

### **Government Polytechnic, Ahmedabad**

#### **Science and Humanities Department**

## **Engineering Mathematics**

Subject Code: 4320002

## **Unit -05 Complex Numbers**

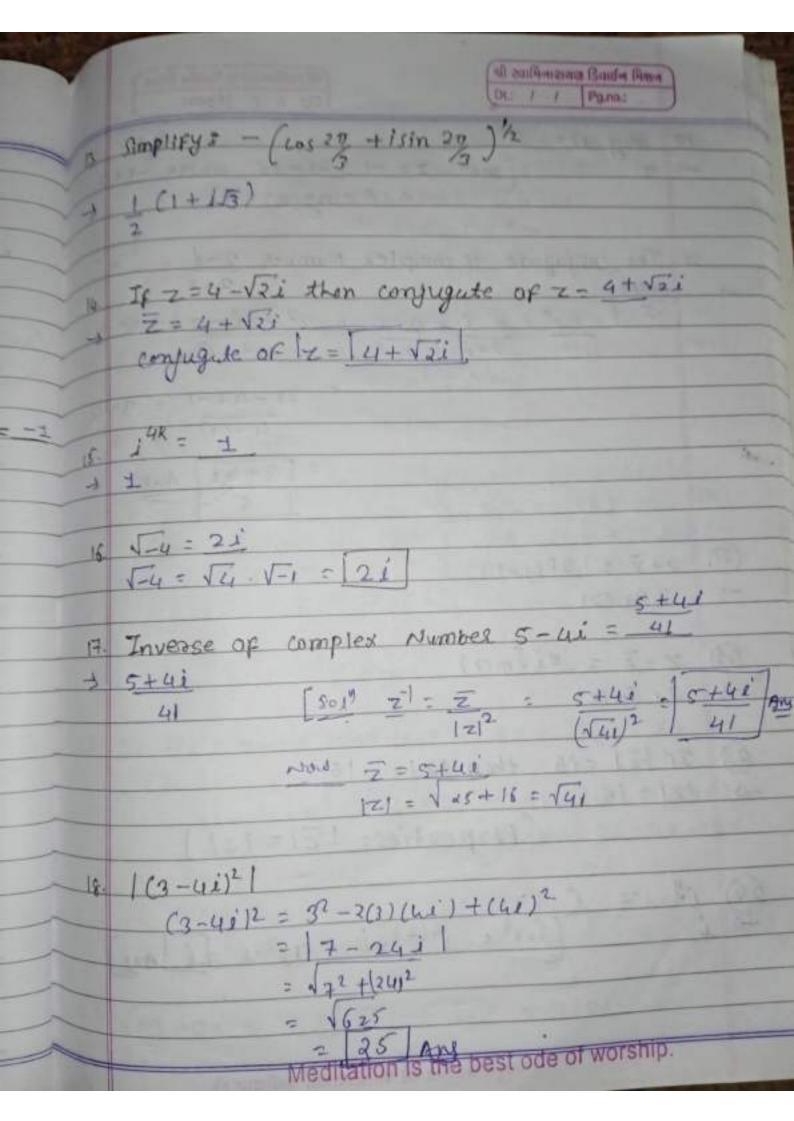
[Marks - 12]

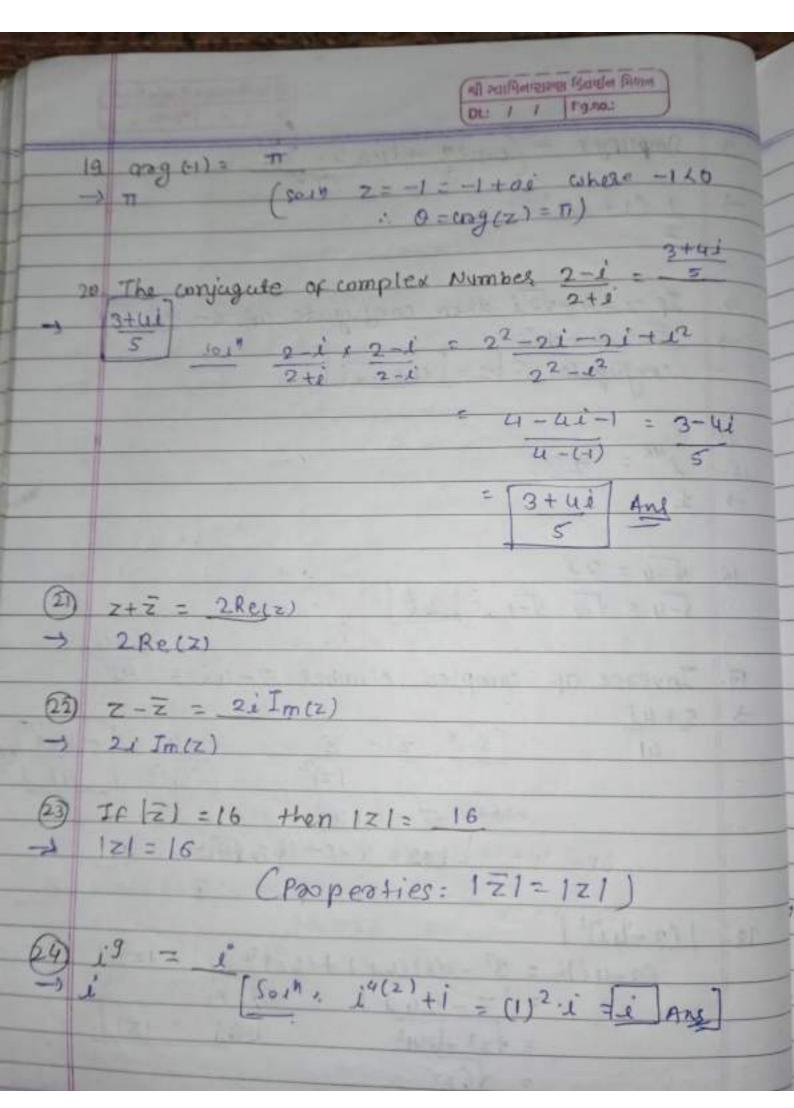
**Course Outcome (CO e):** 

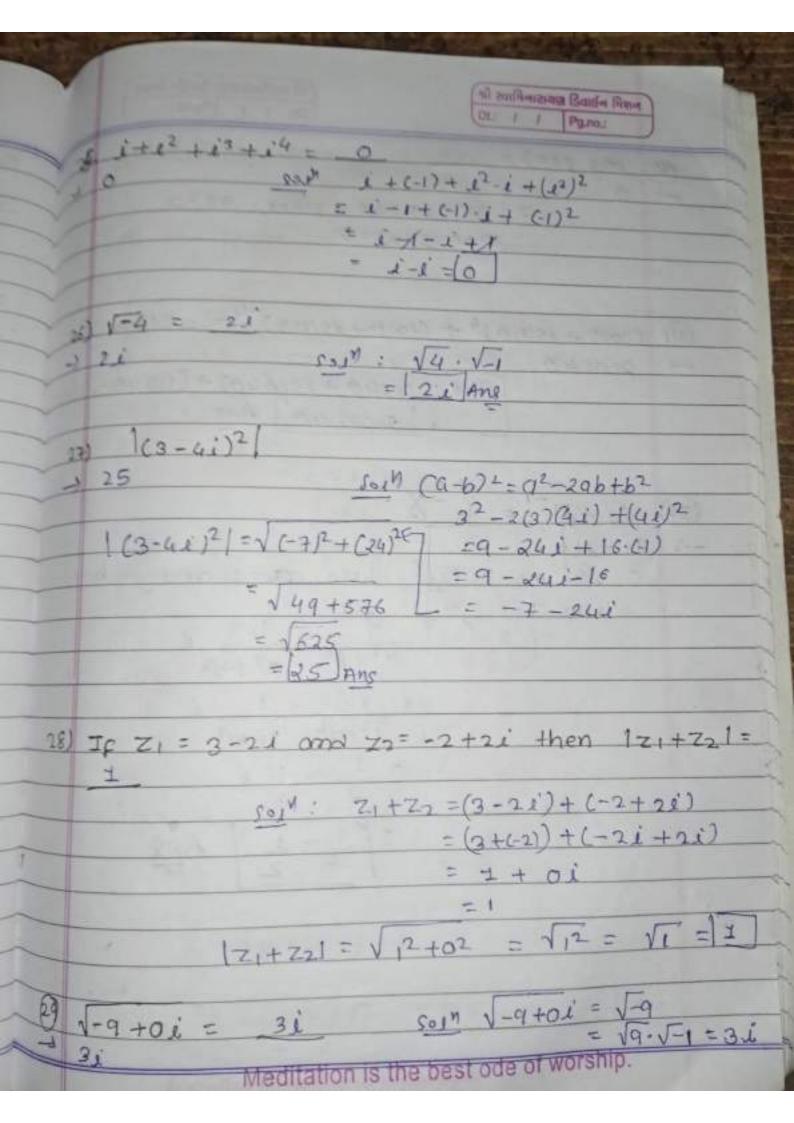
Solve applied problems using the concept of mean.

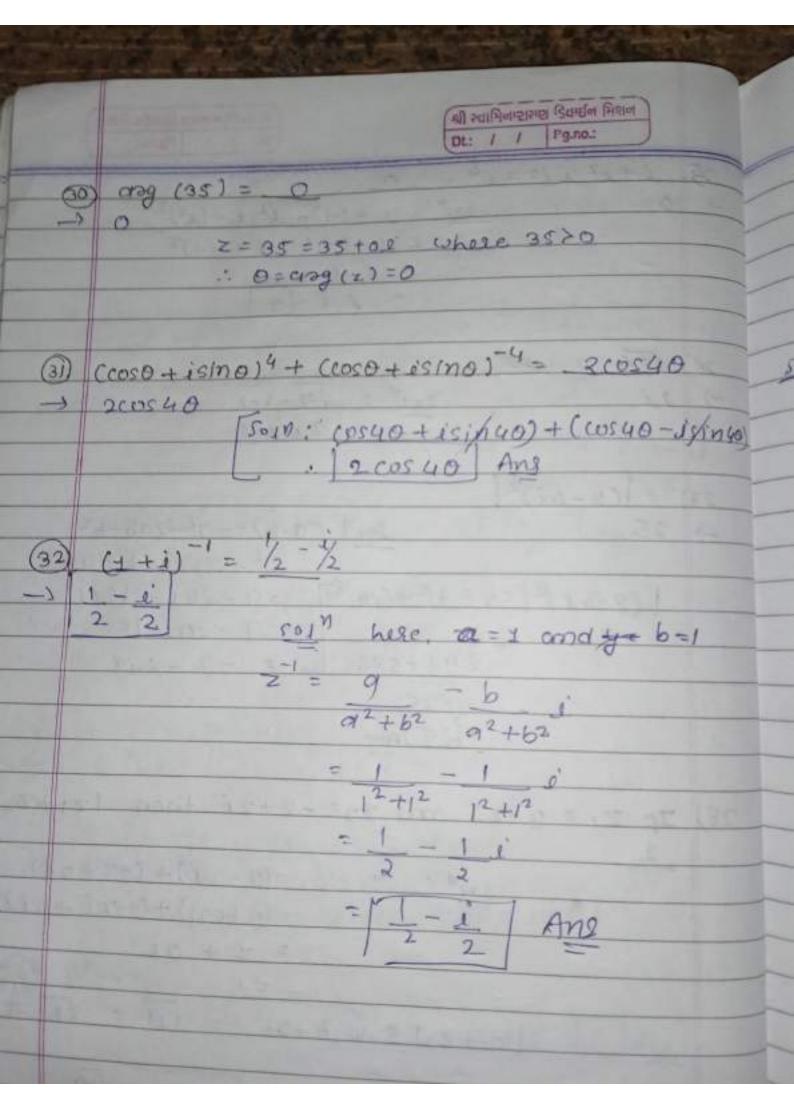
# ell auffentiaa Barie Nee Assignment -5 Unit-5 Complex Number auestion set por al masks: y IF Z=2+3i then Re(z) = 2 Peca 2. If z=2+i3/, then Im(z)=3/2 3. Find complex number having 121=2 and argz=27 -> -1+i5 4. If P= 1 then coso + isino = P coso-isino Coso + isino = P 5. Modulus of Z = (3) - i (4) -> 121 = (3) 2 + (4) 2 - \(\frac{25}{3}\) = \(\frac{1}{3}\) 6. (2+3i)·(3-2i)= 12+si 6+4i+9i-6e2=6+5i-6(+)=6+5i+6=12+5i - 12+5i 7 Z=5-31 then Z = 5+31 $\vec{z} = 5 + 3\vec{i}$ Meditation is the best ode of worship.

8. If Z1=3-1, Z2 = 1+51 then Z1-Z2 71-72= (3-1)(1+51) = (3-1) + (-i-si) = 2 + (+61) 2-61 9. 71-72 = 71-72 10. If (x+iy) - (7+4i) = 3-5i then x= 10, y== Now a + iy = (3-5i) + (7+4i) = (3+7) + (-5i+4i) = 10 -1 . [x = 10] [y = -1] If == \sigma + i + hen |z| = 2 121= N (V3)2 HU2 = ~ 3+1 12 Modulus of 5+2i = 13/5 4+3.0









## + question set for as Meroks:

260)

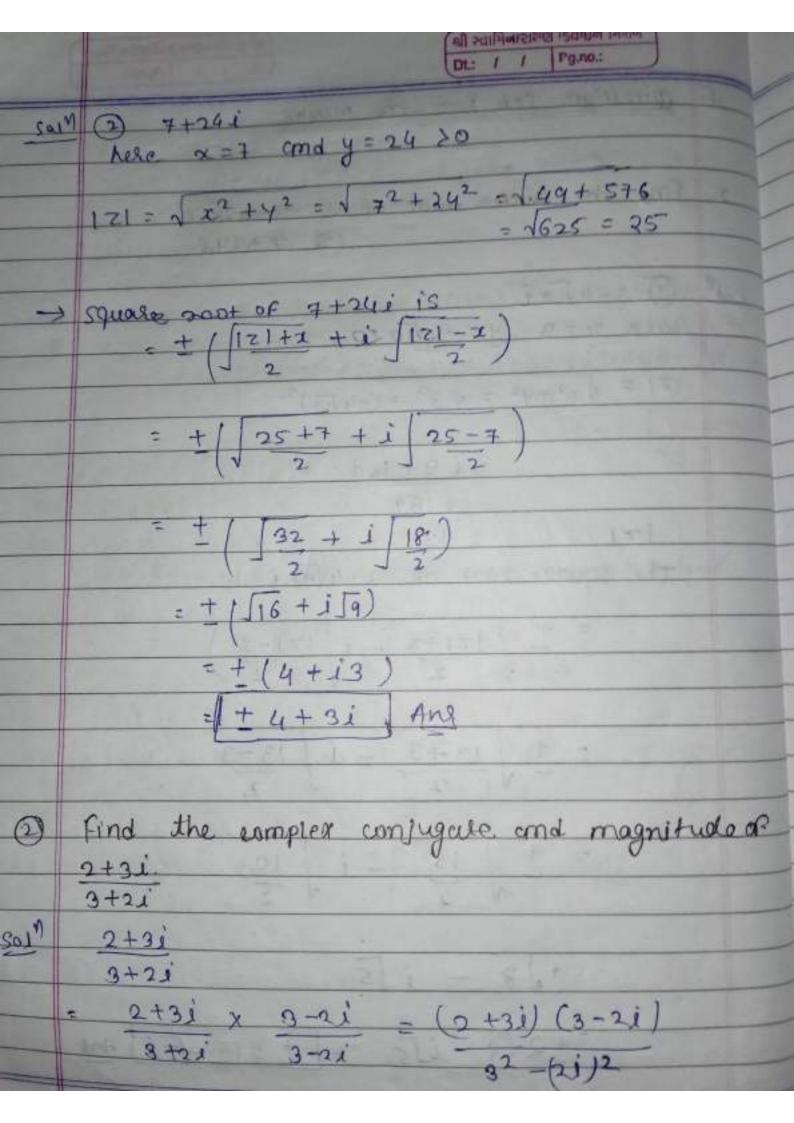
$$|2| = \sqrt{x^2 + y^2} = \sqrt{3^2 + (-4\sqrt{10})^2}$$

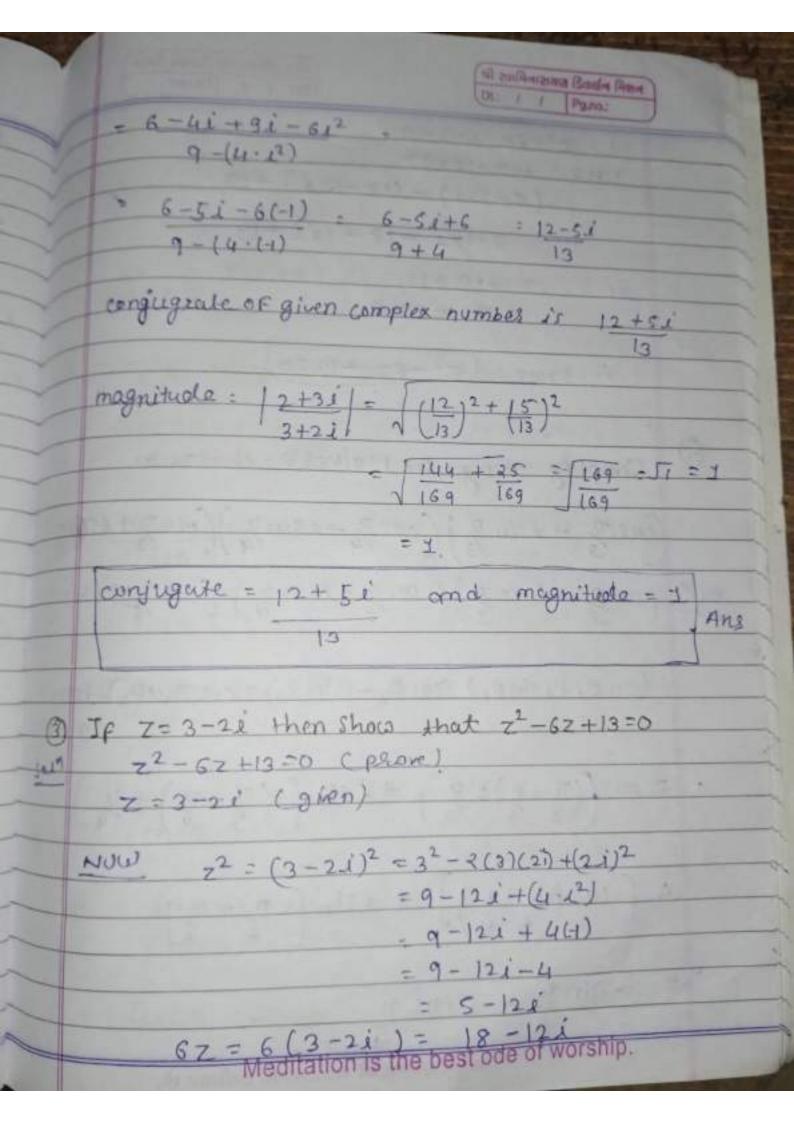
The square root of 3-4VIO is

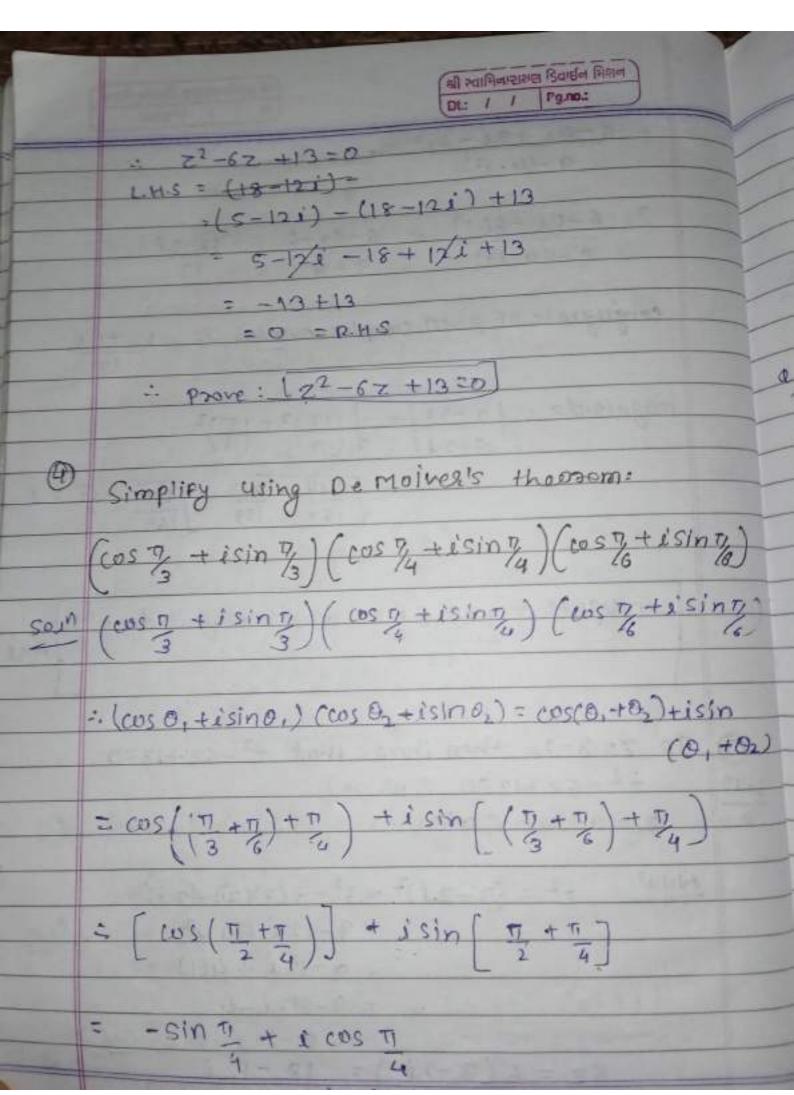
$$= + \int \frac{|z| + x - i \int |z| - x}{2}$$

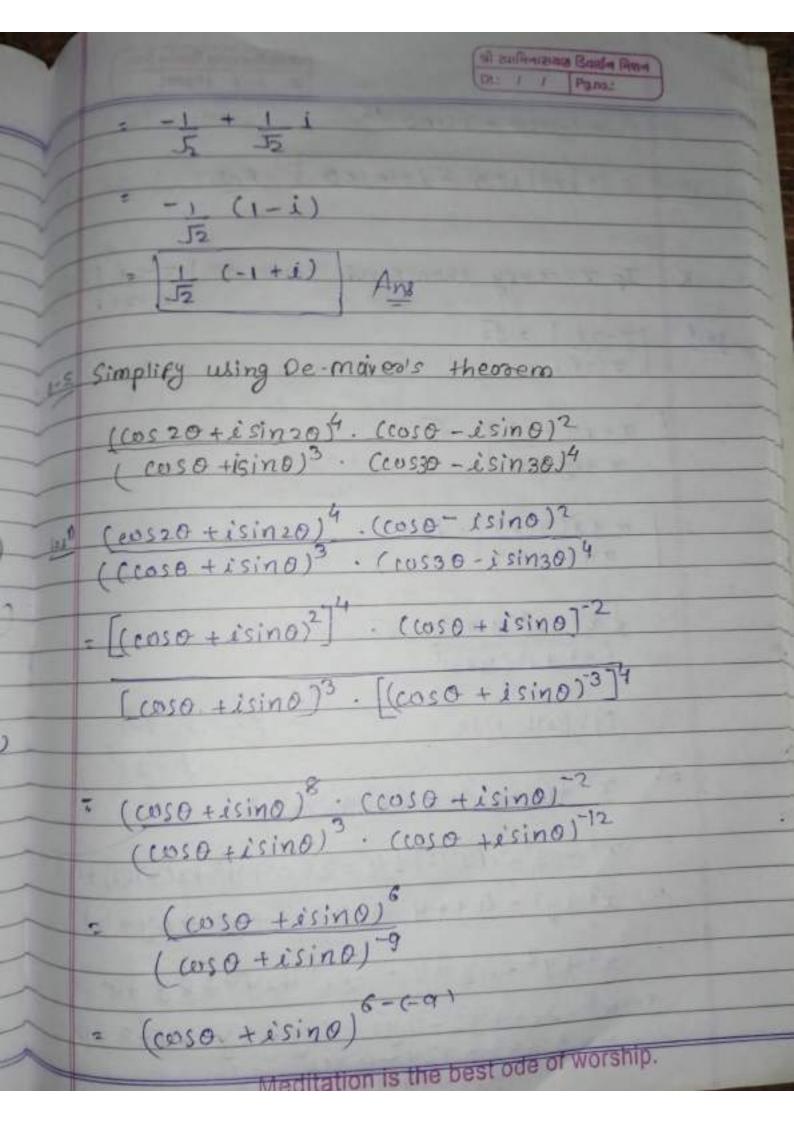
$$= + \left[ \frac{13+3}{2} - i \right] \frac{13-3}{2}$$

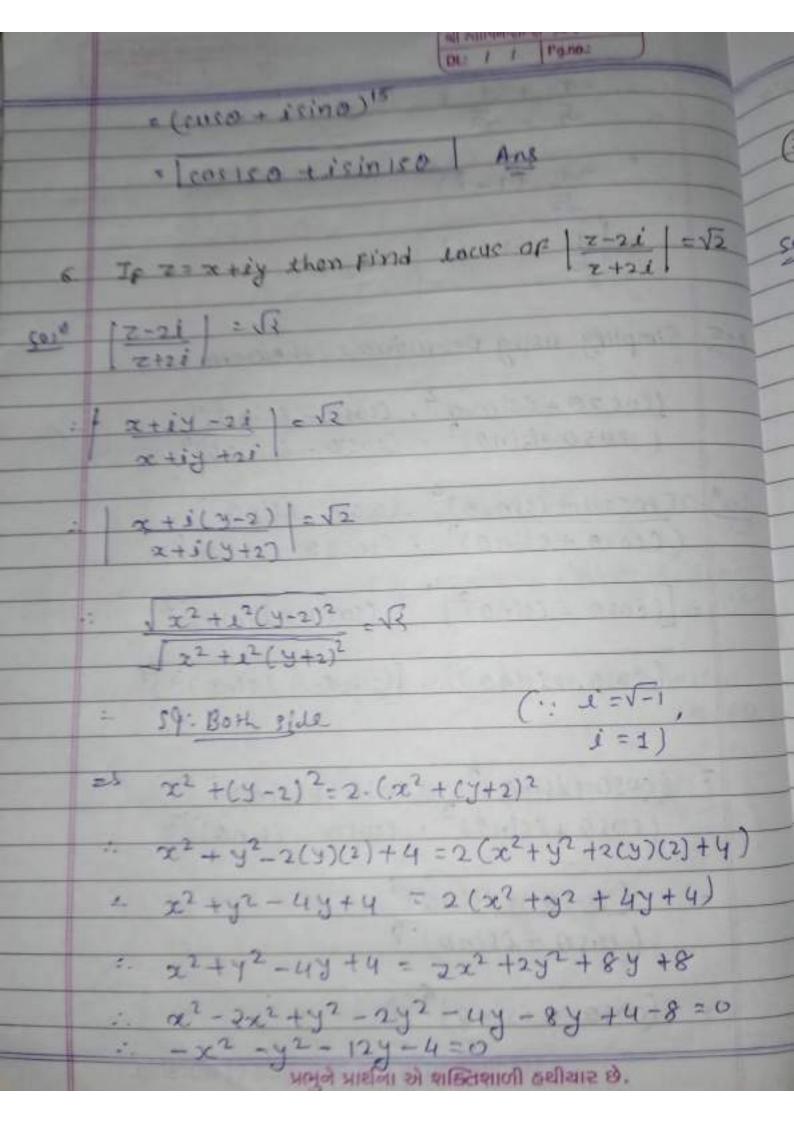
$$= + \int_{2}^{16} -i \int_{2}^{10}$$











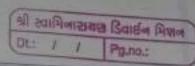
1	ा स्वाधिकारमञ्ज दिवार्धक विभाव Dt.: / / Pg.noi:
	122 + y2 + 12y + 4 = 0   Any
	IF (1+i)2 = x + iy + hen Find the value of
	2+4.
Ce LY	$2+iy=\frac{(1+i)^2}{2-i}=\frac{1^2+2(1)(i)+i^2}{2-i}=\frac{1+2i+i^2}{2-i}=\frac{1+2i-1}{2-i}$
-	
-	$x + iy = 2i \times 2 + i$ $2 - i \times 2 + i$
-	2+3
-	= 7i(2+i)
	$\frac{1}{2^2-4^2}$
1	= 41 + 212
-	4-12
-	
1	$= \frac{4i - 2}{5} = \frac{4i - 2}{5} = \frac{-2 + 4i}{5}$
1	
	x+iy = -2+4i
	5
	= -2 + 4 o
	then $\alpha = -2$ and $y = \frac{4}{5}$

Ans

= -2+4 = 2

· · · >c+y= -2 + 4

위 2대학교·관관 (축대변화 원칙회 Dt: / / Pg.no.: (8) Prove that (\si\mathread) + (\si\mathread) = 2n+1. cos no, no sol (v3+i)n + (v3-i)n = 2n+1. cos my LHS: (13+1)n + (13-1)n = (2.53+2·i)n+(2.53-2·i)n  $= 2^{n} \left( \frac{\sqrt{3}}{2} \cdot \frac{1}{2} \right)^{n} + 2^{n} \left[ \frac{\sqrt{3}}{2} - \frac{1}{2} \cdot \frac{1}{2} \right]^{n}$  $\frac{2^{n}}{\left(\frac{\sqrt{3}+1}{2}\right)^{n}+\left(\frac{\sqrt{3}-1}{2}\right)^{n}}$ = 2n (cos # + isin ] n + (cos Ti - isin Ti) n = 2<sup>n</sup> [ (05 m 0 + isih no) + (05 n to - isih no) = 2n (2cos nt) = 2n+1. cos no Any



Simplify (1-i). (2-i). (3-i) into a+ib form

(1-i)(2-i)(3-i)

=  $(d-i)(3-i)(1-i) \times (1-i)$  (multiply by (1-i) (conjugante)

= [(2-i) (3-i)] (1-i)2 12 -(1)2

= (6-2i-3i+12)(12-2(1)(i)(12))

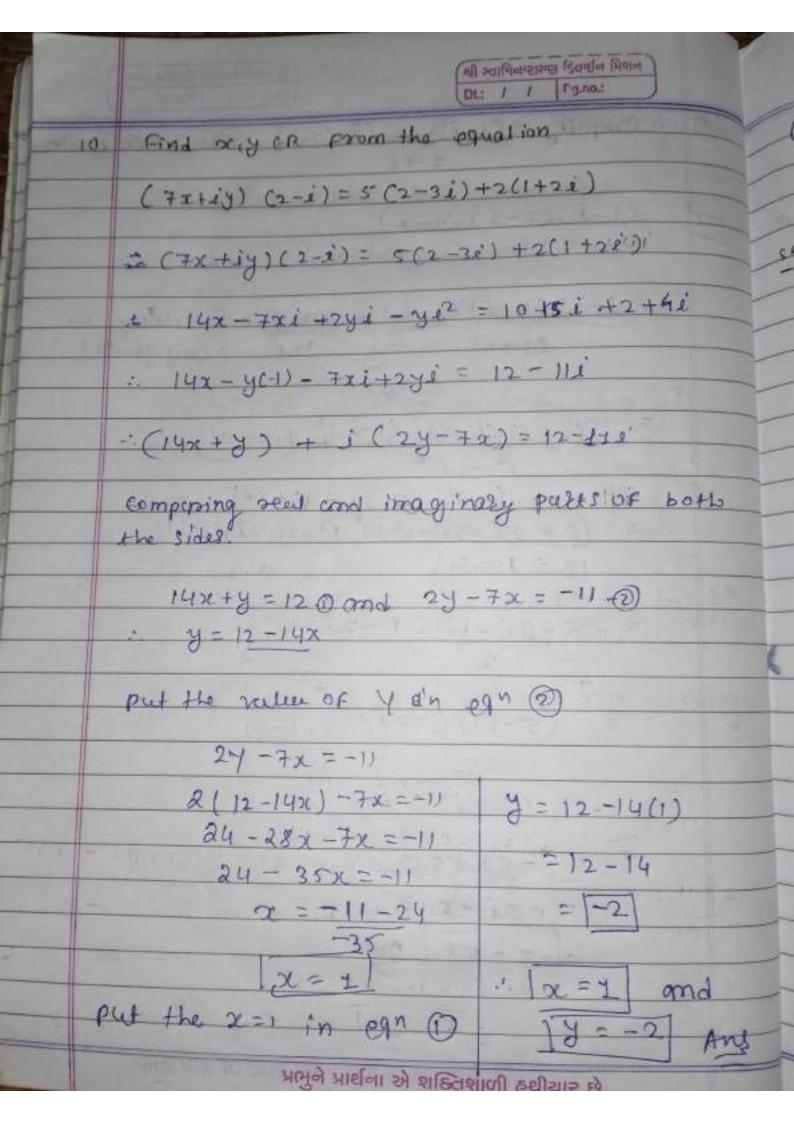
= (6-51-1)(1-21-1)

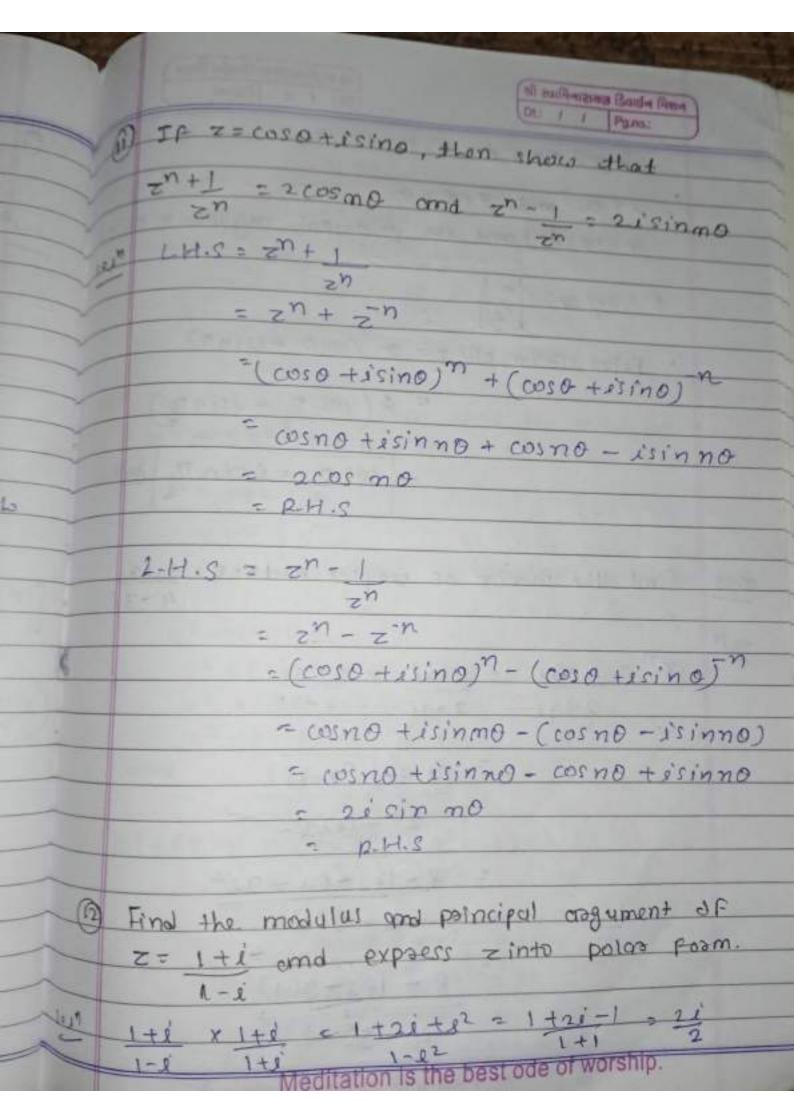
= (5-51)(-21)

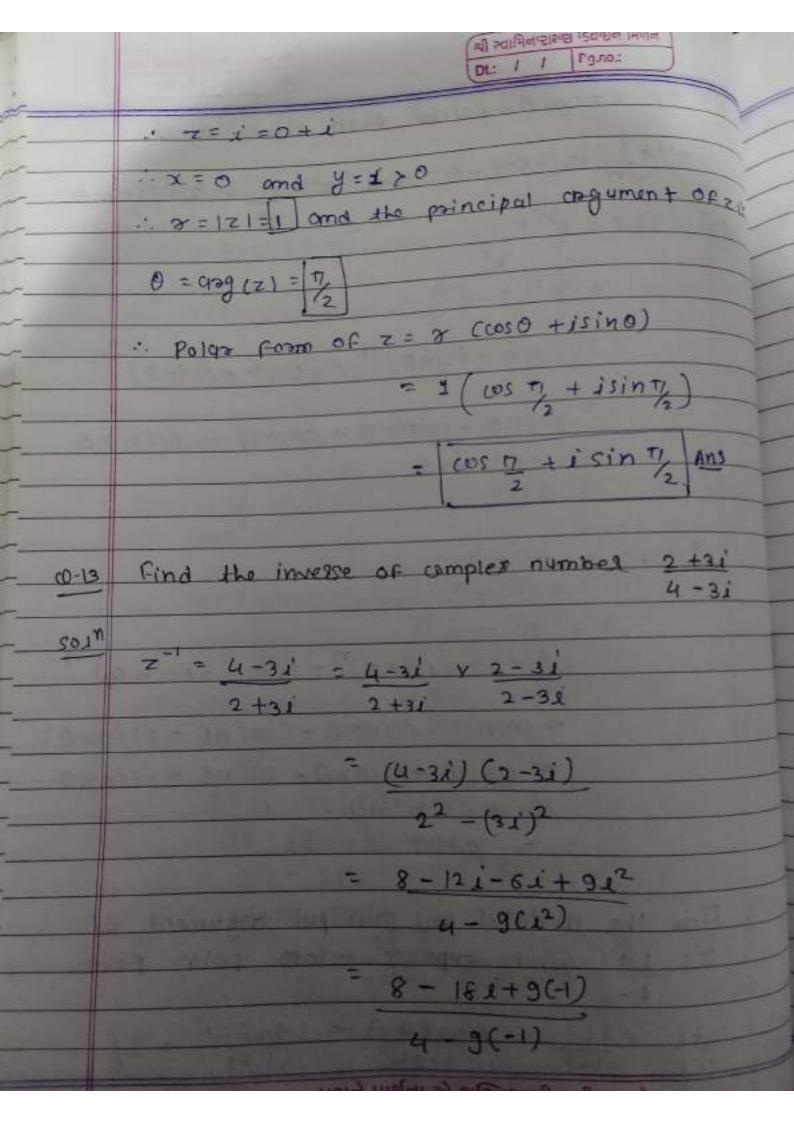
= (5-si) (-i)

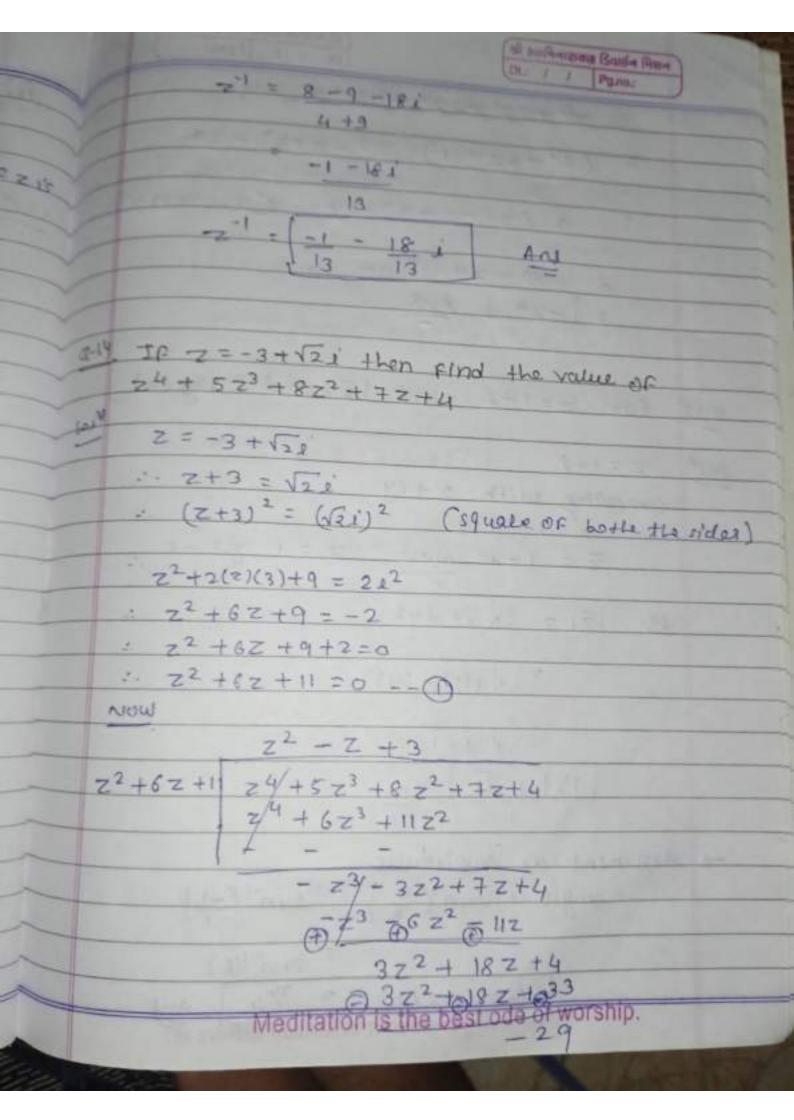
= -51+522

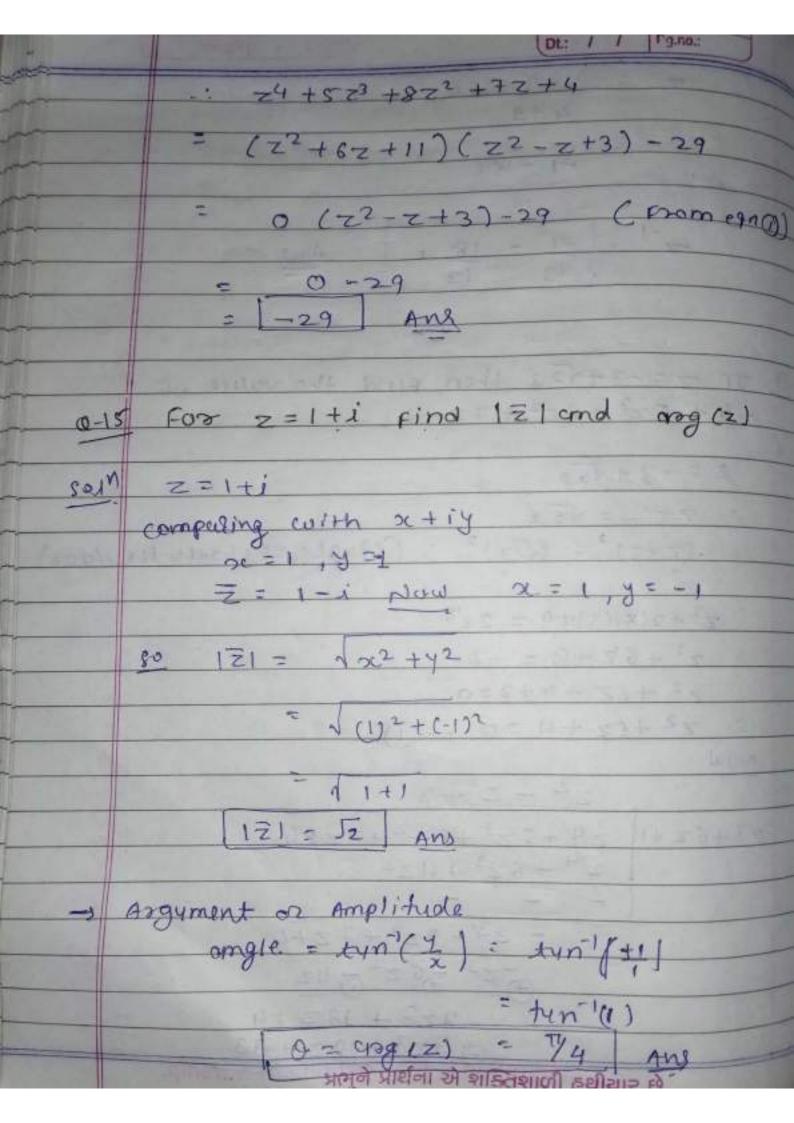
= -5i-5 : -5-5i Any

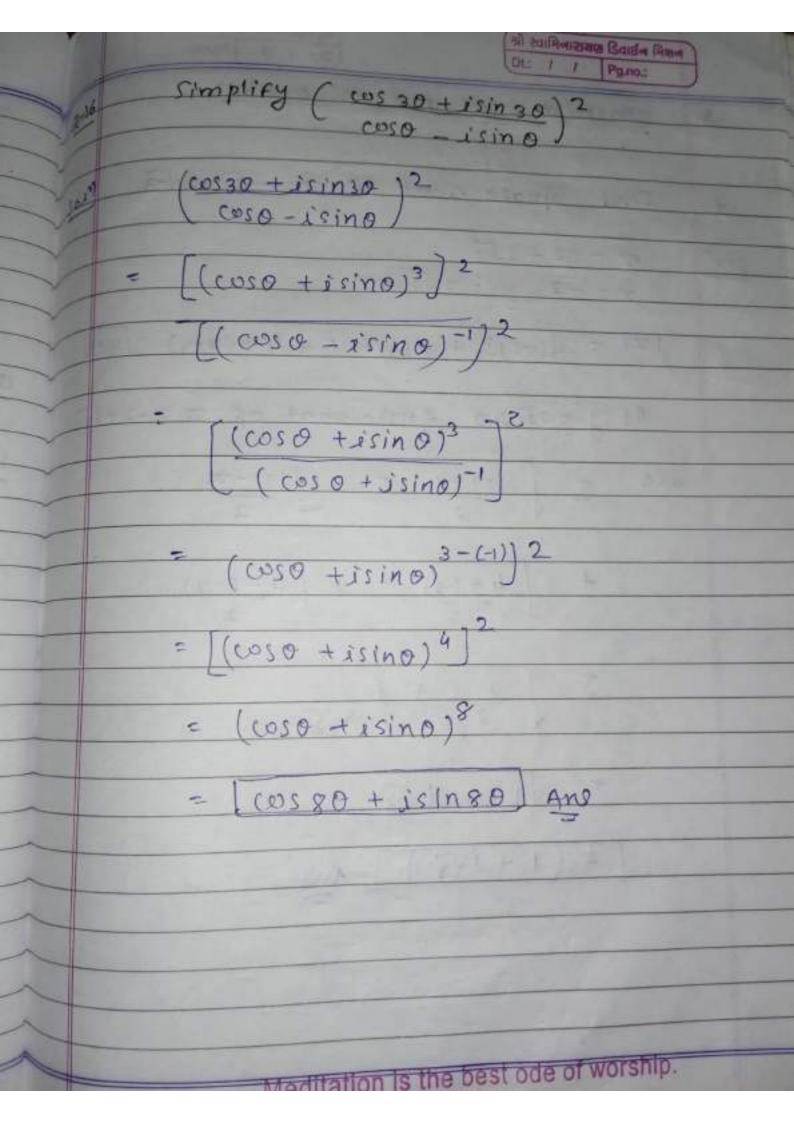












\* Question set ros ou malks:

I. Find square most of z=-2+2V-3

501 = -2 + 253

: x = -2 , y = 25

121 = J(-2)2 + RB)2 = J4+(4x3) = J4+12 = VIII

4) y = 253>0 square root of z = -2+2531

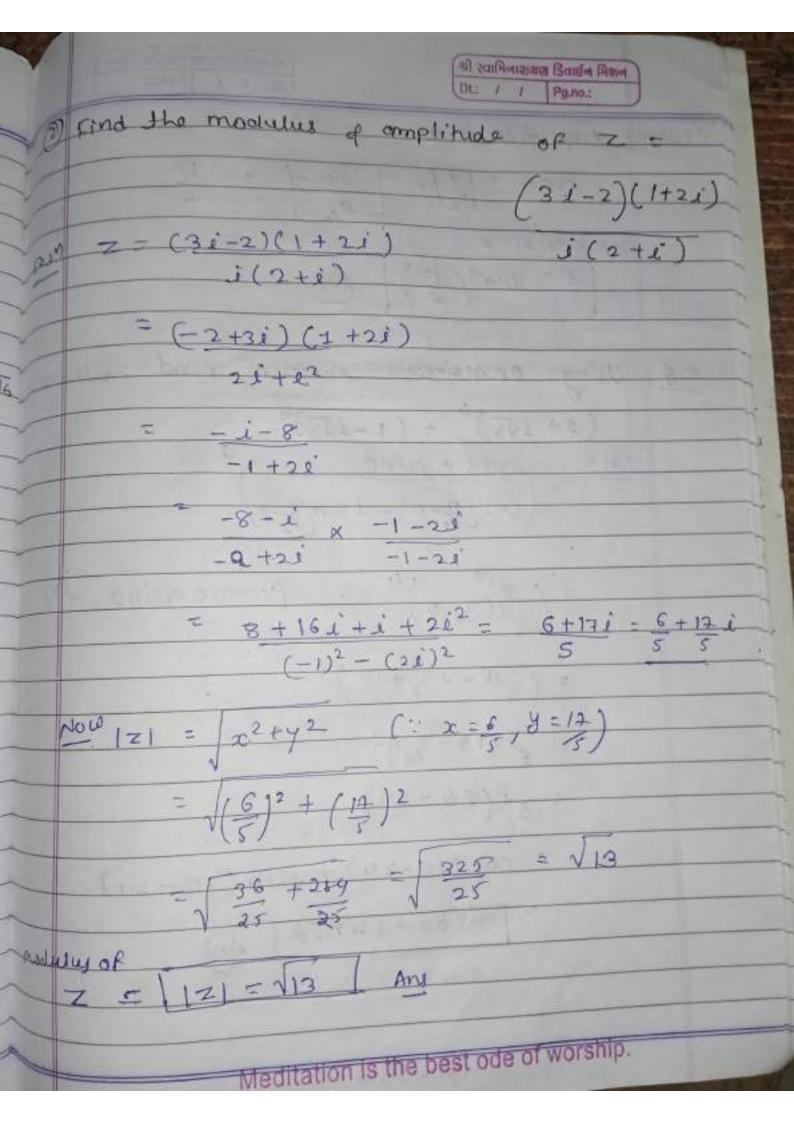
are + 121+x + 1 /21-00

+ 14+(-2) + 1 14-(-2)

 $\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$ 

+ 11 + 153

[ = (1+1/3)] Ans



DE: 1 1 Figure:

Amplitude of z

Amplitude of z

Prove that: (coso + isino) 4 = cos 80 + isin 80

$$= \left(\frac{e^{i\theta}}{e^{i(\eta_2 - \theta)}}\right)^4 \qquad \left(\frac{e^{i\theta}}{e^{i(\eta_2 - \theta)}}\right)^4$$

_	
	Simplify: $(\cos 3\alpha + i\sin 3\alpha)^5 (\cos 3\alpha + i\sin 3\alpha)^2$ $(\cos 4\alpha + i\sin 4\alpha)^3$
	$(\cos 3\alpha + i\sin 3\alpha)^5$ . $(\cos 3\alpha + i\sin 3\alpha)^2$ $(\cos 4\alpha + i\sin 4\alpha)^3$
1	= [(cos x + isinx)3)5. [(cos x + isin x)3]2
/	$[(\cos d + i \sin a)^4]^3$
-	(cosa tisina)15. (cosa tisina)6 (cosa tisina)12
	( cosa tisina) 15+6
	(cosa tisina)12
	$= \frac{(\cos \alpha + i \sin \alpha)^{2}}{(\cos \alpha + i \sin \alpha)^{12}}$
	= (cosa + isina) de 12
	= (cos x tisin x)9

Meditation is the best ode of worship.

cos 9x + isin 9x Ans

2

बी स्वामिनारास्स दिवार्धन मिनन Dt.: / / Pg.no.:  $(\cos 10 + i\sin 10)^{2}(\cos 0 - i\sin 0)^{3} = \cos 0 - i\sin 0$   $(\cos 20 + i\sin 20)^{11} - (\cos 30 + i\sin 0)^{1}$ (coso+isino)")2. (coso + isino)3 [(coso+isino)2)". (coso+isino)3.1 coso tisino)22. (coso tisino)3 (coso +isino) 22. (coso +isino)

 $(\cos \theta + i\sin \theta)^{22+3}$  $(\cos \theta + i\sin \theta)^{22+3}$ (coso +isino) 20 (coso +isino) 20

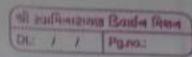
as Bore that:

(Leos

= (coso +isino) 19-25

(coso +isino)-6

( cos60 - isin60 P.H.s



7 If Z1=2-3i and Z2=3-2j Hon find

Z1+Z2, Z1-Z2, Z1×Z2 and Z1

Z1 = 2-3i and Z2 = 3-20

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50,1

 $Z_1-Z_2 = (2-3i)-(3-2i)$ = (2-3)+i(-3-(2))= -1+i(-3+2)= -1+i(-1) $[7_1-2_2 = -1-i]$ 

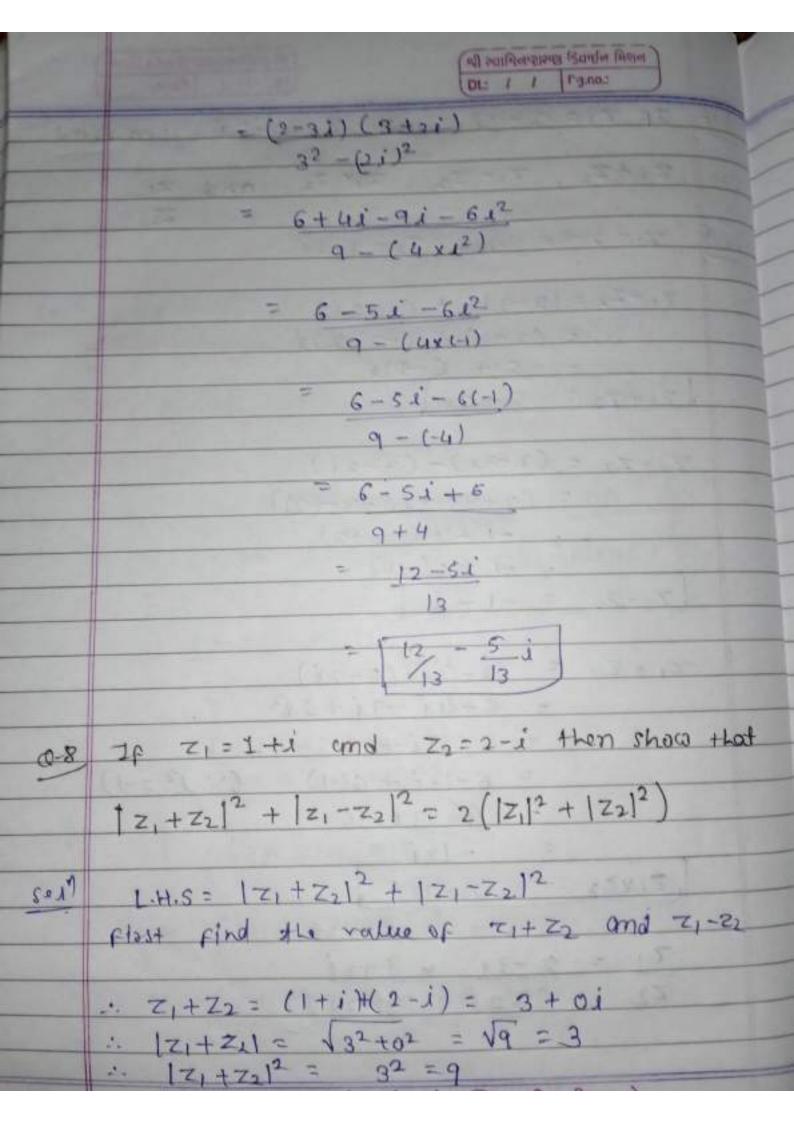
 $-z_{1} \times z_{2} = (2-3i)(3-2i)$   $= 6-4i-9i+62^{2}$   $= 6-13i+62^{2}$ 

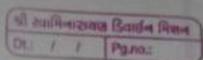
= 6 - 13i + 6(-1) (-:  $l^2 = -1$ )

= 0-13i-6

(ZIXZ) = 0-13i

 $\frac{71}{22} = \frac{2-3i}{3-2i} \times \frac{3+2i}{3+2i}$ 





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

$$\frac{1|z_1+z_2|^2+|z_1-z_2|^2}{|z_1+z_2|^2}$$

$$|Z_1| = \sqrt{|Z_1|^2} = \sqrt{2}$$
  $|Z_2| = \sqrt{2^2 + (-1)^2}$   
 $|Z_1|^2 = (\sqrt{2})^2 = 2$   $|Z_2| = \sqrt{4 + 1} = \sqrt{5}$   
 $|Z_2|^2 = (\sqrt{3})^2 = 5$ 

