

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

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

Q02. Write the value of:  $i^{4016} + i^{4017} + i^{4018} + i^{4019} + i^{4020} + i^{4021} + i^{4022}$ .

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

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

Q04. For  $z = \sqrt{5} - \sqrt{5}i$ , 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  $z_1 = 2+i$ ,  $z_2 = 1-2i$ , 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  $(3x-2yi)(2+i)^2 = (10+10i)$ , then find the value of  $(x+y)$ .

(b) If  $u+iv = (x+iy)^3$ , then write 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  $x = -1+i$ .

OR

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

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

[5 × 2 = 10]

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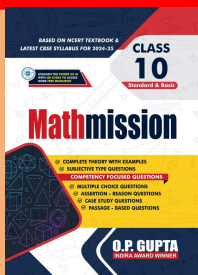
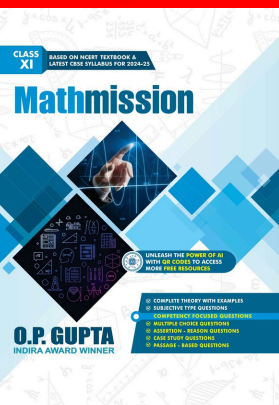
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