Complex Numbers

AI24BTECH11034 - Tanush Sri Sai Petla*

Section-A

Fill in the blanks

1. If the expression

$\frac{[\sin(\frac{x}{2})+\cos(\frac{x}{2})+i\tan(x)]}{[1+2i\sin\frac{x}{2}]}$ $(1987-2Marks)$

is real,then the set of all possible values of x is...

2. For any two complex numbers z_1, z_2 and any real number a and b.

$|az_1 - bz_2|^2 + |bz_1 + az_2|^2 =.....$ $(1988-2Marks)$

3. If a,b,c are the numbers between 0 and 1 such that the points $z_1 = a + i, z_2 = 1 + biandz_3 = 0$ form an equilateral triangle,then a=.... and b=..... $(1989-2Marks)$

4. ABCD is a rhombus. Its diagonals AC and BD intersect at the point M and satisfy BD=2AC. If the points D and M represent the complex numbers 1+i and 2-i respectively, then A represents the complex number..... or..... $(1993-2Marks)$

5. Suppose Z_1, Z_2, Z_3 are the vertices of an equilateral triangle inscriped in the circle $|z| = 2.IfZ_1 = 1 + i\sqrt{3}thenZ_2 = ..., Z_3 = ...$ $(1994-2Marks)$

B True/False

1. For complex number $z_1 = x_1+iy_1$ and $z_2 = x_2+iy_2$, we write $z_1 \cap z_2, if x_1 \leq x_2 and y_1 \leq y_2$. then for all complex numbers z with $1 \cap z$, we have $\frac{1-z}{1+z} \cap 0$ $(1981-2Marks)$

2. If the complex numbers $z_1, z_2 and z_3$ represent the vertices of an equilateral triangle such that $|z_1| = |z_2| = |z_3|$ then $z_1 + z_2 + z_3 = 0$ $(1984-1Mark)$

3. If three complex numbers are in A.P. then they lie on a circle on the complex plane. $(1985-1Mark)$

4. The cube roots of unity when represented on Argand diagram form the vertices of an equilateral triangle. $(1988-1Mark)$

C MCQs with One Correct Answer

1. If the cube roots of unity are $1,\omega, \omega^2$, then the roots of the equation $(x + 1)^8 = 0$ are (1979)

(a) $-1, 1 + 2\omega, 1 + 2\omega^2$
(b) $-1, 1 - 2\omega, 1 - 2\omega^2$
(c) -1 , -1 ,-1
(d) None of these

2. The smallest positive integer for which $(\frac{1+i}{1-i})^n = 1$ is (1980)

(a) n=8
(b) n=16
(c) n=12
(d) None of these

3. The complex number z= x+iy which satisfy the equation $(1981-2Marks)$
$\left|\frac{z-5i}{z+5i}\right| = 1$ lie on

(a) the x-axis
(b) the straight line y=5
(c) a circle passing through the origin
(d) None of these

4. If $z = (\frac{\sqrt{3}}{2}+\frac{i}{2})^5 + (\frac{\sqrt{3}}{2}-\frac{i}{2})^5$, then $(1982-2Marks)$

(a) $Re(z)$=0
(b) $Im(z)$=0
(c) $Re(z) > 0, Im(z) > 0$
(d) $Re(z) > 0, Im(z) < 0$

5. The inequality $|z-4| < |z-2|$ represents the region given by $(1982-2Marks)$

(a) $Re(z) \geq 0$
(b) $Re(z) < 0$
(c) $Re(z) > 0$
(d) None of these