CLASS: XII **Slip Test – 1** **Time : 1.30 Hrs**
Maths **Maxi. Marks: 50**

I. Choose the correct answer **10X1=10**

1. The conjugate of a complex number is $\frac{1}{i-2}$. Then the complex number is
   1) $\frac{1}{i+2}$ 2) $\frac{-1}{i+2}$ 3) $\frac{-1}{i-2}$ 4) $\frac{1}{i-2}$
2. If Z is a non zero complex number , such that $2i\,z^2 = \bar{z}$ then $|z|$ is
   1) $\frac{1}{2}$ 2) 1 3) 2 4) 3
3. The solution of the equation $|z| - z = 1 + 2i$ is
   1) $\frac{3}{2} - 2i$ 2) $\frac{-3}{2} + 2i$ 3) $2 - \frac{3}{2}i$ 4) $2 + \frac{3}{2}i$
4. If $\frac{z-1}{z+1}$ is purely imaginary , then $|z|$ is 1) $\frac{1}{2}$ 2) 1 3) 2 4) 3
5. The principal argument of $\frac{3}{-1+i}$ is 1) $\frac{-5\pi}{6}$ 2) $\frac{-2\pi}{3}$ 3) $\frac{-3\pi}{4}$ 4) $\frac{-\pi}{2}$
6. If $\omega \neq 1$ is a cubic root of unit and $(1 + \omega)^7 = A + B\omega$, then (A, B) equals
   1) (1,0) 2) (-1,1) 3) (0 , 1) 4) (1,1)
7. If α and β are the roots of $x^2 + x + 1 = 0$, then $\alpha^{2020} + \beta^{2020}$ is 1) -2 2) -1 3) 1 4) 2
8. The value of $\left(\frac{1+\sqrt{3}\,i}{1-\sqrt{3}\,i}\right)^{10}$ is 1) cis $\frac{2\pi}{3}$ 2) cis $\frac{4\pi}{3}$ 3) -cis $\frac{2\pi}{3}$ 4) - cis $\frac{4\pi}{3}$
9. The product of the n roots of n^{th} roots unity is 1) $(-1)^{n-1}$ 2) $(1)^{n-1}$ 3) $(-1)^{\frac{n-1}{2}}$ 4) $(1)^{\frac{n-1}{2}}$
10. The value of $i^{100} + i^{101} + i^{102} + i^{103}$ is 1) 0 2) 1 3) -1 4) 2

Part - B

II. Answer the following 4 questions (Q.No: 16 is Compulsory) **4x2=8**

11. Simplify : $\sum_{n=1}^{10} i^{n+50}$
12. If $Z_1 = 1 - 3i$, $Z_2 = -4i$ and $Z_3 = 5$, show that $(Z_1 + Z_2) + Z_3 = Z_1 + (Z_2 + Z_3)$
13. Find Z^{-1}, if $Z = (2 + 3i)(1 - i)$
14. Find the modulus of the complex number $2i(3 - 4i)(4 - 3i)$
15. Write the polar form of a complex number - 2 - i2
16. Show that $|Z + 2 - i| < 2$ represents interior points of a circle. Find its centre and radius

Part - C

III. Answer the following 4 questions (Q.No: 22 is Compulsory) **4x3=12**

17. Find the values of the real numbers x and y , if the complex numbers
    $(3 - i)x - (2 - i)y + 2i + 5$ and $2x + (-1 + 2i)y + 3 + 2i$ are equal
18. Simplify : $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3$ into rectangular form
19. Find the square root of 6 - 8i
20. Obtain the Cartesian form of the locus of Z in $|2z - 3 - i| = 3$
21. If $(x_1 + iy_1)(x_2 + iy_2)(x_3 + iy_3) \ldots\ldots (x_n + iy_n) = a + ib$ show that
    i) $(x_1^2 + y_1^2)(x_2^2 + y_2^2)(x_3^2 + y_3^2) \ldots\ldots (x_n^2 + y_n^2) = a^2 + b^2$
    ii) $\sum_{r=1}^{n} \tan^{-1}\left(\frac{y_r}{x_r}\right) = \tan^{-1}\left(\frac{b}{a}\right) + 2K\pi$, $K \in Z$
22. Find the value of $\left(\frac{1+\sin\frac{\pi}{10} + i\cos\frac{\pi}{10}}{1+\sin\frac{\pi}{10} - i\cos\frac{\pi}{10}}\right)^{10}$

Part - D

IV. Answer the following **4x5=20**

23. a) Suppose Z_1, Z_2 and Z_3 are the vertices of equilateral triangle inscribed in the circle $|z| = 2$. If $Z_1 = 1 + i\sqrt{3}$, then find Z_2 and Z_3

(OR)

   b) If $2\cos\alpha = x + \frac{1}{x}$ and $2\cos\beta = y + \frac{1}{y}$ show that
   i) $\frac{x}{y} + \frac{y}{x} = 2\cos(\alpha - \beta)$ ii) $\frac{x^m}{y^n} - \frac{y^n}{x^m} = 2i\sin(m\alpha - n\beta)$

24. a) If $Z = x + iy$ and $\arg\left(\frac{z-i}{z+2}\right) = \frac{\pi}{4}$ show that $x^2 + y^2 + 3x - 3y + 2 = 0$

(OR)

   b) Let Z_1, Z_2 and Z_3 be complex numbers such that $|Z_1| = |Z_2| = |Z_3| = r > 0$ and $Z_1 + Z_2 + Z_3 \neq 0$ prove that $\left|\frac{Z_1Z_2+Z_2Z_3+Z_3Z_1}{Z_1+Z_2+Z_3}\right| = r$

25. a) Show that i) $(2 + i\sqrt{3})^{10} - (2 - i\sqrt{3})^{10}$ is purely imaginary
   ii) $\left(\frac{19-7i}{9+i}\right)^{12} + \left(\frac{20-5i}{7-6i}\right)^{12}$ is real

(OR)

   b) State and prove triangle inequality

26. a) i) If $|Z| = 1$, show that $2 \leq |Z^2 - 3| \leq 4$
   ii) Find the value of $\sum_{k=1}^{8}\left(\cos\frac{2k\pi}{9} + i\sin\frac{2k\pi}{9}\right)$

(OR)

   b) If $Z = x + iy$ is a complex numbers such that $\mathrm{Im}\left(\frac{2z+1}{iz+1}\right) = 0$ show that the locus of z is $2x^2 + 2y^2 + x - 2y = 0$

Mr.R.Murali ., M.Sc., B.Ed.,
PGT. MATHS , SVVK - KRISHNAGIRI
CELL NO : 9786760672

Padasalai