

Followings are of 2 Marks each (Q01-05).

Q01. Express in the standard form : $\left(\frac{1-i}{2i}\right)^2$.

Q02. Write the value of : $i^{416} + i^{417} + i^{418} + i^{419} + i^{420}$.

Q03. Write the additive inverse of : $z = \frac{i}{3} - \frac{1}{4}$.

Hence, write the sum of $\text{Re}(z)$ and $\text{Im}(z)$.

Q04. For $z = \sqrt{3} - \sqrt{3}i$, find $|z|$ and $\arg(z)$.

Q05. Find the multiplicative inverse of $z = \frac{i}{1+i\sqrt{3}}$. [2×5 = 10]

Followings are of 3 Marks each (Q06-07).

Q06. If $\left(\frac{1+i}{1-i}\right)^m = 1$, then find the least positive integral value of 'm'.

OR

If $\left|\frac{z-5i}{z+5i}\right| = 1$, then show that z is a real number.

Q07. If $z_1 = 2 - i$, $z_2 = 1 + i$, then find $\left|\frac{z_1 + z_2 + 1}{z_1 - z_2 + 1}\right|$. [3×2 = 6]

Following is of 4 Marks (Q08).

Q08. **PASSAGE BASED QUESTION** : Let z_1 and z_2 be two complex numbers.

Then the complex numbers z_1 and z_2 are said to be equal, if $\text{Re}(z_1) = \text{Re}(z_2)$ and $\text{Im}(z_1) = \text{Im}(z_2)$.

That is, $z_1 = z_2$ if the real parts and imaginary parts of both complex numbers are identical.

Based on the information given above, answer the following questions.

(a) If $(3x - 2yi)(2 + i)^2 = 10(1 + i)$, then find $(x + y)$.

(b) If $u + iv = (x + iy)^3$, then find the value of $\frac{u}{x} + \frac{v}{y}$. [2×2 = 4]

Followings are of 5 Marks each (Q09-10).

Q09. Evaluate $2x^4 + 5x^3 + 7x^2 - x + 14$, when $x = -2 - i\sqrt{3}$.

OR

If α and β are two different complex numbers such that $|\beta| = 1$, then find $\left|\frac{\alpha - \beta}{1 - \bar{\alpha}\beta}\right|$.

Q10. If $x + iy = \frac{m+i}{m-i}$, then prove that $x^2 + y^2 = 1$ and $\frac{y}{x} = \frac{2m}{m^2 - 1}$.

[5 × 2 = 10]

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