

Mains.2.B.1-14

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SECTION - B

[2004]

- 1) z and w are two nonzero 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

(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 (b) the imaginary axis
(c) a circle (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) $-1, -1 + 2\omega, -1 - 2\omega^2$
(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