ANSWER KEYS 1. (4) **2.** (3) **3.** (4) **4.** (2) **5.** (3) **6.** (1) 7. (1) 9. (4) nathongo 10. (4) thongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// 1. (4) 2. (3) we know that $e^{i\theta} = \cos \theta + i \sin \theta$ /// mathongo /// mat We know that Then. $z_r = \cos\frac{2r\pi}{5} + i\sin\frac{2r\pi}{5}$ So, $z_1 z_2 z_3 z_4 z_5 = e^{i\frac{2\pi}{5}} \cdot e^{i\frac{4\pi}{5}} \cdot e^{i\frac{6\pi}{5}} \cdot e^{i\frac{8\pi}{5}} \cdot e^{i\frac{10\pi}{5}}$ $=e^{2i\left(rac{\pi}{5}+rac{\pi}{5}+rac{\pi}{5}+rac{\pi}{5}+rac{\pi}{5} ight)}\cdot e^{i2\pi}$ /// mathongo // matho $=e^{2i\left(2\pi ight) }\cdot e^{i2\pi}$ $=e^{i6\pi}=\cos 6\pi+\mathrm{i}\sin 6\pi=1$ Thus $z_1z_2z_3z_4z_5=1$ where $z_r=\cos\frac{2r\pi}{5}+i\sin\frac{2r\pi}{5}$ mathongo /// mathongo // matho 3. (4) 4. (2) $(\mathbf{x}_1\mathbf{x}_2\mathbf{x}_3\ldots \infty)^2(\mathbf{z}_1\mathbf{z}_2\mathbf{z}_3\ldots \infty)^4$ $= \left[\left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2} \right) \left(\cos \frac{\pi}{2^2} + i \sin \frac{\pi}{2^2} \right) \left(\cos \frac{\pi}{2^3} + i \sin \frac{\pi}{2^3} \right) \dots \infty \right]^2 \cdot \left[\left(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3} \right) \left(\cos \frac{\pi}{3^2} + i \sin \frac{\pi}{3^2} \right) + \dots \infty \right]^4$ $= \left[\cos\left(\frac{\pi}{2} + \frac{\pi}{2^2} + \frac{\pi}{2^3} + \ldots\right) + i\sin\left(\frac{\pi}{2} + \frac{\pi}{2^2} + \frac{\pi}{2^3} + \ldots\right)\right]^2 \cdot \left[\cos\left(\frac{\pi}{3} + \frac{\pi}{3^2} + \frac{\pi}{3^3} + \ldots\right) + i\sin\left(\frac{\pi}{3} + \frac{\pi}{3^2} + \frac{\pi}{3^3} + \ldots\right)\right]^4$ $= \left[\cos\left(\frac{\pi/2}{1-\frac{1}{2}}\right) + i\sin\left(\frac{\pi/2}{1-\frac{1}{2}}\right)\right]^2 \cdot \left[\cos\left(\frac{\pi/3}{1-\frac{1}{3}}\right) + i\sin\left(\frac{\pi/3}{1-\frac{1}{3}}\right)\right]^4$ $= \left[\cos\left(\frac{\pi/2}{1-\frac{1}{2}}\right) + i\sin\left(\frac{\pi/3}{1-\frac{1}{3}}\right) + i\sin\left(\frac{\pi/3}{1-\frac{1}{3}}\right)\right]^4$ $= \left[\cos\left(\frac{\pi/3}{1-\frac{1}{3}}\right) + i\sin\left(\frac{\pi/3}{1-\frac{1}{3}}\right)\right]^4$ $= \left[\cos\left(\frac{\pi/3}{1-\frac{1}$ $= (\cos \pi + i \sin \pi)^{2} \left(\frac{\frac{\cos \pi}{2} + i \sin \pi}{2}\right)^{4} = (-1)^{2} (i)^{4} = 1.$ 5. (3) $= \left[\frac{\cos\left(\frac{\theta}{4}\right) - i\sin\left(\frac{\theta}{4}\right)}{\cos\left(\frac{\theta}{4}\right) + i\sin\left(\frac{\theta}{4}\right)}\right]^{4n}$ $= (\cos \theta + i \sin \theta)^{-2n} = \cos 2n\theta - i \sin 2n\theta$

Basic Question Practice Set 2

Answer Kevs and Solutions

Complex Number JEE Main Crash Course

6. (1) Explanation of the correct option: mathongo /// mathongo // m Step1. Define the cube root of unity.

Given,

Given, $1, \omega$ and ω^2 are cube root of unity. We mathongo W. ma

 $1+\omega+\omega^2=0$... (i)

 $1 imes \omega imes \omega^2 = 1 \quad \dots (ii)$

Step2. Find the value of $(3 + \omega^2 + \omega^4)^6$: $\left(3+\omega^2+\omega^4\right)^6$

 $=\left(3+\omega^{2}+\left(\omega^{3}
ight)\left(\omega
ight)
ight)^{6}$

 $=\left(3+\omega^2+\omega
ight)^6$ [::From(2), $\omega^3=1$] athongo /// mathongo // math

 $=(2+1+\omega^2+\omega)^6$

 $=(2+0)^6\quad \left[\because \mathrm{From}(1), 1+\omega+\omega^2=0
ight]$ $= 2^6$ ongo $\frac{1}{12}$ mathongo $\frac{1}{12}$ m =64

Hence, Option(A) is the correct answer.

7. (1)athongo ///. mathongo // $\omega = -\frac{1}{2} + \frac{\sqrt{3}}{2} i$ (cube root of unity)

mathongo ///. mathongo ///.

 $1 + \omega + \omega^2 = 0$ and $\omega^3 = 1$

mathongo ///. mathongo ///.

$$\begin{vmatrix} 1 & \omega & \omega^2 \\ 1 & \omega^2 & \omega \end{vmatrix} = 3(\omega^2 - \omega)$$

$$1 & \omega^2 & \omega^2$$

First $\sqrt{3}i$ = -z mathongo ///. mathongo ///.

8. (3) As, $4 + 5\left(-\frac{1}{2} + \frac{i\sqrt{3}}{2}\right)^{334} - 3\left(\frac{1}{2} + \frac{i\sqrt{3}}{2}\right)^{365}$

 $\Rightarrow 4 + 5(\omega)^{334} - 3(\omega^2)^{365}$

 $\Rightarrow 4+5\omega+3\omega^2$ mathongo /// mathongo // mat

igo ///. mathongo $1 + 2\left(-\frac{1}{2} + \frac{\sqrt{3}}{2}i\right)$

9. (4)

 $z=\frac{\sqrt{3}}{2}+\frac{i}{2}=\cos\frac{\pi}{6}+i\sin\frac{\pi}{6}$ /// mathongo // mathongo /// mathongo /// mathongo /// mathongo /// mathongo // mathongo /// mathongo // ma

 $\Rightarrow z^5 = \cos\frac{5\pi}{6} + i\sin\frac{5\pi}{6} = \frac{-\sqrt{3} + i}{2}$

and $z^8 = \cos\frac{4\pi}{3} + i\sin\frac{4\pi}{3} = -\left(\frac{1+i\sqrt{3}}{2}\right)^{190}$ /// mathongo // mathongo /// mathongo /// mathongo /// mathongo /// mathongo /// math

 $\text{mathongo} \quad \text{mathongo} \quad$

 $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}\right)^9 = \cos 3\pi + \sin 3\pi = -1$ $= \left(\frac{1+i\sqrt{3}}{\log 2}$

10. (4) ithongo w						
then $z = r(\cos(\pi$ $= r(-\cos heta + i \sin heta))$	$(-\theta)+i\sin(\pi- heta)$ $(-\theta)=-\overline{w}$.	mathongo				