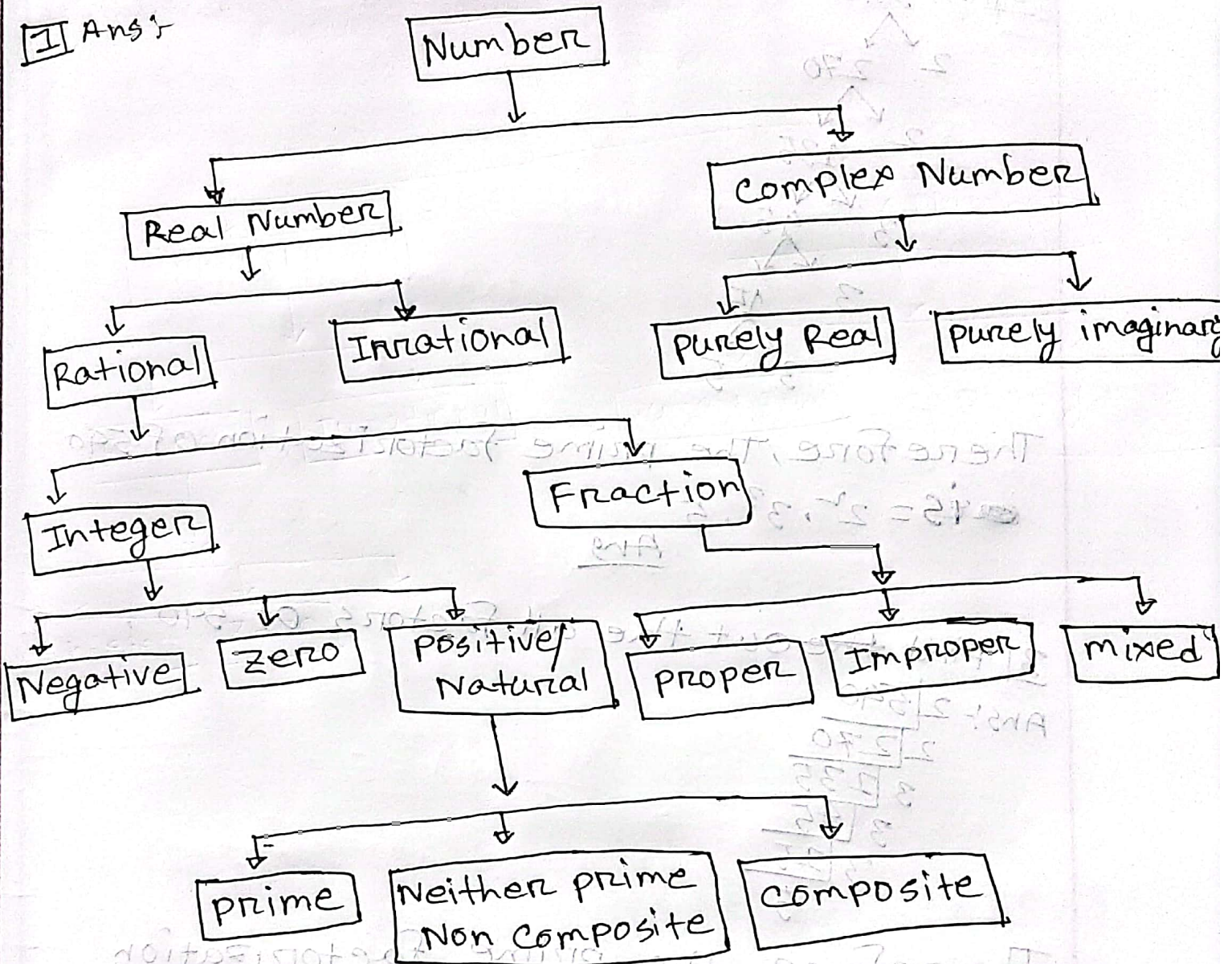


Qus: write down the classification of number system

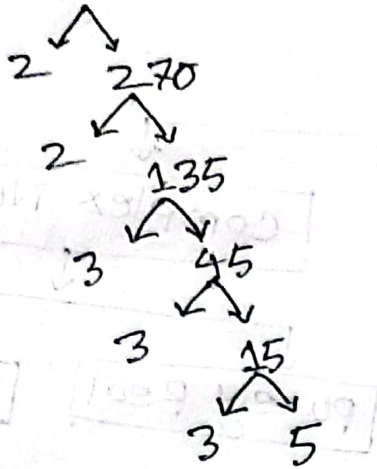
[I] Ans:





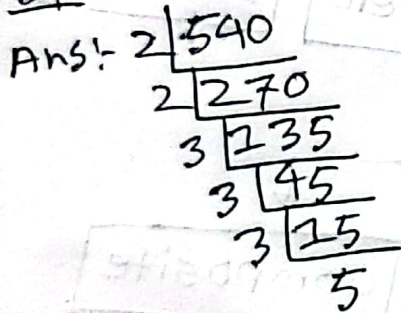
Ques: Find the prime factorization of 540 using tree

2) Ans: 540



Therefore, the prime factorization of 540 is  $= 2^2 \cdot 3^3 \cdot 5$   
Ans

3) Find out the all factors of 540.



Therefore, the prime factorization of 540 is  $= 2^2 \cdot 3^3 \cdot 5$

So, the total number of factors of

$$540 \text{ is } = (2+1)(3+1)(1+1)$$

$$= 3 \cdot 4 \cdot 2$$

$$= 24$$

Calculation for all factors, ~~it is 540~~

$$\begin{aligned}540 &= 1 \times 540 \\ &= 2 \times 270 \\ &= 3 \times 180 \\ &= 4 \times 135 \\ &= 5 \times 108 \\ &= 6 \times 90 \\ &= 9 \times 60 \\ &= 10 \times 54 \\ &= 12 \times 45 \\ &= 15 \times 36 \\ &= 18 \times 30 \\ &= 20 \times 27\end{aligned}$$

The factors of 540 are -

1, 2, 3, 4, 5, 6, 9, 10, 12, 15, 18, 20, 27, 30, 36,  
45, 54, 60, 90, 108, 135, 180, 270, 540

B



4] What is the GCD and LCM of 240 and 540.

Ans:-

$$240 = 2 \times 120 = 2 \times 2 \times 60 = 2^2 \times 2 \times 30 = 2^3 \times 2 \times 15 = 2^4 \times 3 \times 5$$

$$540 = 2 \times 270 = 2 \times 2 \times 135 = 2^2 \times 3 \times 45 = 2^2 \times 3 \times 3 \times 15 \\ = 2^2 \times 3^3 \times 5 \\ = 2^2 \times 3^3 \times 5$$

$$\therefore \text{LCM}(240, 540) = 2^4 \cdot 3^3 \cdot 5 = 2160$$

$$\text{and HCF}(240, 540) = 2^2 \cdot 3 \cdot 5 = 60$$

GCD

5] Find the H.C.F and L.C.M of 42, 63, and 140

Ans:-

$$42 = 2 \times 21 = 2 \times 3 \times 7$$

$$63 = 3 \times 21 = 3 \times 3 \times 7 = 3^2 \times 7$$

$$140 = 2 \times 70 = 2 \times 2 \times 35 = 2^2 \times 5 \times 7$$

$$\therefore \text{LCM}(42, 63, 140) = 2^2 \times 3^2 \times 5 \times 7 = 1260$$

$$\therefore \text{HCF}(42, 63, 140) = 2 \times 7 = 14$$

Q Find the H.C.F and L.C.M of  $\frac{2}{3}$ ,  $\frac{8}{9}$ ,  $\frac{16}{81}$  and  $\frac{10}{27}$

Ans:-

Calculation for Numerators.

$$2 = 2^1$$

$$8 = 2^3$$

$$16 = 2^4$$

$$10 = 2^1 \times 5^1$$

$$\text{L.C.M}(2, 8, 16, 10) = 2^4 \times 5 = 80$$

$$\text{H.C.F}(2, 8, 16, 10) = 2$$

Calculation for Denominators

$$3 = 3^1$$

$$9 = 3^2$$

$$81 = 3^4$$

$$27 = 3^3$$

$$\text{L.C.M}(3, 9, 81, 27) = 3^4$$

$$\text{H.C.F}(3, 9, 81, 27) = 3$$

$$\therefore \text{H.C.F of } \frac{2}{3}, \frac{8}{9}, \frac{16}{81} \text{ and } \frac{10}{27} = \frac{\text{H.C.F}(2, 8, 16, 10)}{\text{L.C.M}(3, 9, 81, 27)} = \frac{2}{81}$$

$$\therefore \text{L.C.M of } \frac{2}{3}, \frac{8}{9}, \frac{16}{81} \text{ and } \frac{10}{27} = \frac{\text{L.C.M}(2, 8, 16, 10)}{\text{H.C.F}(3, 9, 81, 27)} = \frac{80}{3}$$



7. Find the modulus and Argument of  $z = \frac{1+\sqrt{3}i}{1-\sqrt{3}i}$  and also its polar, exponential form.

Ans:-

We have,

$$\begin{aligned} & \frac{1+\sqrt{3}i}{1-\sqrt{3}i} \\ &= \frac{(1+\sqrt{3}i)(1+\sqrt{3}i)}{(1-\sqrt{3}i)(1+\sqrt{3}i)} \\ &= \frac{1+\sqrt{3}i+\sqrt{3}i+2\sqrt{3}i}{1-(\sqrt{3}i)^2} \\ &= \frac{1+2\sqrt{3}i-3}{1+(\sqrt{3}i)^2} \\ &= \frac{-2+2\sqrt{3}i}{2+3} \\ &= \frac{2(-1+\sqrt{3}i)}{5} \\ &= \frac{-1+\sqrt{3}i}{2} \\ &= -\frac{1}{2} + \frac{\sqrt{3}}{2}i \end{aligned}$$

Polar Form  $= -\frac{1}{2} + \frac{\sqrt{3}}{2}i$

Exponential Form is  $z = re^{i\theta}$

$$\begin{aligned} &= 1 \cdot e^{i\frac{2\pi}{3}} \\ &= e^{i\frac{2\pi}{3}} \end{aligned}$$

Let,  $z = -\frac{1}{2} + \frac{\sqrt{3}}{2}i$

$$|z| = \sqrt{\left(-\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2}$$

$$r = \sqrt{\frac{1}{4} + \frac{3}{4}}$$

$$r = \sqrt{\frac{4}{4}} = 1$$

∴ modulus of  $z$  will

$$\theta = \pi - \tan^{-1} \left| \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} \right|$$

$$\begin{aligned} &= \pi - \tan^{-1}(\sqrt{3}) = \pi - \frac{\pi}{3} \\ &= \frac{2\pi}{3} \end{aligned}$$

8] Evaluate  $\sqrt{-16} \times \sqrt{-4}$  and  $\frac{\sqrt{-16}}{\sqrt{-4}}$

Ans

We have,  $\sqrt{-16} \times \sqrt{-4}$

$$\begin{aligned} &= \sqrt{16i} \times \sqrt{4i} \\ &= \sqrt{16}i \times \sqrt{4}i \\ &= 4i \times 2i \\ &= 8i^2 \\ &= -8 \end{aligned}$$

Now  $\frac{\sqrt{-16}}{\sqrt{-4}} = \frac{-8}{-2} = 4$

$$\text{and, } \frac{\sqrt{-16}}{\sqrt{-4}} = \frac{4i}{2i}$$

$$= \frac{4i}{2i} = 2$$

Ans

9] Evaluate modulus and argument of

$8z - z^2$  by replacing  $z = 2+i$

Ans:-

We have  $z = 2+i$

$$\therefore 8z - z^2 = 8(2+i) - (2+i)^2$$

$$= 16 + 8i - (4 + 4i + i^2)$$

$$= 16 + 8i - 4 - 4i + 1$$

$$= 13 + 4i$$



$$\begin{aligned} \text{modulus } r &= \sqrt{(13)^2 + (4)^2} \\ &= \sqrt{169 + 16} \\ &= \sqrt{185} \end{aligned}$$

$$\begin{aligned} \text{Argument } \theta &= \tan^{-1} \frac{4}{13} \\ &= 17.102 \end{aligned}$$

20] Express  $1 + i\sqrt{3}$  in the form of  $r(\cos\theta + i\sin\theta)$

Ans:-

$$\begin{aligned} \text{Let, } z &= 1 + i\sqrt{3} \quad z = x + iy \quad |z| = \sqrt{x^2 + y^2} \\ & \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \theta = \tan^{-1} \left| \frac{y}{x} \right| \end{aligned}$$

$$\begin{aligned} \therefore \text{ modulus of } z &= \sqrt{(1)^2 + (\sqrt{3})^2} \\ &= \sqrt{1+3} \\ &= 2 \end{aligned}$$

$$\therefore r = 2$$

$$\begin{aligned} \text{Argument of } z &= \tan^{-1} \left( \frac{y}{x} \right) \\ &= \tan^{-1} \left( \frac{\sqrt{3}}{1} \right) \\ &= \tan^{-1} \cdot \tan \frac{\pi}{3} \\ &= \frac{\pi}{3} \end{aligned}$$

Therefore,  $r(\cos\theta + i\sin\theta)$  form is

$$= 2 \left( \cos \frac{\pi}{3} + i \sin \frac{\pi}{3} \right)$$