Sri Chaitanya IIT Academy, India

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A right Choice for the Real Aspirant

ICON CENTRAL OFFICE, MADHAPUR-HYD

Sec: Sr.IPLCO	JEE–ADVANCE	Date: 02-08-15
Time: 02:00 PM to 05:00 PM	2014-P2-Model	Max Marks: 180

PAPER-II
KEY & SOLUTIONS

PHYSICS

1	**D**	2	**A**	3	**B**	4	**A**	5	**A**	6	**A**
7	**A**	8	**A**	9	**A**	10	**D**	11	**C**	12	**B**
13	**B**	14	**C**	15	**C**	16	**D**	17	**C**	18	**A**
19	**D**	20	**A**								

CHEMISTRY

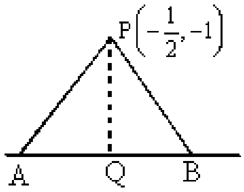
21	**D**	22	**A**	23	**D**	24	**B**	25	**B**	26	**C**
27	**A**	28	**B**	29	**B**	30	**D**	31	**B**	32	**C**
33	**B**	34	**C**	35	**C**	36	**D**	37	**C**	38	**B**
39	**A**	40	**A**								

MATHS

41	**B**	42	A	43	**B**	44	C	45	**D**	46	C
47	C	48	**D**	49	**D**	50	C	51	A	52	**B**
53	A	54	C	55	**B**	56	**D**	57	**D**	58	A
59	A	60	C								

MATHEMATICS

41. $(2x)^3 + y^3 + (-1)^3 = 3(2x)(y)(-1)$



$\Rightarrow 2x = y - 1$ (or) $2x + y - 1 = 0$

$\Rightarrow P\left(-\frac{1}{2},-1\right)$ (or) $2x + y - 1 = 0$

No.of rt isosceles $\Delta\text{les} = 3$

42. Diagonals parallel to A.B.s i.e. $\frac{x+y-2}{\sqrt{2}} = \pm\frac{7x-y+4}{5\sqrt{2}}$

$\Rightarrow$ Slopes are: $\frac{1}{2}, -2$

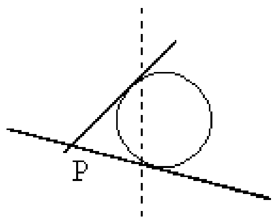
Let $A = (1-2k, k)$

$\therefore \frac{k-5}{(1-2k)-3} = \frac{1}{2}$ (or) $-2 \Rightarrow k = 2, k = -3$

$A = (-3, 2)$ (or) $(7, -3)$

Min distance from origin to $A = \sqrt{13}$

43. $r = d \Rightarrow a = \frac{2\sqrt{2}a}{\sqrt{4+K^2}} \Rightarrow K^2 + 4 = 8 \Rightarrow K = \pm 2 \Rightarrow K = -2$

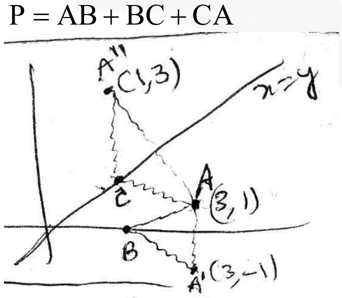


$$\left.\begin{array}{l} 2x - 2y - 2\sqrt{2}a = 0 \\ 2x + 2y - 2\sqrt{2}a = 0 \end{array}\right\} P\left(\sqrt{2}a, 0\right)$$

Area $= \frac{r.S_{11}^{3/2}}{S_{11} + r^2} = \frac{a.\left(a^2\right)^{3/2}}{a^2 + a^2} = \frac{a^2}{2}$

$$\therefore \left.\begin{array}{l} \lambda = 1 \\ K = -2 \end{array}\right\} \Rightarrow 6\lambda + K = 6(1) - 2 = 4$$

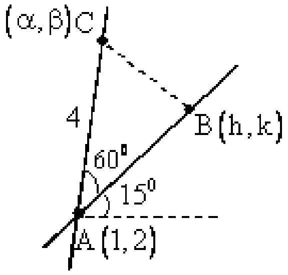
44. $P = AB + BC + CA$



$= A^1B + BC + CA^{11} \geq A^1A^{11}$

$\geq \sqrt{(3-1)^2+(-1-3)^2} = \sqrt{20} = 2\sqrt{5}$

45. $\Delta ABC = \sqrt{8+4\sqrt{3}}$ and $\overline{AC}\text{equation} = \left(2+\sqrt{3}\right)x - y - \sqrt{3} = 0$

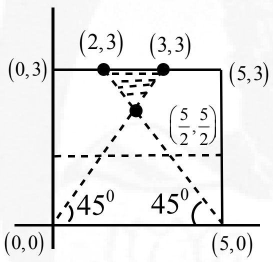


$$\Rightarrow \frac{1}{2}(4)\frac{\left|\left(2+\sqrt{3}\right)h-k-\sqrt{3}\right|}{\sqrt{8+4\sqrt{3}}} = \sqrt{8+4\sqrt{3}}$$

$$\Rightarrow \left|\left(2+\sqrt{3}h-k-\sqrt{3}\right)\right| = 4+2\sqrt{3}$$

$$\Rightarrow \left(\left(2+\sqrt{3}\right)h-k\right)_{\max} = 4+3\sqrt{3}$$

46. $\text{R.A} = \frac{1}{2}\times 1\times\frac{1}{2} = \frac{1}{4}$



47. L.C.C = altitude

$$\therefore \frac{1}{h_1}+\frac{1}{h_2}+\frac{1}{h_3} = \frac{a+b+c}{2\Delta} = \frac{s}{\Delta} = \frac{1}{r}$$

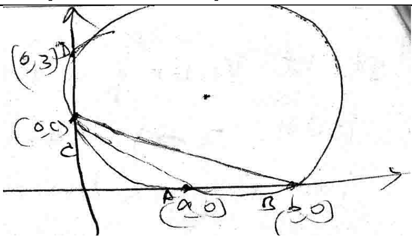
$$\Rightarrow r = \frac{1}{3}\left(\frac{3}{\frac{1}{h_1}+\frac{1}{h_2}+\frac{1}{h_3}}\right)$$

$$r = \frac{1}{3}(H.M) \Rightarrow r = \frac{1}{3}(12) \Rightarrow r = 4$$

48. $A = \left(-\frac{1}{5},\frac{2}{5}\right), B = \left(\frac{2}{5},-\frac{1}{5}\right) \Rightarrow AB = \sqrt{\frac{18}{25}} = \frac{3\sqrt{2}}{5}$

$$\sin\theta = \frac{\begin{vmatrix}1 & -2\\ 2 & -1\end{vmatrix}}{\sqrt{5}\sqrt{5}} = \frac{3}{5} \Rightarrow R = \frac{a}{2\sin\theta} = \frac{\frac{3}{5}\sqrt{2}}{2\times\frac{3}{5}} = \frac{1}{\sqrt{2}}$$

49. $ab = 3\times c \Rightarrow c = \frac{ab}{3}$



Altitude through $c \Rightarrow x = 0$

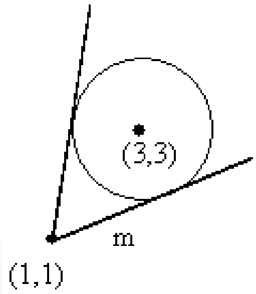
Altitude through $B \Rightarrow ax - cy = ab$

Solving $H = \left(0, -\frac{ab}{c}\right) = (0, -3)$

50. $(x-3)^2 + (y-3)^2 = 6$

$y - 3 = m(x-3) + \sqrt{6}\sqrt{1+m^2}$

(1,1) lies on it



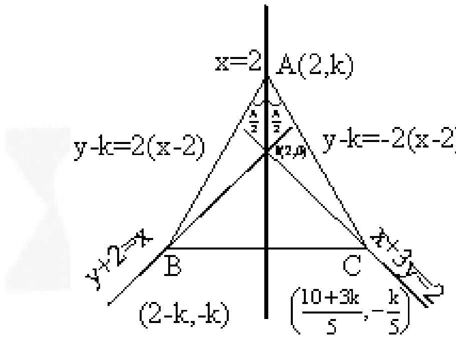
$\Rightarrow 2m - 2 = \sqrt{6}\sqrt{1+m^2} \Rightarrow 4m^2 + 4 - 8m = 6 + 6m^2$

$\Rightarrow 2m^2 + 8m + 2 = 0$

$\Rightarrow m^2 + 4m + 1 = 0 \Rightarrow p = -2 + \sqrt{3}, q = -2 - \sqrt{3}$

pq = 1

51&52. Let A=(2,k)



$\cot\frac{A}{2} = 2$

BC slope $= \frac{\left(\frac{4}{5}k\right)}{\left(\frac{8k}{5}\right)} = \frac{1}{2}$

$\therefore BC \perp AC \Rightarrow \underline{|C} = 90^0$

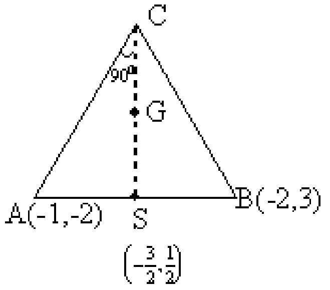
$$G = \left(\frac{2 + 2 - k + \frac{10+3k}{5}}{3}, \frac{k + (-k) + \left(-\frac{k}{5}\right)}{3}\right) = \left(\frac{30-2k}{15}, \frac{-k}{15}\right)$$

Locus is $\frac{15x-30}{-2}=-15y \Rightarrow x-2y=2$

53 & 54. $(2x+3y+8)+\lambda(x-y-1)=0$ $A=(-1,-2)$

$(3x-2y+12)-\lambda(x+y-1)=0$ $B=(-2,3)$

$SG=\frac{1}{3}(CS)=\frac{1}{3}\left(\frac{AB}{2}\right)=\frac{1}{6}(AB)=\frac{1}{6}\sqrt{26}$



Locus is circle with centre at $\left(-\frac{3}{2},\frac{1}{2}\right)$ and radius $\sqrt{\frac{13}{18}}$

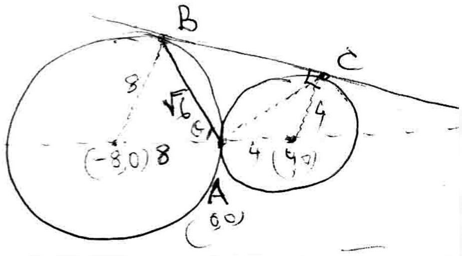
$\left(x+\frac{3}{2}\right)^2+\left(y-\frac{1}{2}\right)^2=\frac{13}{18}$

ABC is rt.isoceles $\Rightarrow C=(-4,0)$ or $(1,1)$

$\therefore (OC)_{min}=\sqrt{2}$

55&56. $\cos\theta=\frac{(\sqrt{6}/2)}{8} \Rightarrow \cos\theta=\frac{\sqrt{6}}{16}$

$B=\left(-\sqrt{6}\cos\theta,\sqrt{6}\sin\theta\right)$



$BC=\sqrt{x_1^2+y_1^2-8x_1}=\sqrt{6\cos^2\theta+6\sin^2\theta+8\sqrt{6}\cos\theta}=\sqrt{6+8\sqrt{6}\times\frac{\sqrt{6}}{16}}=\sqrt{9}=3$

$L.D.C.T=2\sqrt{r_1r_2}=2\sqrt{4\times 8}=8\sqrt{2}$

57. Conceptual

58. P) $GE=(x-3)^2+(y-5)^2$

Distance $=\frac{|15(3)+8(5)-34|}{17}=3$

$\therefore$ Required minimum = 9

Q) Distance from (0,5) to y + 2 = 0 is 7

R) $\frac{1+|a|}{a+1}>0$ and $\frac{a|a|-1}{a+1}>0$ solving $a\in(1,\infty)$

S) $(Area)_{max}=3$ square units

59. Conceptual

60. (A) $C_1 : x^2 + y^2 - 2a(x+y) + a^2 = 0$

Centre: (a,a), radius: a

$C_2 : x^2 + y^2 - 2b(x+y) + b^2 = 0$

Centre: (b,b), radius b

C_1 and C_2 touch $\Rightarrow \sqrt{2}(b-a) = a+b$

$\Rightarrow \frac{b}{a} = \left(\sqrt{2}+1\right)^2 = 3+2\sqrt{2}$.

(B) C_1 and C_2 intersect orthogonally

$\Rightarrow 2(b-a)^2 = a^2 + b^2 \Rightarrow \frac{b}{a} = 2+\sqrt{3}$.

(C) The common chord is

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

If passes through $(a,a) \Rightarrow \frac{b}{a} = 3$.

(D) C_2 passes through (a,)

$\Rightarrow 2a^2 - 4ab + b^2 = 0 \Rightarrow \frac{b}{a} = 2+\sqrt{2}$