $\frac{1+3i}{1-2i}$

Q.37. Solve the equation $3x^2 - 4x + \frac{20}{3} = 0$

Q.38. Solve the equation $x^2 - 2x + \frac{3}{2} = 0$

Q.39. Solve the equation $27x^2 – 10x + 1 = 0$

Q.40. Solve the equation $21x^2 – 28x + 10 = 0$

Q.41. If $z_1 = 2 - i,\ z_2 = 1 + i,$ **find** $\left| \frac{z_1 + z_2 + 1}{z_1 - z_2 + i} \right|$ **.**

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Q.42. If $a + ib = \frac{(x+i)^2}{2x^2+1}$, prove that $a^2 + b^2 = \frac{(x^2+1)^2}{(2x+1)^2}$

Q.43. Let $z_1 = 2 - i,\ z_2 = -2 + i$. Find

(i) $\mathrm{Re}\left(\frac{z_1 z_2}{\bar{z}_1}\right)$, (ii) $\mathrm{Im}\left(\frac{1}{z_1 \bar{z}_1}\right)$

Q.44. Find the modulus and argument of the complex number $\frac{1+2i}{1-3i}$.

Q.45. Find the real numbers x and y if $(x - iy)(3 + 5i)$ is the conjugate of $-6 - 24i$.

Q.46. Find the modulus of $\frac{1+i}{1-i} - \frac{1-i}{1+i}$

Q.47. If $(x + iy)^3 = u + iv$, then show that $\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$.

Q.48. If α and β are different complex numbers with $|\beta| = 1$, then find $\left|\frac{\beta - \alpha}{1 - \bar{\alpha}\beta}\right|$.

Q.49. Find the number of non-zero integral solutions of the equation $|1 - i|^x = 2^x$.

Q.50. If $(a + ib)(c + id)(e + if)(g + ih) = A + iB$, then show that $(a^2 + b^2)(c^2 + d^2)(e^2 + f^2)(g^2 + h^2) = A^2 + B^2$.

Q.51. If $\left(\frac{1+i}{1-i}\right)^m = 1$, then find the least positive integral value of m.

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