

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 $\text{Arg}(z) + \text{Arg}(w) = \pi$ then z equals (2002)

- a) \bar{w} b) $-\bar{w}$ c) w d) $-w$

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

- a) $\text{Re}(z) > 0$ b) $\text{Re}(z) < 0$ c) $\text{Re}(z) > 3$ d) $\text{Re}(z) > 2$

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 $\text{Arg}(z) - \text{Arg}(w) = \frac{\pi}{2}$ 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 $\bar{z} + \iota\bar{w} = 0$ 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 $|z^2 - 1| = |z|^2 + 1$, then z lies on (2004)

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

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

- a) $-1, -1 + 2\omega, -1 - 2\omega^2$ c) $-1, 1 - 2\omega, 1 - 2\omega^2$
b) $-1, -1, -1$ 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

$$\omega = \frac{z}{z - \frac{1}{3}t}$$

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