

Sankalp 2022 (NDA I): Complete Course on Maths



## COMPLEX NUMBERS-1

$$\left[ \frac{n^2 + 1 - 0}{1 - 0} \right]$$





Note:  $1\sqrt{ab} = \sqrt{a} \times \sqrt{b}$ 

only if either of a or b is positive or 0 . केवल यदि a और b धनात्मक और शून्य हो

Q 1. If both a& b are negative (यदि a और b ऋणात्मक हो तो ) then,  $\sqrt{a} imes \sqrt{b} = ?$ 

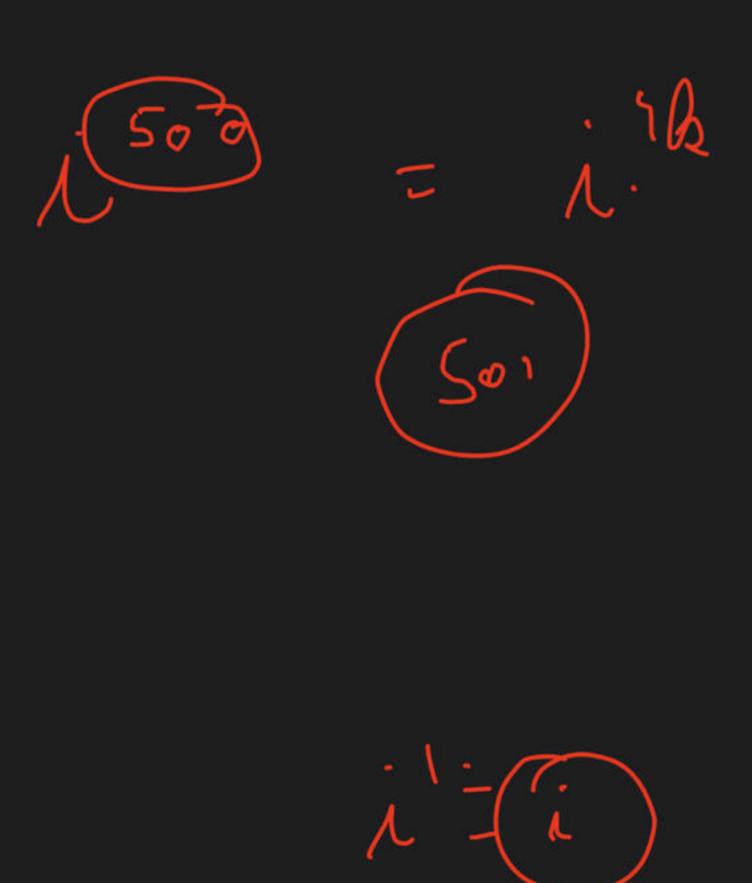
- (a)  $\sqrt{ab}$
- (b)  $\sqrt{ab}$
- (c)  $\pm \sqrt{ab}$
- (d) N.O.T.

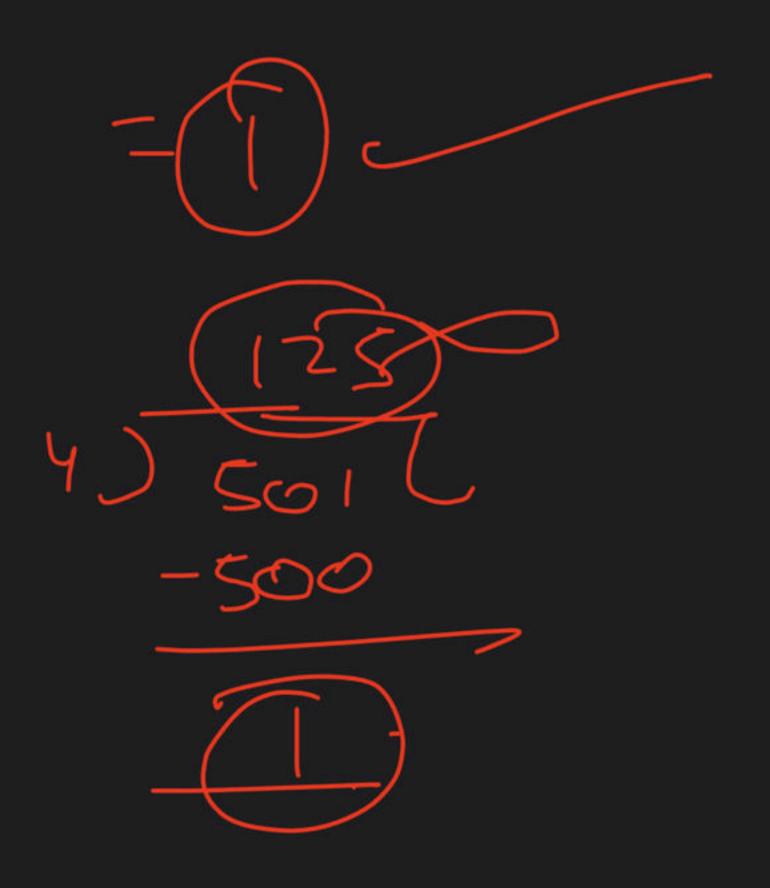
Ja X Mr = Val

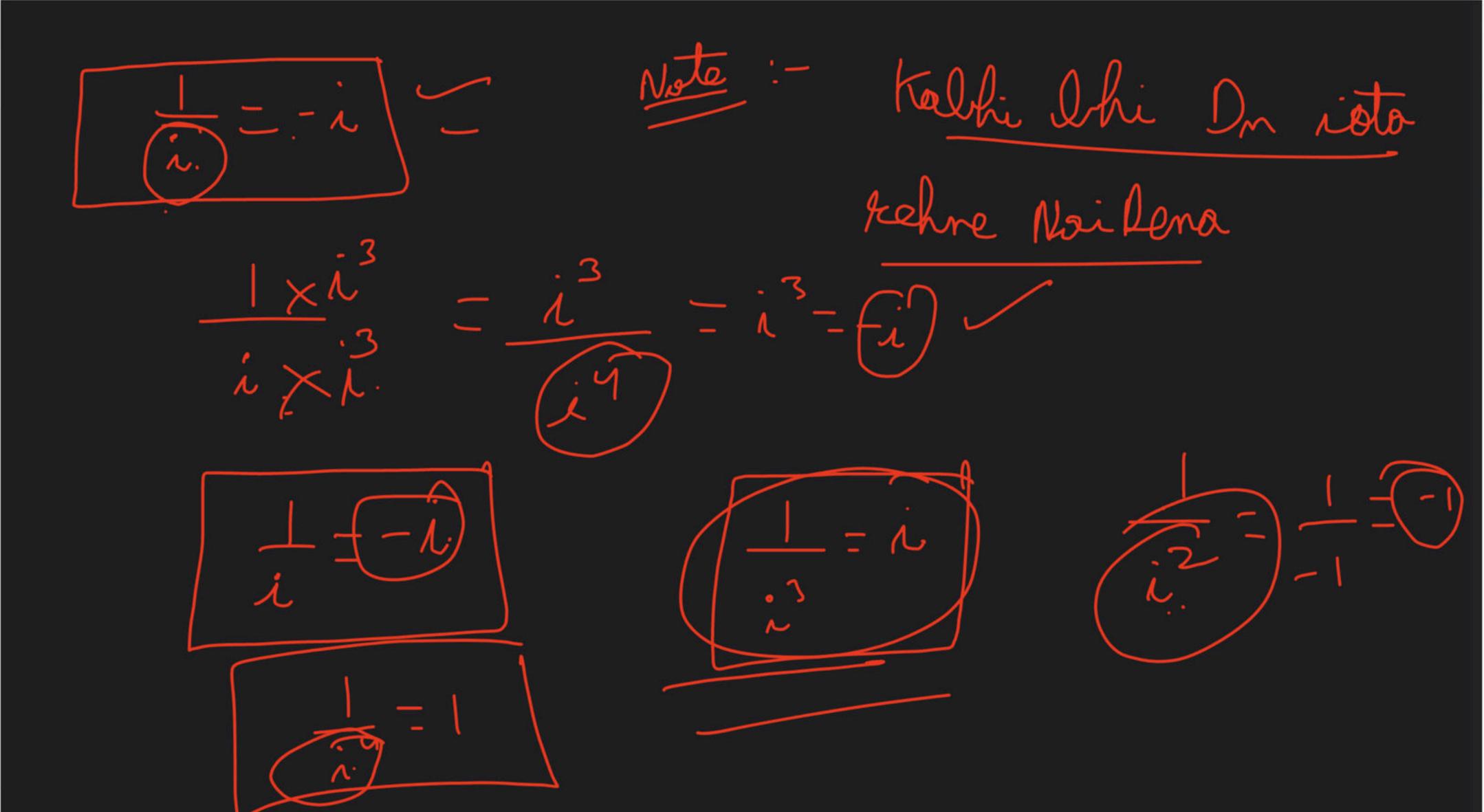
a = -1 0 = -5

270 in : Vi-!
2-30 in : Vi-!
Value

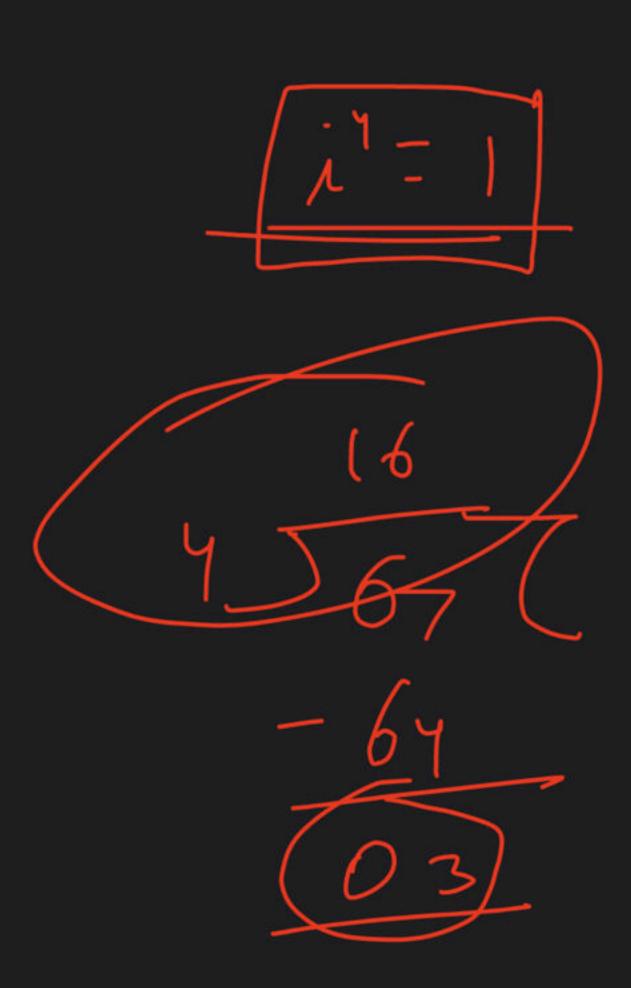
$$\frac{1}{100} = \frac{1}{100} = \frac{1}$$







$$\frac{1}{i^{2}} + \frac{1}{i^{3}} + \frac{1}{i^{3}}$$



## Properties of IOTA

1. Sum of 4 consecutive power of i = 0.

$$i^n + i^{n+1} + i^{n+2} + i^{n+3} = 0$$

Or

$$i^{4n} + i^{4n+1} + i^{4n+2} + i^{4n+3} = 0$$

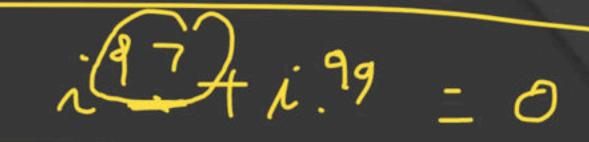
## Properties of IOTA

1. Sum of 2 consecutive even or odd power of i = 0.

$$\mathbf{i^n} + \mathbf{i^{n+2}} = \mathbf{0}$$

Or

$$i^{n+1} + i^{n+3} = 0$$



Q2. 
$$i^{500} + i^{501} + i^{502} + i^{503} =$$
Q3.  $i^{100} + i^{102} + i^{104} + i^{106} =$ 
Q4.  $i^{115} + i^{117} =$ 

Harry.

Q. 
$$6\sum_{n=1}^{25} (i^n + i^{n+1}) = ?$$
(a)  $i - 1$ 
(b)  $i + 1$ 
(c)  $1 + i$ 
(d)  $-1 - i$ 



Q. 
$$\sum_{n=1}^{30} {i^n + i^{n+1} } = ?$$
  
(a) 0 (b) 1  
(c) 2 (d) 1 + i

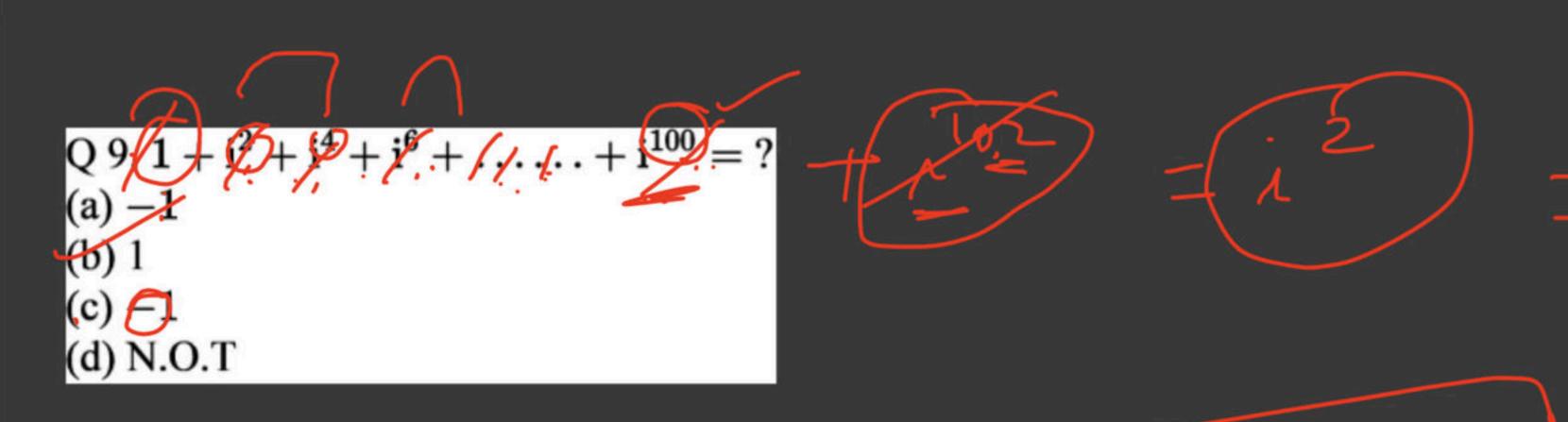
$$\frac{30}{2}$$
 in  $(1+i)$   $\Rightarrow$   $(1+i)$   $\frac{30}{2}$   $\frac{1}{2}$   $\frac{1}{2}$ 

$$(1+i)(i^{29}+i^{30})$$
  
 $(1+i)(i+i^{29})$   
 $(1+i)(i+i^{29})$   
 $(1+i)(i-1)$   
 $(2+1)(i-1)$   
 $(2+1)(i-1)$ 

Q. 
$$8\sum_{n=4}^{16} (i^n + i^{n+3}) = 3$$
  
(a)  $1 - i$   
(b) 0  
(c) 1  
(d) N.O.T

$$\sum_{i=1}^{16} (i^{n} + i^{n+3}) = ?$$

$$\sum_{i=1}^{16} (i^{n} + i^{n} + i^$$

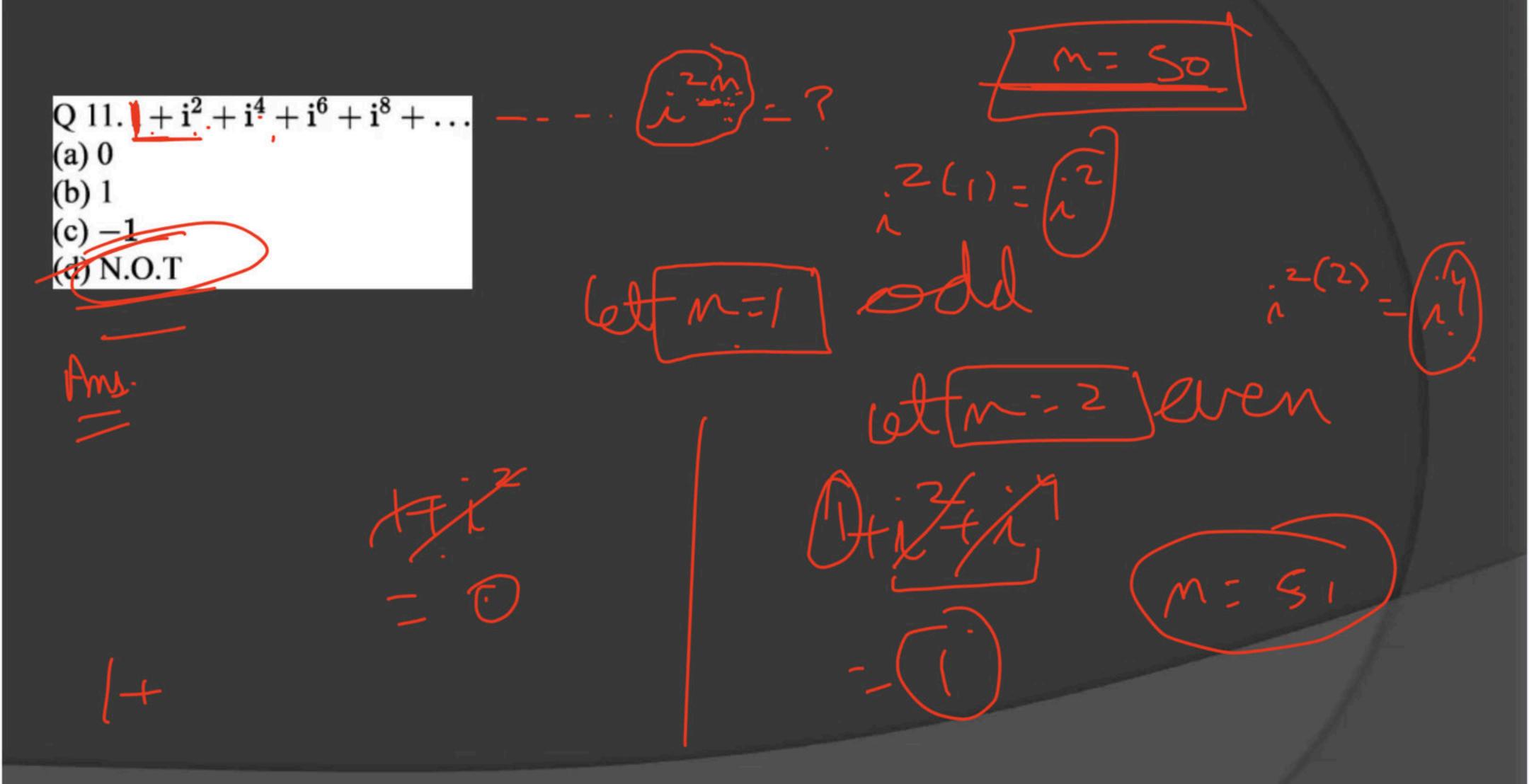


Q 10. 
$$+i^{2}+i^{4}+i^{6}+i^{8}+...$$
 2n items =?  
(a) 0  
(b) 1  
(c) -1  
(d) N.O.T

$$\frac{2(1)}{2} = 2 \text{ items}$$

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$$\frac{1}{2} = 2 \text{ items}$$



Some important values

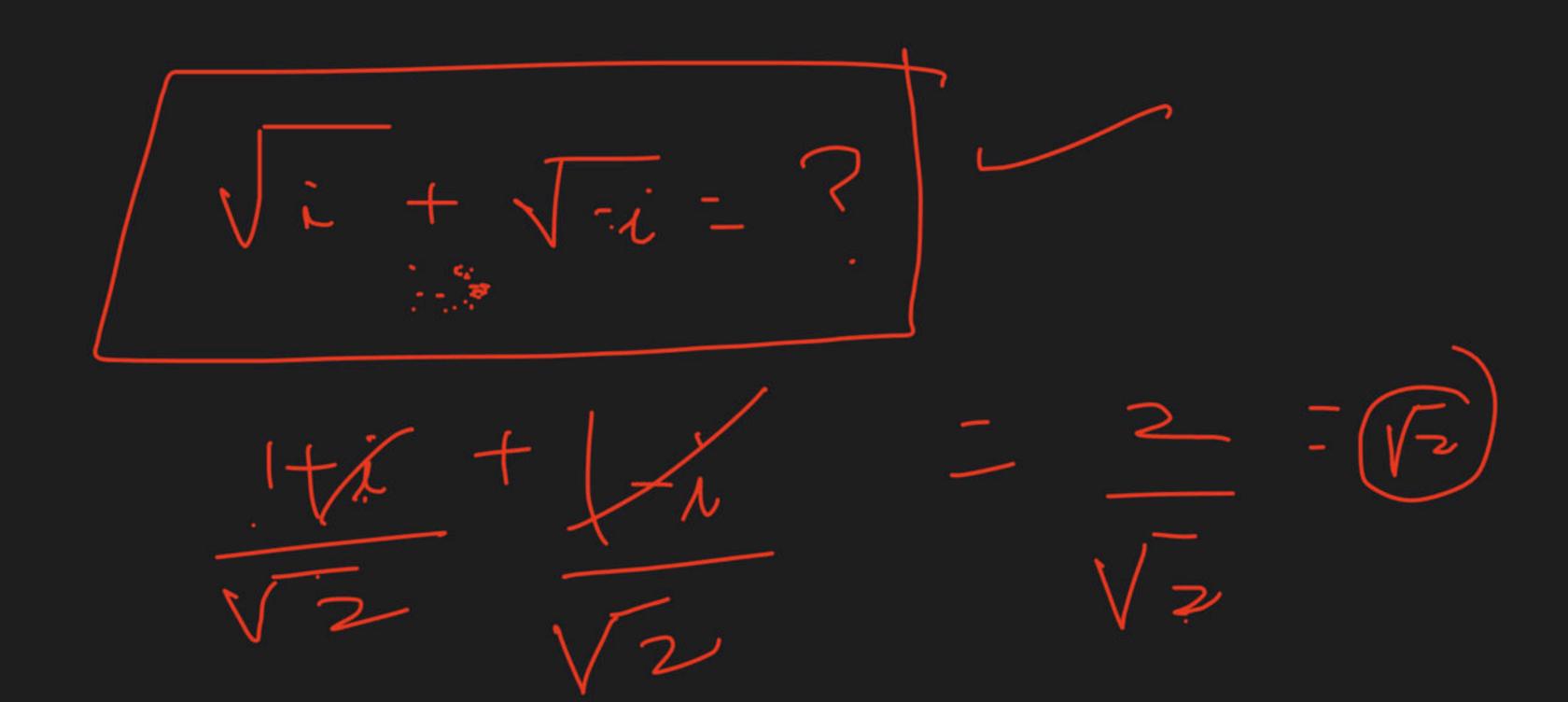
$$1. \quad (1+i)^2 = 2i$$

$$(1-i)^2 = -2i$$

3. 
$$\sqrt{i} = \pm \left(\frac{1+i}{\sqrt{2}}\right)$$

$$4. \quad \sqrt{-i} = \pm \left(\frac{1-i}{\sqrt{2}}\right)$$

$$(1-i)^2 - -2i$$



5. 
$$i^{\frac{1}{3}} = \frac{\sqrt{3} + i}{2} \Rightarrow \sqrt{3} + i = 2i^{\frac{1}{3}}$$

6. 
$$i^{-\frac{1}{3}} = \frac{\sqrt{3} - i}{2} \Rightarrow \sqrt{3} - i = 2i^{-\frac{1}{3}}$$

7. 
$$\frac{1+i}{1-i} = i & \frac{1-i}{1+i} = -i$$

8. 
$$\frac{\sqrt{3}+i}{\sqrt{3}-i}=i^3, \frac{\sqrt{3}-i}{\sqrt{3}+i}=i^{-3}$$

$$(1+i\lambda)(1+i)=(1+i)^{2}$$
  
 $(1-i\lambda)(1+i)=(1+i)^{2}$ 

$$i^{-1/3} = \sqrt{3-i}$$
 $\sqrt{3} - i = 2i^{-1/3}$ 

Q 12. 
$$z = \frac{1+2i}{1-(1-i)^2}$$
  
then, and  $z = ?$   
(a) 0  
(b) 1  
(c) 1 + i

(d) 1 - i

$$\frac{V) A P. Y. Q}{Z = 1 + 2i} = \frac{1 + 2i}{1 - (-2i)^{2}} = \frac{1 + 2i}{1 - (-2i)^{2}} = 0$$

$$Z = \frac{1 + 2i}{1 - (-2i)^{2}} = \frac{1 + 2i}{1 - (-2i)^{2}} = 0$$

Q 13. 
$$(1+i)^6 + (1-i)^6 = ?$$
(a) 16i
(b)  $-16i$ 
(c) 0
(d) N.O.T

$$(1+i)^{2} + (1-i)^{3}$$

$$(2i)^{3} + (-2i)^{3}$$

$$(3i)^{3} + (-2i)^{3}$$

$$(3i)^{3} + (-2i)^{3}$$

$$\frac{\left(1+i\right)^{2}}{\left(1+i\right)^{2}} + \left((1-i)^{2}\right)^{3} + \left(-2i\right)^{3} + \left(-2i$$

Q 14. 
$$\frac{(1+i)^{4n+2}}{(1-i)^{4n+1}} = ?$$
(a) 1 + i
(b) 1 - i
(c) -1 + i
(d) -1 - i

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

$$= 2i((+i) = 2i(+i)$$

$$= 2i((+i) = 2i(+i)$$

$$= 2i((+i)$$

$$= 2i((+i)$$

Q 15.  $z=\left(rac{1+i}{1-i}
ight)^n$ , for what minimum value of n, z is purely real n के किस न्यनूतम मान के लिए z वास्तविक होगा?

- (a) 1 (b) 2 (c) 4 (d) 8



Q 16. 
$$\left(\frac{\sqrt{3}+i}{2}\right)^{24} + \left(\frac{\sqrt{3}-i}{2}\right)^{24} = ?$$
(a) -1
(b) 2
(c) 1
(d) -2

Q 16. 
$$(1+i)^7 + (1-i)^7 = ?$$
(a) 16
(b) -16
(c) 0
(d) N.O.T

$$(1+i)^{2}+(1-i)^{7}$$

$$((1+i)^{2})^{3}(1-i)$$

$$(1+i)^{2})^{3}(1-i)$$

$$8i^{3}(1-i)+(-8i^{3})(1-i)$$

$$-8i(1+i)+(-8i^{3})(1-i)$$

$$8i(-1-i)$$

$$8i(-1-i)$$

$$8i(-2i)=-16i^{2}=-16(-i)$$

Q 18.  $\left(\frac{\sqrt{3+i}}{\sqrt{3}-i}\right)^6 = ?$ (a) 2
(b) 1
(c) 64
(d) N.O.T

NDAP. 7.0 -- (1) -- (1) Q 19.  $(\sqrt{3} + i)^7 + (\sqrt{3} - i)^7 = ?$ (a)  $128\sqrt{3}$ 

(b)  $-128\sqrt{3}$ 

(c)  $128\sqrt{3}i$ 

(d)  $-128\sqrt{3}i$ 

