WORKSHEET XI COMPLEX NUMBER

1. Find the values of x and y if $(\frac{x}{3} -- \frac{y}{4})$ $+\frac{3}{4}\, y\, i$ = - 3 + 5 i
2. For what real numbers of x and y are the number $-3 + x^2$ y i and $x^2 + y + 4$ i conjugate complex numbers?.
3. Express the following complex number in x + i y form
   (i) $(6 + 5 i)^2$ (ii) $\frac{3-7\,i}{2+5\,i}$ (iii) $\frac{4+3\,i}{3-4\,i} + \frac{3-4\,i}{4+3\,i}$
4. Find the conjugate of the following complex number
   (i) $1 - 2 i^6$ (ii) – 5 i (iii) 7
5. Find the multiplicative inverse of the following complex number
   (a) $\frac{3+4\,i}{4-5\,i}$ (b) 6 i – 3 (c) $\frac{3-4\,i}{(4-2\,i)(1+i)}$
6. Find the modulus and amplitude of the following complex numbers
   (a) $1 - \sqrt{3}$ i (b) i (c) $\frac{-1-\sqrt{3}\,i}{2}$ (d) $\frac{1+2\,i}{1-2\,i}$ (e) $\frac{(1+i)(1+\sqrt{3}\,i)}{1-i}$.
7. Express the following complex number in polar form
   (a) $\sqrt{3}$ + i (b) $-i\sqrt{2} - \sqrt{2}$ (c) $\frac{-1+\sqrt{3}\,i}{2}$ (d) 1 – i (e) 7
   (f) – i (g) $\frac{2+6\sqrt{3}\,i}{5+\sqrt{3}\,i}$.
8. If x + i y = $\sqrt{\frac{a+i\,b}{c+i\,d}}$. Show that $(x^2 + y^2)^2 = \frac{a^2 + b^2}{c^2 + d^2}$
9. Find the real values if θ where $0 \le \theta \le \pi$ such that $\frac{3+2\,i\sin\theta}{1-2\,i\sin\theta}$ is purely imaginary.
10. Convert the complex number Z = $\frac{i-1}{\cos\frac{\pi}{6} + i\,\sin\frac{\pi}{6}}$ in polar form.
11. Solve the following quadratic equations over complex roots
    (a) $x^2 + 1 = 0$ (b) $x^2 + 2x + 5 = 0$ (c) $x^2 - 4x + 7 = 0$
    (d) $17 x^2 + 28 x + 12 = 0$ (e) $21 x^2 - 28 x + 10 = 0$
12. If p + i q = $\frac{(a+i)^2}{2\,a-i}$. Show that $p^2 + q^2 = \frac{(a^2+1)^2}{4\,a^2+1}$
13. If $\sqrt[3]{x + i\,y}$ = a + i b . Prove that $\frac{x}{a} + \frac{y}{b}$ = 4 (a^2 - b^2).
14. Find the square root of the following complex numbers
    (a)33 – 56 i (b) -11 –4 √3 i (c) 3 + 4 i (d) 11 – 60 i (e) –1+2√2 i
15. Find the real value “x” which will satisfy the equation a – i b = $\frac{1-i\,x}{1+i\,x}$
    if $a^2 + b^2 = 1$