Sri Chaitanya IIT Academy, India

A.P, TELANGANA, KARNATAKA, TAMILNADU, MAHARASHTRA, DELHI, RANCHI

A right Choice for the Real Aspirant

ICON CENTRAL OFFICE, MADHAPUR-HYD

Sec: Sr.IPLCO **Dt: 02-08-15**

Time: 09:00 AM to 12:00 Noon **RPTA-1** **Max.Marks: 180**

PAPER-1

KEY & SOLUTIONS

PHYSICS

1	**D**	2	**BD**	3	**ABC**	4	**ABCD**	5	**A**	6	**BCD**
7	**ABCD**	8	**ABD**	9	**ABCD**	10	**AD**	11	**3**	12	**3**
13	**1**	14	**5**	15	**5**	16	**2**	17	**6**	18	**2**
19	**9**	20	**5**								

CHEMISTRY

21	**ABCD**	22	**ABC**	23	**AB**	24	**BCD**	25	**ABCD**	26	**ABCD**
27	**ABC**	28	**BCD**	29	**ABC**	30	**CD**	31	**5**	32	**3**
33	**4**	34	**9**	35	**2**	36	**5**	37	**5**	38	**5**
39	**5**	40	**4**								

MATHS

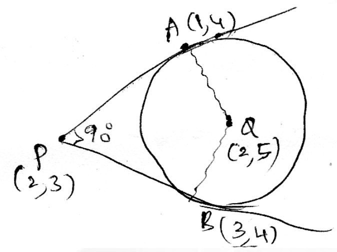
41	**AC**	42	**ABCD**	43	**BD**	44	**BCD**	45	**ABC**	46	**C**
47	**ABCD**	48	**ABC**	49	**ABD**	50	**AD**	51	**5**	52	**9**
53	**5**	54	**3**	55	**3**	56	**5**	57	**6**	58	**1**
59	**5**	60	**4**								

MATHEMATICS

41. $\left.\begin{matrix} CP^2-\lambda^2=t_1^2 \\ CP^2-\mu^2=t_2^2 \end{matrix}\right\} \Rightarrow \frac{t_1}{t_2}=\frac{\mu}{\lambda} \Rightarrow \lambda^2\left(CP^2-\lambda^2\right)=\mu^2\left(CP^2-\mu^2\right) \Rightarrow CP^2=\lambda^2+\mu^2$

Concentric circle. Also area $=10\pi \Rightarrow \lambda^2+\mu^2=10$

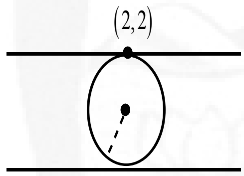
42. Solving normal $Q=(2,5)$



$C: x^2+y^2-4x-10y+27=0 \Rightarrow a+b+c=13$

Circumcentre of $\Delta PAB=\frac{P+Q}{2}(2,4)$ lies inside

43. Tangent at $(2,2)$ is $x-3y+4=0$ other line $x-3y-6=0$



Solving normal : $3x+y-8=0$

Midway line : $x-3y-1=0$ $\left(\frac{5}{2},\frac{1}{2}\right)$

Equation of circle $x^2+y^2-5x-y+4=0$

Circle is unique rad$=\frac{\sqrt{10}}{2}=\sqrt{\frac{5}{2}}$

44. Line $y=mx+c$ passes through centroids of $\Delta C_1C_3C_4$ & $\Delta C_2C_3C_5$

i.e., $(1,0),(4,3) \Rightarrow x-y-1=0 \Rightarrow y=x-1$

45. Lines are perpendicular on tangent is $x+y-h=0 \Rightarrow \frac{h}{\sqrt{2}}=4 \Rightarrow h=4\sqrt{2}, r=\frac{\Delta}{s}=\frac{36}{8+2\sqrt{2}}$

$\therefore P\left(0,4\sqrt{2}\right), A\left(4\sqrt{2},0\right), B\left(-4\sqrt{2},0\right)$

46. $\left.\begin{array}{ll}(x-2)^2+(y-4)^2=4 & ....(1) \\ x^2+y^2=16 & ....(2)\end{array}\right\}$ chord is $x+2y=8$

Solving with $(2)\Rightarrow\left(\frac{16}{5},\frac{12}{5}\right),\left(\frac{16}{5},-\frac{12}{5}\right)$ $\left[|\alpha|+|\beta|\right]=\left[\frac{28}{5}\right]=5$

47. Chord equation is $y=x \quad ...(1)$

Distance $=\frac{7}{3}\sqrt{2}\Rightarrow$ chord length $=7\sqrt{2}$

Mid point $=(3,3)$

$\therefore 2^2+1^2+c=\left(\frac{7}{\sqrt{2}}\right)^2+\left(\frac{1}{\sqrt{2}}\right)^2\Rightarrow c=20$

48. Solving $S+\lambda L=0\Rightarrow y=0\,\&\,x^2-2x-8=0\Rightarrow A(-2,0),B(4,0)$

$\overleftrightarrow{AB}$ equation is $y=0 \quad ...(1)$

Line of centre $x=1 \quad ....(2)$ Solving with $x+2y+5=0\Rightarrow(1,3)$

$S_1=0\Rightarrow x(1)+y(-3)-1(x+1)-\lambda(y-3)-8=0$

$\Rightarrow-(\lambda+3)y-a+3\lambda=0$ which is same as $y=0\ \therefore\lambda=3$

Circle is $x^2+y^2-2x-6y-8=0$

49. $P(x_1,y_1)\Rightarrow\sqrt{(x_1-1)^2+(y_1-2)^2}=R-r \qquad ..(1)$ also $\frac{r}{AB}=\frac{1}{\sqrt{2}}\Rightarrow r=\frac{(R-r)}{\sqrt{2}}\Rightarrow R=3r$

Locus is $(x-1)^2+(y-2)^2=(2r)^2\Rightarrow(x-1)^2+(y-2)^2=\frac{8}{9}\left(2+\sqrt{3}\right)$

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

$R-r=2r=\frac{2\left(\sqrt{3}+1\right)}{3}$

50. $\left.\begin{array}{l}x-1=X\\ y-1=Y\end{array}\right\}\left.\begin{array}{ll}X+2Y+2=X & ...(1)\\ \lambda X+Y+(\lambda-2)=Y & ...(2)\end{array}\right\}\left.\begin{array}{l}X=0.....(3)\\ Y=0.......(4)\end{array}\right\}$

$a_1a_2=b_1b_2\Rightarrow(1)(\lambda)=(2)(1)\Rightarrow\lambda=2$

Circle $(X+2Y+2)(2X+Y-4)-(XY\ term)=0$

$\Rightarrow 2X^2+2Y^2-6Y-8=0\Rightarrow X^2+Y^2-3Y-4=0$

Rad $=\sqrt{\frac{9}{4}+4}=\frac{5}{2}$

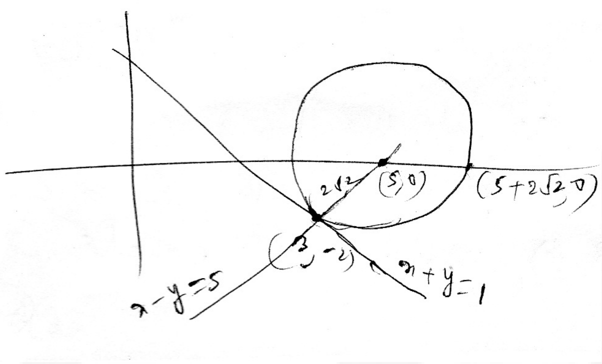
51. $S-S^1=0 \Rightarrow (\lambda+6)x+(2\lambda-8)y+2=0$

$\Rightarrow (6x-8y+2)+\lambda(x+2y)=0 \Rightarrow P.C=\left(\frac{-2}{10},\frac{1}{10}\right)$

Locus is polar of $\left(\frac{-2}{10},\frac{1}{10}\right)$ .ie., $S_1=0 \Rightarrow x\left(\frac{-2}{10}\right)+y\left(\frac{1}{10}\right)=1 \Rightarrow 2x-y+10=0$

$\therefore \frac{C}{m}=5$

52. Centre $=(5,0)$



Rad $=2\sqrt{2}$

$(x-5)^2+y^2=8$

$\alpha=5+2\sqrt{2}\cos\theta$

$\beta=0+2\sqrt{2}\sin\theta$

$\alpha+\beta=5+2\sqrt{2}(\cos\theta+\sin\theta)$

$\in[1,9]$ max=9

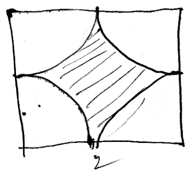
53. $x^2+y^2-5x+4+2x(y)=0 \Rightarrow c=f^2 \Rightarrow 4=\lambda^2 \Rightarrow \lambda=\pm 2$

Two circles are $x^2+y^2-5x\pm 4y+4=0$

$C_1=\left(\frac{5}{2},2\right), C_2=\left(\frac{5}{2},-2\right), r_1=\frac{5}{2}, r_2=\frac{5}{2}$

$$\cos\theta=\frac{16-\frac{25}{4}-\frac{25}{4}}{2\times\frac{5}{2}\times\frac{5}{2}}=\frac{\frac{7}{2}}{\frac{25}{2}}=\frac{7}{25} \Rightarrow 25\cos\theta-2=5$$

54. $\Delta = 4 - 4\left(\frac{\pi(1)^2}{4}\right) = 4 - \pi$

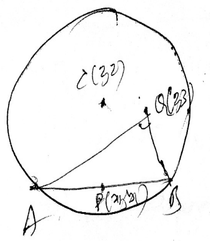


$\Delta - \pi = 4 - 2\pi = -2.28$

$\left|\left[\Delta - \pi\right]\right| = |-3| = 3$

55. $2\cos\frac{\pi}{2k} + 2\cos\frac{\pi}{k} = \sqrt{3} + 1 \Rightarrow$ solving $\cos\frac{\pi}{2k} = \frac{\sqrt{3}}{2} \Rightarrow \frac{\pi}{2k} = \frac{\pi}{6} \Rightarrow k = 3$

56. $AC^2 = AP^2 + PC^2 \Rightarrow 4 = (x_1 - 2)^2 + (y_1 - 3)^2 + (x_1 - 2)^2 + (y_1 - 2)^2$



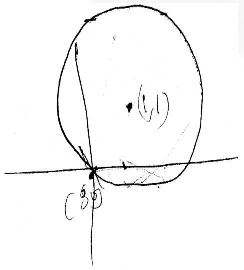
$\Rightarrow$ Locus $x^2 + y^2 - 4x - 5y + \frac{17}{2} = 0$

Centre $= \left(2, \frac{5}{2}\right) \Rightarrow \alpha\beta = 5$

57. $-\frac{x}{8}$ integer $\Rightarrow x = \pm1, \pm2, \pm4, \pm8$ but $x^2 + y^2 < 125$

$\therefore x = \pm1, \pm2, \pm4$

58. $S_1 = S_{11} \Rightarrow xx_1 + yy_1 - (x + x_1) - (y + y_1) = 0 \Rightarrow (x_1 - 1)x + (y_1 - 1)y = x_1 + y_1$



$$x^2+y^2-2(x+y)\left\{\frac{(x_1-1)x+(y_1-1)y}{x_1+y_1}\right\}=0$$

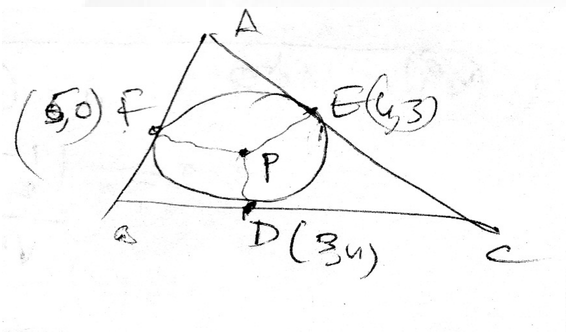
Equally inclined to x-axis $\rightarrow$ coefficient of $xy=0 \Rightarrow \frac{-2}{x_1+y_1}\{y_1-1+x_1-1\}=0$

Locus is $x+y=2 \Rightarrow a+b=1$

59. $a^2-1=3(a+1) \Rightarrow a=4 \Rightarrow \text{radius}=\frac{a^2-1}{2} \Rightarrow r=\frac{15}{2}$

$L.C=r\sqrt{2}=\frac{15}{\sqrt{2}} \Rightarrow G.E=5$

60.



Clearly $P=(0,0)$

$\overleftrightarrow{AE}$ equation : $4x+3y=25$

$\overleftrightarrow{AF}$ equation : $x=5$

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

$\overleftrightarrow{AP}$ slope $=\frac{1}{3}$