RELATIVE POSITIONS OF TWO CIRCLES (1)

Class: IX, Mathematics (A)

SOLUTIONS

TEACHING TASK

01. $(x-a)^2+(y-b)^2=r^2$

Centre (a,b)

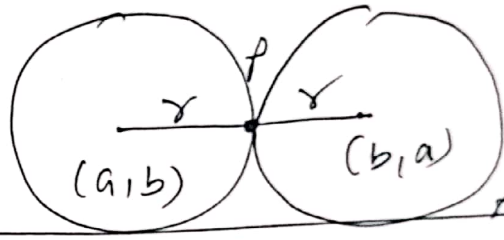
radius $= r$

$(x-b)^2+(x-a)^2=r^2$

Centre (b,a)

radius $= r$

$\therefore\ P=\left(\frac{a+b}{2},\frac{a+b}{2}\right)$



Ans: A

02. $x^2+y^2-6x=0 \longrightarrow (1)\ c_1$ Centre $(3,0)$ $r_1=3$

$x^2+y^2+2x=0 \longrightarrow (2)\ c_2$ Centre $(-1,0)$ $r_2=1$

~~Common~~

$d=c_1c_2=\sqrt{(3+1)^2+0^2}=4$

i.e. $|r_1+r_2|=d$

Length of Common tangent $=\sqrt{d^2-(r_1-r_2)^2}$

$=\sqrt{16-(3-1)^2}$

$=\sqrt{12}$

$=2\sqrt{3}$

Ans: C

03. Eqn of the circle be $(x-h)^2+(y-k)^2=r^2$ (2)

$\Rightarrow (0,0) \Rightarrow (0-h)^2+(0-k)^2=r^2$

$\Rightarrow h^2+k^2=r^2 \rightarrow (1)$

$(1,0) \Rightarrow (1-h)^2+(0-k)^2=r^2$

$\Rightarrow 1+h^2-2h+k^2=r^2$

$\Rightarrow 1-2h+r^2=r^2$

$\Rightarrow h=\frac{1}{2}$

$C_1C_2=|r_1 \pm r_2|$

$\Rightarrow \sqrt{(h-0)^2+(k-0)^2}=|3 \pm r|$

$\Rightarrow h^2+r^2=|3 \pm r|$

$\Rightarrow r=|3 \pm r|$

$\Rightarrow r=\frac{3}{2}$

(1) $\Rightarrow \left(\frac{1}{2}\right)^2+k^2=\left(\frac{3}{2}\right)^2 \Rightarrow k=\pm\sqrt{2}$

$\therefore$ centre $=\left(\frac{1}{2}, \pm\sqrt{2}\right)$

Ans: D

04. $C_1(4,-3)$

$r_1=\sqrt{16+9-21}$

$C_2=(-2,5)$

$r_2=\sqrt{4+25+115}=12$

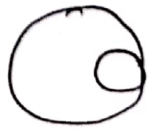
$r_1=2$

$\therefore d=C_1C_2=\sqrt{(4+2)^2+(-3-5)^2}$

$=\sqrt{36+64}$

$=10$

$d=|r_1-r_2|$



Ans: C

③

05 $x^2+y^2=8, \quad x^2+y^2=2$

Concentric circles

hence No. of common tangents $=0$

Ans. D

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06. $C_1=(3,2) \qquad C_2=(-5,-6)$

$$r_1 : r_2 = 3:3$$
$$=1:1$$

Internal centre of similitude $=\left(\frac{3-5}{2}, \frac{2-6}{2}\right)$

$$=(-1,-2)$$

Ans: A

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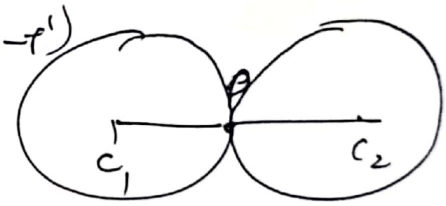
07. $x^2+y^2+2gx+2fy=0$

$x^2+y^2+2g'x+2f'y=0$

Both the circles passes through the origin

$C_1(-g,-f)$, $O(0,0)$, $C_2(-g',-f')$



slope of C_1O = slope of C_2O

$$\frac{f}{g}=\frac{f'}{g'}$$

$\Rightarrow fg'=gf'$

Ans: B

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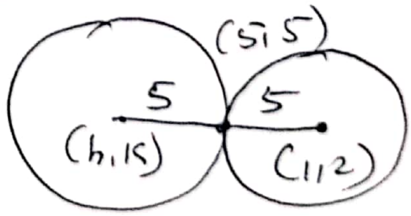
08 $x^2+y^2-2x-4y-20=0$



Centre $=(1,2)$

$r=\sqrt{1+4+20}=5$

~~Given~~ Let required centre (h,k), $r=5$

$\therefore \left(\frac{h+1}{2}, \frac{k+2}{2}\right)=(5,5) \Rightarrow (h,k)=(9,8)$

$\therefore$ Eqn of circle $(x-9)^2+(y-8)^2=25$

Ans. D

④

09. $x^2+y^2-ax=0$

centre $\left(\frac{a}{2},0\right)$

$r_1=\sqrt{\left(\frac{a}{2}\right)^2}=\frac{a}{2}$

$x^2+y^2=c^2$

centre $(0,0)$

$r_2=$ radius $=c$

$\therefore d=c_1c_2=\sqrt{\left(\frac{a}{2}\right)^2}=\left(\frac{a}{2}\right)$

$\therefore d=|r_1\pm r_2|$

$\frac{a}{2}=\left|\frac{a}{2}\pm c\right|$

$\Rightarrow c=a$ or $-a$

$\Rightarrow |a|=c$

Ans: A

10. $x^2+y^2=2$

$c(0,0)$

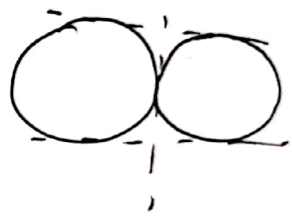
$r_1=\sqrt{2}$

$x^2+y^2-4x-4y+\lambda=0$

$c(2,2)$

$r_2=\sqrt{4+4-\lambda}$

$=\sqrt{8-\lambda}$



$\therefore d=\sqrt{2^2+2^2}=\sqrt{4+4}=\sqrt{8}=2$

$\therefore d=r_1+r_2$

$\sqrt{8}=\sqrt{2}+\sqrt{8-\lambda}$

$\Rightarrow 2\sqrt{2}=\sqrt{2}+\sqrt{8-\lambda}$

option verification $\lambda=6$

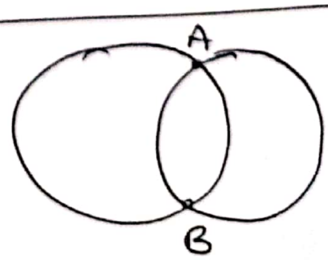
Ans.. B

11. $c_1(1,3)$

$r_1=r$

$c_2(4,-1)$

$r_2=\sqrt{16+1-8}=3$



$|r_1-r_2|<d<r_1+r_2$

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

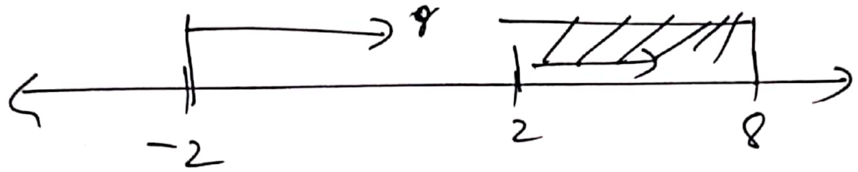
$|r-3| < 5 < r+3$

$\Rightarrow \quad r > 2$ (or)

$|r-3| < 5$

$\Rightarrow -5 < r-3 < 5$

$\Rightarrow -2 < r < 8$



$\therefore \quad 2 < r < 8$ Ans: A, B, C

12. $C_1 = (2,2)$

$r_1 = \sqrt{4+4-7}$

$r_1 = 1$

$C_2 = (6,5)$

$r_2 = \sqrt{36+25-45}$

$= 4$

$$d = \sqrt{(2-6)^2 + (2-5)^2}$$
$$= 5$$

$\therefore \quad d = r_1 + r_2$

$$P = \left(\frac{2\cdot4+1\cdot6}{1+4}, \frac{2\cdot4+5\cdot1}{1+4}\right)$$
$$= \left(\frac{14}{5}, \frac{13}{5}\right)$$

α, β

$\alpha+\beta = \frac{27}{5}, \quad \alpha-\beta = \frac{1}{5}$ Ans: A, B, C, D

13. Statement I:

$C_1 = (6, -4)$

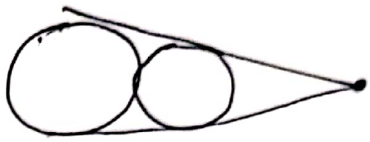
$r_1 = \sqrt{36+16-48}$

$= 2$

$C_2 = (2, -1)$

$r_2 = \sqrt{4+1+4}$

$= 3$



$\because$ ~~rati~~ $d = 5$

$\therefore$ $d = r_1 + r_2$

External centre divides $C_1 C_2 = -r_1 : r_2$

$= -2 : 3$ (True)

Statement II: Conceptual (True)

Ans: B

14. Statement I:

$C_1 = (1, -2)$

$r_1 = \sqrt{1+4-4}$

$r_1 = 1$

$C_2 = (-2, 1)$

$r_2 = \sqrt{4+1-1}$

$= 2$

$d = \sqrt{(1+2)^2 + (-2-1)^2} = \sqrt{18}$

Length of the transverse common tangent

$= \sqrt{d^2 - (r_1 + r_2)^2}$

$= \sqrt{18 - (1+2)^2}$

$= \sqrt{18 - 9}$

$= 3$ (True)

Statement II: Conceptual (False)

Ans: C

(7)

15. $C_1(0,0)$ | $C_2(3,4)$

$r_1 = 16$ | $r_2 = 11$

$d = \sqrt{3^2+4^2} = \sqrt{9+16} = 5$

$\because |r_1 - r_2| = |16-11| = 5$

$d = |r_1 - r_2|$

No. of Common tangent $= 1$

Ans: A

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16. $C_1(1,2)$ | $C_2(-2,1)$

$r_1 = \sqrt{1+4+20}$ | $r_2 = \sqrt{4+1-4}$

$r_1 = 5$ | $r_2 = 1$

$d = \sqrt{(1+2)^2 + (2-1)^2} = \sqrt{9+1} = \sqrt{10} = 3.3$ (approx)

$r_1 - r_2 = 5 - 1 = 4$

$\because |r_1 - r_2| > C_1C_2$

No. of Common tangents $= 0$

Ans: A

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*17. $C_1(0,0)$, $C_2(8,0)$

$r_1 : r_2 = 3:5$

External centre of similitude

$= \left(\frac{mx_2 - nx_1}{m-n}, \frac{my_2 - ny_1}{m-n}\right)$

$= \left(\frac{3\cdot 8 - 5\cdot 0}{3-5}, \frac{3\cdot 0 - 5\cdot 0}{3-5}\right) = (-12, 0)$

Ans: $\longrightarrow$

18 $c(0,0)$, $c(12,0)$

$r_1 : r_2 = 4:6$

$= 2:3$

Internal centre $= \left(\frac{2\cdot 12+3\cdot 0}{2+3}, \left(\frac{2\cdot 0+3\cdot 0}{2+3}\right)\right.$

$= \left(\frac{24}{5}, 0\right)$ Ans: —

19. $c_1 = (0,0)$, $r_1 = 3$ | $c_2 = (4,3)$, $r_2 = \sqrt{16+9-n^2}$ $= \sqrt{25-n^2}$ | $d = \sqrt{16+9}$ $= 5$

Exactly two common tangents

$|r_1 - r_2| < c_1c_2 < r_1 + r_2$

Now $25-n^2 > 0$

$\Rightarrow n^2 - 25 < 0$

$\Rightarrow -5 < n < 5 \longrightarrow (1)$

$3 + \sqrt{25-n^2} > 5$

$\Rightarrow \sqrt{25-n^2} > 2$

$\Rightarrow 25-n^2 > 4$

$\Rightarrow n^2 < 21$

$\Rightarrow n^2 - 21 < 0$

$-\sqrt{21} < n < \sqrt{21} \rightarrow (2)$

$\therefore n = -4, -3, -2, -1, 0, 1, 2, 3, 4$

$\therefore$ total values of $n = 9$

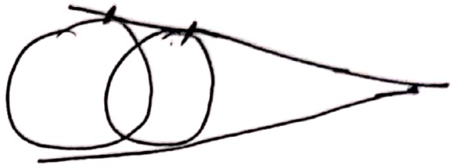
20. $x^2+y^2=1$ | $x^2+y^2-2x-6y-6=0$

$c_1(0,0)$ | $c_2(1,3)$

$r_1=1$ | $r=\sqrt{1+9+6}$

$r_2=4$

$d=\sqrt{1+9}=\sqrt{10}$



clearly $d<r_1+r_2$

Length of D.C.T $=\sqrt{d^2-(r_1-r_2)^2}$

$=\sqrt{10-(1-4)^2}$

$=1$

Ans : 1

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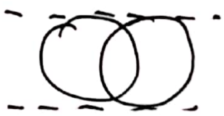
21 (i) $c_1=(2,1)$ | $c_2=(3,2)$

$r_1=2$ | $r_2=3$

$d=\sqrt{(2-3)^2+(1-2)^2}=\sqrt{1+1}=\sqrt{2}$



clearly $d<r_1+r_2$

No. of Common tangents $=2$

(ii) $c_1=(1,-2)$ | $c_2=(-2,1)$

$r_1=\sqrt{1+4-4}$ | $r_2=\sqrt{4+1-1}$

$r_1=1$ | $r_2=2$

$d=\sqrt{(1+2)^2+(-2-1)^2}$

$=\sqrt{9+9}=3\sqrt{2}$

Length of T.C.T $=\sqrt{18-(1+2)^2}=\sqrt{18-9}$

$=\sqrt{9}=3$

(10)

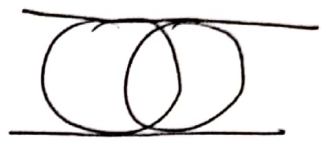
(iii) $c_1 = (0,0)$ | $c_2 = (4,3)$

$r_1 = 3$ | $r_2 = \sqrt{16+9-n^2}$

$= \sqrt{25-n^2}$

$d = \sqrt{4^2+3^2}$

$= \sqrt{16+9} = 5$



two common tangents

$\Rightarrow |r_1-r_2| < d < r_1 + r_2$

$= \left|3-\sqrt{25-n^2}\right| < 5 < 3+\sqrt{25-n^2}$

Now, $25-n^2 > 0$

$\Rightarrow n^2-25 < 0$

$\Rightarrow -5 < n < 5 \rightarrow (1)$

$3+\sqrt{25-n^2} > 5$

$\Rightarrow n^2-21 < 0$

$\Rightarrow -\sqrt{21} < n < \sqrt{21} \rightarrow (2)$

$\therefore n = -4, -3, -2, -1, 0, 1, 2, 3, 4.$

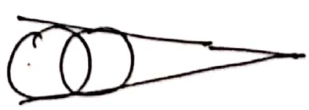
$\therefore$ Total No. of values $= n = 9$

(iv) $x^2+y^2=1$ | $x^2+y^2-2x-6y-6=0$

$c_1(0,0)$ | $c_2(1,3)$

$r_1 = 1$ | $r_2 = \sqrt{1+9+6} = 4$

$d = \sqrt{1+9} = \sqrt{10}$



$\therefore d < r_1+r_2$

Length of D.C.T $= \sqrt{d^2-(r_1-r_2)^2}$

$= \sqrt{10-(1-4)^2} = 1$

Ans: r, p, s, q

22 (i) Option verification.

(0, −1) satisfies both the equations.

(ii) $x^2+y^2 = 2, \quad x^2+y^2-4x-4y+\lambda = 0$

$c_1(0,0)$ $c_2(2,2)$ $c_1c_2 = \sqrt{4+4}$

$r_1 = \sqrt{2}$ $r_2 = \sqrt{4+4-\lambda}$ $= \sqrt{8}$

$= \sqrt{8-\lambda}$

Exactly three tangents $\rightarrow$ Circles touch externally

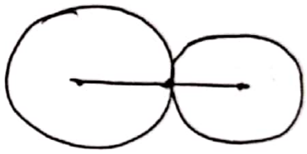
$$c_1c_2 = r_1 + r_2$$

$$\Rightarrow \sqrt{8} = \sqrt{2} + \sqrt{8-\lambda}$$

$$\Rightarrow \cancel{\sqrt{8} - \sqrt{6} = \sqrt{8-\lambda}}$$

option verification $\lambda = 6$

iii) $c_1(h,k), \quad r_1 = 5$



$c_2(1,2), \quad r_2 = \sqrt{1+4+20}$

$= 5$

$$d = \sqrt{(h-1)^2 + (k-2)^2}$$

$$\Rightarrow d = r_1 + r_2$$

$$\Rightarrow \sqrt{(h-1)^2 + (k-2)^2} = 5+5 = 10$$

option verification $(h,k) = (9,8)$

(iv) $r_1 = \sqrt{1+4-4} = 1$

$r_2 = \sqrt{4+1-1} = 2$

∴ Required ratio = 1 : 2

Ans: s, p, q, r

LEARNER'S TASK

CUQ's

01. Conceptual — Ans: C
02. Conceptual — Ans: C
03. Conceptual — Ans: B
04. Conceptual — Ans: A
05. Conceptual — Ans: B
06. Conceptual — Ans: A
07. Conceptual — Ans: D
08. Conceptual — Ans: A
09. Conceptual — Ans: B
10. Conceptual — Ans: A

JEE MAINS LEVEL

01. option A: $(x-3)^2 + (y-4)^2 = 25$ | $(x+2)^2 + (y-1)^2 = 16$

$c_1(3,4)$ | $c_2(-2,1)$

$r_1 = 5$ | $r_2 = 4$

$c_1c_2 = \sqrt{(3+2)^2 + (4-1)^2} = \sqrt{25+9} = \sqrt{34}$

$c_1c_2 \neq r_1 + r_2$

option 2: $c_1 = (0,0)$ | $c_2 = (6,0)$

$r_1 = 6$ | $r_2 = 5$

$c_1c_2 = \sqrt{6^2 + 0^2} = 6$

$c_1c_2 \neq r_1 + r$

option: c : $c_1 = (6,-2)$ | $c_2 = (-6,0)$

$r_1 = \sqrt{5}$ | $r_2 = \sqrt{35}$

$c_1c_2 = \sqrt{(6+6)^2 + (-2-0)^2} = \sqrt{144+4} = \sqrt{148}$

$c_1c_2 \neq r_1+r_2$

Ans: ——

02. option: A: $c_1(0,0)$ | $c_2(4,0)$ | $c_1c_2 = \sqrt{4^2} = 4.$

$r_1 = 4$ | $r_2 = 5$

$|r_1 - r_2| < c_1c_2 < r_1 + r_2$

option: B : $c_1(2,3)$ | $c_2 = (-1,2)$ | $c_1c_2 = \sqrt{(2+1)^2+(3-2)^2}$

$r_1 : \sqrt{13}$ | $r_2 = \sqrt{10}$ | $= \sqrt{9+1}$

$= \sqrt{10}$

$|r_1 - r_2| < c_1c_2 < r_1 + r_2$

option: C $c_1(0,0)$ | $c_2(3,4)$ | $c_1c_2 = \sqrt{9+16}$

$r_1 = 5$ | $r_2 = \sqrt{20}$ | $= 5$

$|r_1 - r_2| < c_1c_2 < r_1 + r_2$

Ans: D

03 A: $c_1 : (0,0)$ | $c_2 : (0,0)$ Both circles are concentric circles

$r_1 : 4$ | $r_2 : 2$

All the circles in the options are concentric circles.

Hence, one circle lies entirely inside the other

Ans: D

04. $c_1 : (0,0)$ | $c_2 : (8,0)$ | $c_1c_2 : \sqrt{(8-0)^2+(0-0)^2} = 8$

$r_1 : 5$ | $r_2 : 4$

14

Length of D.C.T $= \sqrt{d^2-(r_1-r_2)^2}$

$= \sqrt{8^2-(5-4)^2}$

$= \sqrt{64-1}$

$= \sqrt{63}$

Ans: C

05. $c_1 : (0,0)$ | $c_2 : (8,0)$ | $c_1c_2 : \sqrt{(8-0)^2+(0-0)^2} = 8$

$r_1 : 5$ | $r_2 : 4$

Since $|r_1-r_2| < c_1c_2 < r_1+r_2$

Since these two circles intersect each other, there won't be any transverse common tangent

Ans —

06. $c_1 : (0,0)$ | $c_2 : (8,0)$ | $c_1c_2 = 8$

$\cancel{r}_1 : 5$ | $r_2 : 4$

External centre of similitude $= \left(\frac{5.8-4.0}{5-4}, \frac{5.0-4.0}{5-4}\right)$

$= \left(\frac{40}{1}, 0\right)$

$= (40, 0)$

Ans: ___

07. c

07. $C_1(4,1)$ | $C_2:(1,-3)$ | $C_1C_2 = \sqrt{(4-1)^2+(1+3)^2}$

$r_1 = \sqrt{16+1-8}$

$= \sqrt{9}$

$= 3$

$r_2 = \sqrt{1+9-6}$

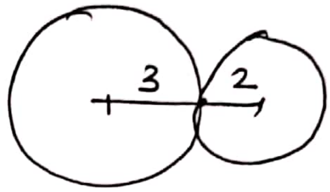
$= 2$

$= \sqrt{9+16}$ (15)

$= \sqrt{25}$

$= 5$

point of Contact



(4,1) (1,-3)

$= \left(\frac{3\cdot1+2\cdot4}{3+2}, \frac{3\cdot(-3)+2\cdot1}{3+2}\right)$

$= \left(\frac{3+8}{5}, \frac{-9+2}{5}\right)$

$= \left(\frac{11}{5}, \frac{-7}{5}\right)$

Ans: D

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08 $C_1 = (1,2)$ | $C_2: (-3,-10)$ | $x^2+y^2+6x+2y-90=0$

$r_1 = \sqrt{1+4+20}$

$r_1 = 5$

$r_2 = \sqrt{9+100+90}$

$= 10$

$C_1C_2 = \sqrt{(1+3)^2+(2+1)^2}$

$= \sqrt{16+9} = 5$

Point of Contact $= \left(\frac{mx_2-nx_1}{m-n}, \frac{my_2-ny_1}{m-n}\right)$

$= (5,5)$

Ans: A

16

9. $c_1 = (2,3)$, $r_1 = \sqrt{4+9+12}$, $r_1 = 5$ | $c_2 = (-3,-9)$, $r_2 = \sqrt{9+81-26} = 8$ | $c_1c_2 = \sqrt{25+144} = \sqrt{169} = 13$

clearly $c_1c_2 = r_1 + r_2$

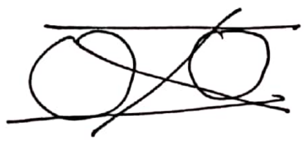
Ans: D

10. $c_1 : (7,-3)$, $r_1 = \sqrt{49+9-33} = 5$ | $c_2 : (-15, 1)$, $r_2 = \sqrt{225+1-1}$, $r_2 : 15$

$c_1c_2 = \sqrt{484+16} = \sqrt{500} = 10\sqrt{5}$

clearly $c_1c_2 > r_1 + r_2$

Ans. B



11. $c_1 : (-3,-3)$, $r_1 : \sqrt{9+9-14}$, $r_1 : 2$ | $c_2 : (1,2)$, $r_2 = \sqrt{1+4+4}$, $r_2 : 3$ | $c_1c_2 = \sqrt{16+25} = \sqrt{41}$

clearly $c_1c_2 > r_1 + r_2$

Ans: A, B, C, D

12.

12. $C_1 : (1, 3)$ | $C_2 : (0, 0)$ | $C_1C_2 = \sqrt{1+9}$ (17)

$r_1 = \sqrt{1+9-9}$ | $r_2 : 2$ | $= \sqrt{10}$

$r_1 : 1$

External centre of similitude = $\left(\frac{1 \cdot 0 - 2 \cdot 1}{1-2}, \frac{1 \cdot 0 - 2 \cdot 3}{1-2} \right)$

$= (2, 6)$

Length of d.C.T. $= \sqrt{d^2 - (r_1 - r_2)^2}$

$= \sqrt{(\sqrt{10})^2 - (1-2)^2}$

$= \sqrt{10 - 1}$

$= 3$

Length of T.C.T $= \sqrt{d^2 - (r_1 + r_2)^2}$

$= \sqrt{(\sqrt{10})^2 - (1+2)^2}$

$= \sqrt{10 - 9}$

$= 1$

Ans. A, C, D

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13. Statement I: $C_1 : (4, 3)$ | $C_2 : (0, 1)$

$r_1 : \sqrt{16+9-21}$ | $r_2 = \sqrt{0+1+15}$

$r_1 : 4$ | $= 4$

$C_1C_2 = \sqrt{16+4} = \sqrt{20}$

$|r_1 - r_2| < C_1C_2 < |r_1 + r_2|$ (True)

Statement II: Conceptual (True)

Ans: A

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14. Statement I:

$c_1 : (4, 3)$ | $c_2 : (0, 1)$

$r_1 : \sqrt{16 + 9 - 21}$ | $r_2 : \sqrt{0 + 1 + 15}$

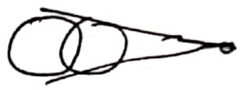
$r_1 : 2$ | $= 4$

$r_1 : r_2 = 1 : 2$

$c_1 c_2 = \sqrt{16 + 4}$

$= \sqrt{20}$

clearly $c_1 c_2 < r_1 + r_2$



External centre of similitude

$$= \left(\frac{1 \cdot 0 - 2 \cdot 4}{1 - 2}, \frac{1 \cdot 1 - 2 \cdot 3}{1 - 2} \right)$$

$= (8, 5)$ (True)

Statement II: (Conceptual (true)

Ans: A

15. $c_1 : (3, 1)$ | $c_2 : (-1, 4)$ | $c_1 c_2 = \sqrt{16 + 9}$

$r_1 = \sqrt{9 + 1 - 1}$ | $r_2 = \sqrt{1 + 16 - 13}$ | $= 5$

$r_1 : 3$ | $r_2 = 2$

clearly $c_1 c_2 = r_1 + r_2$

Ans. A

16 Point of Contact $= \left(\frac{-3 + 6}{3 + 2}, \frac{12 + 2}{3 + 2} \right)$

$= \left(\frac{3}{5}, \frac{14}{5} \right)$

Ans: B

17. $c_1 : (2, 5)$ | $c_2 : (-2, 3)$

$r_1 : \sqrt{4+25-28}$ | $r_2 = \sqrt{4+9-4}$

$r_1 : 1$ | $r_2 = 3$

$$c_1c_2 = \sqrt{(2+2)^2 + (5-3)^2}$$

$$= \sqrt{16+4}$$

$$= \sqrt{20} \approx 4.5$$

$$c_1c_2 < |r_1 - r_2|$$

$$\sqrt{20} < |1-3|$$

$$c_1c_2 > r_1 + r_2$$

Circles do not touch each other   Ans: —

18. Internal centre of Circilitude

$$= \left(\frac{-2+6}{1+3}, \frac{3+15}{1+3}\right)$$

$$= \left(1, \frac{9}{2}\right)$$

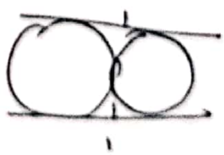
Ans: D

19. $c_1 : (0,0)$ | $c_2 : (3, 4)$

$r_1 = 2$ | $r_2 = \sqrt{9+16-16} = 3$

$$c_1c_2 = \sqrt{9+16} = 5$$

clearly $c_1c_2 = r_1 + r_2$



Ans: 3

20. $c_1 : (-3,-3)$

$r_1 : \sqrt{9+9-14}$

$r_1 : 2$

$c_2 : (1,2)$

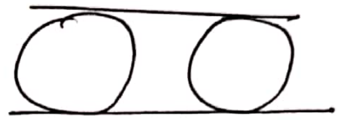
$r_2 = \sqrt{1+4+4} = 3$

$c_1c_2 = \sqrt{(-3-1)^2 + (-3-2)^2}$

$= \sqrt{16+25}$

$= \sqrt{41}$

clearly $c_1c_2 > r_1 + r_2$



Ans : 2

21(i) So (ii), (iii), (iv) Conceptuals

Ans : r, t, p, s

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22 (i) $c_1 : (2,-1)$

$r_1 : 3$

$c_2 : (-1,3)$

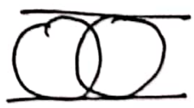
$r_2 : 3$

$c_1c_2 = \sqrt{(2+1)^2 + (-1-3)^2}$

$= \sqrt{9+16}$

$= 5$

clearly $|r_1 - r_2| < c_1c_2 < r_1 + r_2$



Length of D.C.T $= \sqrt{d^2 - (r_1-r_2)^2}$

$= \sqrt{(5)^2 - (3-3)^2}$

$= 5$

(ii) $c_1 : (1,-2)$

$r_1 : \sqrt{1+4+4} = 3$

$c_2 : (-2,3)$

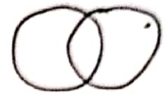
$r_2 = \sqrt{4+9+3}$

$= 4$

$C_1C_2 = \sqrt{(1+2)^2 + (-2-3)^2}$

$= \sqrt{9+25}$

$= \sqrt{34} \approx 5.5$



clearly $|r_1 - r_2| < C_1C_2 < r_1 + r_2$

Length of D.C.T $= \sqrt{d^2 - (r_1 - r_2)^2}$

$= \sqrt{34 - (3-4)^2}$

$= \sqrt{34 - 1}$

$= \sqrt{33}$

iii) $C_1 : (-3, 1)$ | $C_2 : (1, 3)$

$r_1 : \sqrt{9+1-1}$ | $r_2 = \sqrt{1+9-9}$

$r_1 : 3$ | $r_2 : 1$

$C_1C_2 = \sqrt{(-3-1)^2 + (1-3)^2}$

$= \sqrt{16+4}$

$= \sqrt{20} =$

clealy $C_1C_2 > r_1 + r_2$

Length of D.C.T $= \sqrt{d^2 - (r_1 - r_2)^2}$

$= \sqrt{20 - (3-1)^2}$

$= \sqrt{20 - 4} = 4.$

(iv) $c_1 : (1, 3)$ | $c_2 : (0,0)$

$r_1 : \sqrt{1+9-9}$ | $r_2 : 2$

$r_1 : 1$

$c_1c_2 : \sqrt{1+9} = \sqrt{10}$

clealy $c_1c_2 > r_1 + r_2$

Length of T.C.T $= \sqrt{d^2 - (r_1+r_2)^2}$

$= \sqrt{10-(1+2)^2}$

$= \sqrt{10-9}$

$= 1$

$\Longrightarrow$ THE END $\Longleftarrow$