SWOT INSTITUTE
COMPLEX NUMBER & QUADRATIC EQUATION
XI-TEST

Time : 1 hr.

1. Express the following expressions in the form of a + ib :

$$\frac{(3+i\sqrt{5})(3-i\sqrt{5})}{(\sqrt{3}+\sqrt{2}i)-(\sqrt{3}-i\sqrt{2})}$$

2. If $x + iy = \frac{a+ib}{a-ib}$, prove that $x^2 + y^2 = 1$.

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

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

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

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

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