COMPLEX NUMBERS
CLASS- XI (2021-22)

1 If $i = \sqrt{-1}$ then the value of $\frac{i^{4n+1} - i^{4n-1}}{2} =$ _____.
a) 1 b) i c) -1 d) $-i$

2 Find the magnitude of the complex number : $12i - 5$
(a) 12 (b) 13 (c) 10 (d) -13

3 Evaluate: $(i)^{1000} + (i)^{100} =$ _____.
(a) 1 (b) $-i$ (c) 2 (d) 0

4 If $i = \sqrt{-1}$ then the multiplicative inverse of $2 - 3i =$ _____.
a) $\frac{2}{13} - \frac{3}{13} i$ b) $\frac{3}{13} + \frac{2}{13} i$ c) $-\frac{2}{13} + \frac{3}{13}$ d) $\frac{3}{12} + \frac{3}{12} i$

5 If the multiplicative inverse of a complex number is $\frac{(\sqrt{3}+4i)}{19}$ where $i = \sqrt{-1}$, find the complex number.

6 If $3 + i\,x^2y \text{ and } x^2 + y + 4i$ are conjugate complex numbers, then find the real values of $and\ y$.

7 Show that: $(x + 1 + i)(x + 1 - i)(x - 1 + i)(x - 1 - i) = x^4 + 4$.

8 If $a^2 + b^2 = 1$, prove that $\frac{1+b+ia}{1+b-ia} = b + ia$

9 If $(1 + 2i)(2 + 3i), (3 + 4i) = a + ib$, prove that $a^2 + b^2 = 1625$.

10 Express $(3i - 7) + (7 - 4i) - (6 + 3i) + i^{23}$ in the form $(a + ib)$.

11 Express the following in the form $(a + ib)$.
$i)\ \frac{4}{i^3}$ ii) i^{-38} iii) $i^9 + i^{-19}$ iv) $i^4 + i^9 + i^{26}$ v) $i^{10} + i^{99}$

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

13 Express the following in the form $(a + ib)$.
$$\left[i^{18} + \left(\frac{1}{i}\right)^{25}\right]^3$$

14 If $4x + i(3x - y) = 3 + i(-6)$, where x and y are real numbers, find the value of x and y.

15 If the conjugate of $(x + iy)(2 - 3i)$ is $7 + 4i$, find the real values of $x\ and\ y$

16 Find the multiplicative inverse of $(4 - 3i)$.

17 Find the multiplicative inverse of $2 - 3i$

18 Express $i^{15} - 3i^7 + 2i^{109} + i^{100} - i^{17} + 5i^3$. in the form $(a + ib)$.

19 Express $(3i - 7) + (7 - 4i) - (6 + 3i) + i^{23}$ in the form $(a + ib)$.

20 Express $\left(\frac{3-i}{5+6i}\right)$ in the form $(a + ib)$.

21 Express $\left(\frac{1}{2} + 2i\right)^3$ in the form $(a + ib)$.

22 Find the conjugate of the following : $\left(5 + \sqrt{2}\, i\right)^2$

23 Find the conjugate of the following : $(6 - 3i)(2 + 5i)$

24 Find the magnitude of the following : $(3 + 2i)^3$

25 Find the multiplicative inverse of the following : $3 + 4i$

26 Find the multiplicative inverse of the following : $(2 - i)(3 + i)$

27 Find the modulus and the argument of the following complex number : $1 + \sqrt{3}\, i$

28 $x + iy = \frac{a+ib}{c+id}$, then show that $x - iy = \frac{a-ib}{c-id}$ and hence $x^2 + y^2 = \frac{a^2+b^2}{c^2+d^2}$

29 If $z = x + iy$ and $z^2 = a + ib$ where a, b, x, y are real numbers, show that $2x^2 = \sqrt{a^2 + b^2} + a$.

30 If $\frac{3}{2 + cos\theta + i\, sin\theta} = x + iy$, then show that $(x - 1)(x - 3) = -y^2$

31 Find the square roots of $5 + 12i$.

32 Find the square root of the complex number $-i$.

33 Find the square roots of the complex number $-3 - 4i$.

34 Evaluate: $\sqrt{-5 + 12i}$

35 Find the square root of the following complex numbers : $-16 - 30i$

36 Find the square root of the following complex number : $2i$

38 Find the square root of the following complex number : $4 - 3i$

39 Find the square root of the following complex number : $-7 + 24\, i$

40 Find the square root of the following complex number : $9 + 40\,i$

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

42 Convert the following complex number in the polar form : $\sqrt{3} + i$.

43 Convert the following complex number in the polar form : $-1 - i\sqrt{3}$.

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

45 If $x + iy = \sqrt{\frac{a+ib}{c+id}}$, prove that $(x^2 + y^2)^2 = \frac{a^2+b^2}{c^2+d^2}$.

46 What are the real numbers 'x' and 'y', if $(x - iy)(3 + 5i)$ is the conjugate of $(-1 - 3i)$?

47 Solve the following for x and y : $(x - iy)(2 + 3i) = \frac{x+2i}{1-i}$

48 Solve the following for x and y : $(3 + i)\,x + (1 - 2i)\,y + 7i = 0$

49 Express the following number in polar form : $1 + \sqrt{3}i$

50 Convert the complex number $z = -\frac{16}{1+\,i\sqrt{3}}$ into polar form.

51 Convert the following complex number into polar form: $\frac{1+\ 7i}{(2-\,i)^2}$.

52 Express the complex number $\frac{1+2i}{1-3i}$ in polar form.

53 If $\propto$, β are different complex numbers with $|\beta| = 1$ then find the value of $\left|\frac{\beta-\propto}{1-\bar{\alpha}\beta}\right|$..

54 Solve the following for x and y : $x^2 - 7x + 9y\,i = y^2\,i + 20i - 12$

55 If $\frac{i^4+\,i^9+i^{26}}{2-i^8+i^{10}-i^{15}} = A + iB$ then (A, B) = ?

56 Express the complex number $\frac{5-\sqrt{3}\,i}{4+2\,\sqrt{3}\,i}$ in polar form