Mains.2.B.1-14

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Section - B

1) z and w are two non zero complex numbers such that $|z| = |w|$ and $Arg(z) + Arg(w) = \pi$ then z equals (2002)

   a) $\overline{\omega}$ b) $-\overline{\omega}$ c) ω d) $-\omega$

2) If $|z-4| < |z-2|$, its solution is given by (2002)

   a) $Re(z) > 0$
   b) $Re(z) < 0$
   c) $Re(z) > 3$
   d) $Re(z) > 2$

3) The locus of the centre of a circle which touches the circle $|z - z_1| = a$ and $|z - z_2| = b$ externally $(z, z_1, z_2$ are complex numbers) will be (2002)

   a) an ellipse
   b) a hyperbola
   c) a circle
   d) none of these

4) If z and w are two non-zero complex numbers such that $|zw| = 1$ and $Arg(z) - Arg(w) = \frac{\pi}{2}$ then $\bar{z}w$ is equal to (2003)

   a) $-\iota$ b) 1 c) -1 d) ι

5) Let Z_1 and Z_2 be two roots of the equation $Z^2 + aZ + b = 0$, Z being complex. Further assume that the origin, Z_1 and Z_2 form an equilateral triangle. Then (2003)

   a) $a^2 = 4b$
   b) $a^2 = b$
   c) $a^2 = 2b$
   d) $a^2 = 3b$

6) If $\left(\frac{1-\iota}{1+\iota}\right)^x = 1$ then (2003)
   a) $x = 2n + 1$, where n is any positive integer
   b) $x = 4n$, where n is any positive integer
   c) $x = 2n$, where n is any positive integer
   d) $x = 4n + 1$, where n is any positive integer

7) Let z and w be complex numbers such that $\overline{z} + \iota\overline{w} = 0$ and $arg(zw) = \pi$ then $arg(z)$ equals (2004)

   a) $\frac{5\pi}{4}$ b) $\frac{\pi}{2}$ c) $\frac{3\pi}{4}$ d) $\frac{\pi}{4}$

8) If $z = x - \iota y$ and $z^{\frac{1}{3}} = p + \iota q$, then $\frac{\frac{x}{p}+\frac{y}{q}}{p^2+q^2}$ is equal to (2004)

   a) -2 b) -1 c) 2 d) 1

9) If $\left|z^2 - 1\right| = |z|^2 + 1$, then z lies on (2004)

   a) an ellipse
   b) the imaginary axis
   c) a circle
   d) the real axis

10) If the cube roots of unity are 1, ω, ω^2 then the roots of the equation $(x-1)^3 + 8 = 0$, are (2004)
    a) $-1, -1 + 2\omega, -1 - 2\omega^2$
    b) $-1, -1, -1$
    c) $-1, 1 - 2\omega, 1 - 2\omega^2$
    d) $-1, 1 + 2\omega, 1 + 2\omega^2$

11) If z_1 and z_2 are two non-complex numbers such that $|z_1 + z_2| = |z_1| + |z_2|$, then arg$(z_1)$ - arg(z_2) is equal to (2005)

    a) $\frac{\pi}{2}$ b) $-\pi$ c) 0 d) $\frac{\pi}{2}$

12) If $\omega = \frac{z}{z-\frac{1}{3}\iota}$ and $|\omega| = 1$, then z lies on (2005)

    a) an ellipse
    b) a circle
    c) a straight line
    d) a parabola

13) The value of $\sum_{k=1}^{10}\left(sin\left(\frac{2k\pi}{11}\right) + \iota cos\left(\frac{2k\pi}{11}\right)\right)$ is (2006)

    a) ι b) 1 c) $-\iota$ d) -1

14) If $z^2 + z + 1 = 0$, where z is a complex number, then the value of

$$\left(z + \frac{1}{z}\right)^2 + \left(z^2 + \frac{1}{z^2}\right)^2 + \left(z^3 + \frac{1}{z^3}\right)^2 + \cdots + \left(z^6 + \frac{1}{z^6}\right)^2$$

is (2006)

a) 18 b) 54 c) 6 d) 12