

CLASS XI SAMPLE PAPER MATHS

[Complex Numbers, Quadratic Equations and Linear Inequalities]

Time: - 1 ½ hr

F.M-50

(Answer **ALL** questions)

Group- A [2 × 10 = 20]

1 - a) : Which is bigger, π or $\frac{22}{7}$

b) : If $x^3 = 1$ and $x \neq 1$, then what is the value of $x^{31} + x^{83} = ?$

c) : If $a = (\cos\alpha + i \sin\alpha)$ and $b = (\cos\beta + i \sin\beta)$, then find $ab = ?$

d) : Find the multiplicative inverse of $-i$.

e) : Write the conjugate and modulus of $(2 + 5i)$.

f) : If $a < 0$, then state which is true, $|a| = a$, $|a| = -a$.

g) : Express the complex number $(-3 + 2i)$ geometrically as a point in the Argand plane.

h) : Solve $3x + 8 > 2$, when (i) $x \in \mathbb{Z}$ (ii) $x \in \mathbb{R}$

i) : Solve: $3x - 2 < 2x + 1$

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

Group- B [5 × 6 = 30]

(2) : Find the square root of the complex number $(-16 - 30i)$.

(3) : (i). Prove that $\left(x + \frac{4}{x^2}\right) > 3, x > 0$. (ii). $\left|\frac{4x-5}{3}\right| \leq \frac{5}{3}$

(4) : If n is any integer, then prove that $\left[\frac{\sin\theta + i(1 - \cos\theta)}{\sin\theta - i(1 - \cos\theta)}\right]^n = \cos n\theta + i \sin n\theta$.

(5) : If α and β are different complex numbers with $|\beta| = 1$, then find $\left|\frac{\beta - \alpha}{1 - \alpha\beta}\right| = ?$

(6) : Solve the following system of inequations graphically :

$2x + y \leq 24; x + y \leq 11; 2x + 5y \leq 40; x \geq 0; y \geq 0$ **or** $-3 \leq \frac{4-7x}{2} \leq 18$

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A manufacturer has 600 litres of a 12% solution of acid. How many litres of a 30% acid solution must be added to it so that acid content in the resulting mixture will be more than 15% but less than 18%?



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