Name - Yash Rameshwar Kamthe
Sub - Maths and Stats. I
Std - 11th
Marks - 24

Q.1

1) $3 + i = 3 - i$

2) $3 - i = 3 + i$

3) $-\sqrt{5} - \sqrt{7}i = -\sqrt{5} + \sqrt{7}i$

4) $-\sqrt{-5} = -\sqrt{5}\,i$
$= \sqrt{5}\,i$

Q.2

1) $i^{35} = i \times i^{34} = i \times (i^2)^{17} = i(-1)^{17}$
$= i$

[Ans = i]

2) $i^{888} = (i^2)^{444} = (-1)^{444} = 1$

[Ans = 1]

3) $i^{93} = i \times i^{92}$

$= i \times (i^2)^{46}$

$= i \times (-1)^{46}$

$= i$

[Ans = i]

4) $i^{30} + i^{40} + i^{50} + i^{60}$

$= (i^2)^{15} + (i^2)^{20} + (i^2)^{25} + (i^2)^{30}$

$= (-1)^{15} + (-1)^{20} + (-1)^{25} + (-1)^{30}$

$= -1 + 1 - 1 + 1$

$= 0$

[Ans = 0]

Q.3

1) $(2+3i)(2-3i)$

Ans $(2+3i)(2-3i)$

$= 4 - 6i + 6i - 9i^2$

$= 4 - 9(-1)$

$= 4 + 9$

$= 13$

Now

Yash Kamthe
Std - 11th
Sub - Maths - I

DATE : / / 20
PAGE No

for a and b

$= \frac{13}{1} + 0i$

$[a = 13 \qquad b = 0]$

2 $\frac{i(4+3i)}{(1-i)}$

Ans $\frac{i(4+3i)}{(1-i)} = \frac{4i+3i^2}{(1-i)}$

$= \frac{4i+3(-1)}{1-i} = \frac{4i-3}{1-i}$

$= \frac{4i-3}{1-i} \times \frac{1+i}{1+i}$

$= \frac{4i-3 \times 1+i}{1^2 - i^2}$

$= \frac{4i + 4i^2 - 3 - 3i}{1-(-1)}$

$= \frac{i + 4(-1) - 3}{2} = \frac{i - 4 - 3}{2}$

$$= \frac{i - 1}{2} = \frac{i}{2} - \frac{1}{2}$$

$$= -\frac{1}{2} + \frac{1}{2} i$$

$$\left[a = -\frac{1}{2} \qquad b = \frac{1}{2} \right]$$

Q 4

1) $7 + 24i$

Let $\sqrt{7 + 24i} = a + ib$

$7 + 24i = a^2 - b^2 + 2abi$

Now

$a^2 - b^2 = 7 \qquad 2ab = 24$

$a^2 - b^2 = 7 \qquad b = \frac{24}{2a} = \frac{12}{a}$

$a^2 - \left(\frac{12}{a}\right)^2 = 7$

$a^2 - \frac{144}{a^2} = 7$

$a^4 - 144 = 7a^2$

$a^4 - 7a^2 - 144 = 0$

Now $m = a^2$ then $m^2 = a^4$

$m^2 + 16m + 9m - 144 = 0$

$m^2(m - 16) + 9(m - 16) = 0$

$(a^2 - 16)(m^2 + 9) = 0$

$m^2 - 16 = 0$ or $m^2 + 9 = 0$

$m^2 = 16$ or $m = -9$

$m \neq 9$

$m = 16$
$a = 16$

When $a = 4$ then b

$$\frac{12}{a} = \frac{12}{4} = 3$$

and $a = -4$ then $b = -3$

$$\frac{12}{-4} = -3$$

$$\sqrt{7+24i} = \pm(4+3i)$$

Q.5

$$3x^2 - 7x + 5 = 0$$

Here $a = 3 \quad b = -7 \quad c = 5$

Now

$$b^2 - 4ac = (-7)^2 - 4(3)(5)$$
$$= 49 - 60$$
$$= -11 < 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{7 \pm \sqrt{-11}\,i}{2 \times 3} = \frac{7 \pm \sqrt{-11}\,i}{6}$$

$$= \frac{7 \pm \sqrt{-11}\,i}{6}$$

$\therefore$ The roots are

$$x = \frac{7 + \sqrt{-11}\,i}{6} \quad \text{or} \quad x = \frac{7 - \sqrt{11}\,i}{6}$$

Q.6

2) $(a+b) + (aw + bw^2) + (aw^2 + bw) = 0$

Ans $(a+b) + (aw + bw^2) + (aw^2 + bw) = 0$

$= (a + aw + aw^2) + (b + bw + bw^2)$

$= a(1 + w + w^2) + b(1 + w + w^2)$

$= a(0) + b(0) = 0$

Hence, proved

---

1) $(2 - w)(2 - w^2) = 7$

Ans $(2 - w)(2 - w^2) = 7$

$= 4 - 2w^2 - 2w - w^3$

$= 4 - 2(w^2 + w) + 1$

$= 5 - 2(-1) = 5 + 2 = 7$

Hence Proved

$(2 - w)(2 - w^2) = 7$