COMPLEX NUMBERS Class XI

1. Express in the standard form a + ib: $\left(\frac{1}{1-4i} - \frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$

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

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

4. Find the values of x and y, if $\frac{(1+i)x - 2i}{3 + i} + \frac{(2-3i)y + i}{3-i} = i$

5. Express: $\frac{5 + i\sqrt{2}}{1 - i\sqrt{2}}$ in the form a + ib.

6. Find the modulus of the complex number $\frac{1+2i}{1-3i}$

7. Find the multiplicative inverse of (4 − 2i)

8. Express i^{-35} in the form a + ib.

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

10. The multiplicative inverse of 2 − 3i.

11. Express in the form of a + ib:

    (i) $i^{15} - 3i^7 + 2i^{109} + i^{100} - i^{17} + 5i^3$

    (ii) $\left(\sqrt{5} - i\sqrt{3}\right)\left(\sqrt{5} + i\sqrt{3}\right)^2$

    (iii) $\sqrt{-4}\left(\sqrt{-9} + 3\right) + \sqrt{-49}\left(i^3 + \sqrt{3}\right) - \sqrt{-36}\left(2 - \sqrt{-121}\right) + \sqrt{5}i^5$

12. Find the conjugate of

    (i) $1 - \frac{1}{2}i$

    (ii) $\frac{7 - 9i}{2 + i}$

    (iii) $\frac{4}{i^5}$

13. Find the magnitude of

    (i) $6 - i$

    (ii) $\frac{1+i}{2+3i}$

    (iii) $\frac{1}{4i^7}$

14. Find the multiplicative inverse of

    (i) $3 + 4i$

    (ii) $\frac{2+3i}{3-2i}$

    (iii) $2 + i\sqrt{3}$

COMPLEX NUMBERS Class XI, ANSWERS

1. Express in the standard form a + ib: $\left(\frac{1}{1-4i} - \frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$

   $\frac{307}{442} + \frac{599}{442}i$

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

   split Re(z) & Im(z), Multiply

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

   $\frac{63}{25} + \frac{16}{25}i$

4. Find the values of x and y, if $\frac{(1+i)x - 2i}{3 + i} + \frac{(2-3i)y + i}{3-i} = i$

   x = 3, y = -1

5. Express: $\frac{5 + i\sqrt{2}}{1 - i\sqrt{2}}$ in the form a + ib.

   $1 + 2\sqrt{2}i$

6. Find the modulus of the complex number $\frac{1+2i}{1-3i}$

   $1/\sqrt{2}$

7. Find the multiplicative inverse of (4 − 3i)

   $\frac{4}{25} + \frac{3}{25}i$

8. Express i^{-35} in the form a + ib.

   0 + i

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

   1

10. The multiplicative inverse of 2 − 3i.

   $\frac{2}{13} + \frac{3}{13}i$

11. Express in the form of a + ib:
    (i) $i^{15} - 3i^7 + 2i^{109} + i^{100} - i^{17} + 5i^3$ 1 − 2i
    (ii) $(\sqrt{5} - i\sqrt{3})(\sqrt{5} + i\sqrt{3})^2$ $8\sqrt{5} + 8\sqrt{3}i$
    (iii) $\sqrt{-4}(\sqrt{-9} + 3) + \sqrt{-49}(i^3 + \sqrt{3}) - \sqrt{-36}(2 - \sqrt{-121}) + \sqrt{5}i^5$ $-65 + (7\sqrt{3} + \sqrt{5} - 6)i$

12. Find the conjugate of
    (i) $7 - \frac{1}{2}i$ $7 + \frac{1}{2}i$
    (ii) $\frac{7 - 9i}{2 + i}$ 1 + 5i
    (iii) $\frac{4}{i^5}$ 0 + 4i

13. Find the magnitude of
    (i) $6 - i$ $\sqrt{37}$
    (ii) $\frac{1+i}{2+3i}$ $\frac{\sqrt{26}}{13}$
    (iii) $\frac{1}{4i^7}$ ¼

14. Find the multiplicative inverse of
    (i) $3 + 4i$ $\left(\frac{3}{25} - \frac{4}{25}i\right)$
    (ii) $\frac{2+3i}{3-2i}$ 0 - i
    (iii) $2 + i\sqrt{3}$ $\left(\frac{2}{7} - \frac{\sqrt{3}i}{7}\right)$