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: 01-11-15

Time: 09:00 AM to 12:00 Noon | RPTA-10 | Max.Marks: 180

PAPER-1

KEY & SOLUTIONS

PHYSICS

1	**ABD**	2	**BC**	3	**A**	4	**BC**	5	**D**	6	**ABC**
7	**AC**	8	**C**	9	**AD**	10	**AC**	11	**5**	12	**3**
13	**8**	14	**6**	15	**3**	16	**0**	17	**6**	18	**6**
19	**3**	20	**0**								

CHEMISTRY

21	**ABCD**	22	**CD**	23	**ABC**	24	**ABCD**	25	**ACD**	26	**ABD**
27	**ABD**	28	**AB**	29	**ABC**	30	**ABD**	31	**4**	32	**3**
33	**4**	34	**5**	35	**7**	36	**2**	37	**8**	38	**3**
39	**9**	40	**3**								

MATHS

41	**BCD**	42	**AC**	43	**ABC**	44	**ABD**	45	**ABCD**	46	**ABD**
47	**BCD**	48	**AB**	49	**AD**	50	**ABCD**	51	**3**	52	**5**
53	**2**	54	**7**	55	**1**	56	**6**	57	**1**	58	**9**
59	**2**	60	**3**								

MATHS

41. $\overline{a}-x\left((x+1)\overline{a}-2\overline{c}\right)=3\overline{c}\Rightarrow\left(x^2+x-1\right)\overline{a}=(2x-3)\overline{c}$ now $\left(x^2+x-1\right)(2x-3)<0\Rightarrow x\in\left(-\alpha,\frac{-1-\sqrt{5}}{2}\right)U\left(\frac{\sqrt{5}-1}{2},\frac{3}{2}\right)$

Given options x cannot be 2,3,4

42. $\overrightarrow{OB}|\,|\{(1,-2,2)\times(1,0,0)\}\times(1,-2,2)=(4,1,-1)\Rightarrow\overrightarrow{OB}=\frac{(4,1,-1)}{\sqrt{2}}$

$\overrightarrow{OC}\,||\,\{(4,1,-1)\times(0,10)\}\times(4,1,-1)=(-4,17,1)\Rightarrow\overrightarrow{OC}=\frac{(-4,17,1)}{\sqrt{34}}$

43. Cleary $\overline{a}.\overline{b}=\frac{1}{2}$ Also $\left(\overline{c}-\overline{a}-2\overline{b}\right).\overline{b}=3\left(\overline{a}\times\overline{b}\right).\overline{b}\Rightarrow\overline{c}.\overline{b}-\frac{1}{2}-2=0\Rightarrow\overline{b}.\overline{c}=\frac{5}{2}$

$\left(\overline{c}-\overline{a}-2\overline{b}\right).\overline{a}=3\left(\overline{a}\times\overline{b}\right).\overline{a}\Rightarrow\overline{a}.\overline{c}-1-2\left(\frac{1}{2}\right)2=0\Rightarrow\overline{a}.\overline{c}=2$

$\therefore\overline{a}.\overline{b}+\overline{b}.\overline{c}+\overline{c}.\overline{a}=\frac{1}{2}+\frac{5}{2}+2=5$

$\left|\overline{c}-\overline{a}-2\overline{b}\right|^2=9\left|\overline{a}\times\overline{b}\right|^2$

$\Rightarrow\left|\overline{c}\right|^2+1+4-2(2)-4\left(\frac{5}{2}\right)+4\left(\frac{1}{2}\right)=9(3)$

$\Rightarrow\left|\overline{c}\right|^2=34\Rightarrow\left|\overline{c}\right|=\sqrt{34}$

44.

$$\left.\begin{array}{l}\overrightarrow{OA}=\overline{a}\\\overrightarrow{OB}=\overline{b}\\\overrightarrow{OC}=\overline{c}\end{array}\right\}\Rightarrow\begin{array}{l}|\vec{a}|=1\\|\overline{b}|=1\\|\overline{c}|=1\end{array}\qquad\begin{array}{l}\vec{a}.\overline{b}=\frac{1}{2}\\\overline{b}.\overline{c}=\frac{1}{2}\\\overline{c}.\overline{a}=\frac{1}{2}\end{array}$$

$\overline{c}=p\overline{a}+p\overline{b}+q\left(\overline{a}\times\overline{b}\right)$

$\Rightarrow\frac{1}{2}=p+\frac{p}{2}+0......(1)$

$\frac{1}{2}=\frac{p}{2}+p+0......(2)\Rightarrow p=\frac{1}{3}$

Also $\left[\bar{a}\,\bar{b}\,\bar{c}\right] = 0 + 0 + q\left(\frac{3}{4}\right) \Rightarrow \frac{1}{\sqrt{2}} = \frac{3q}{4} \Rightarrow q = \frac{2\sqrt{2}}{3}$

45. $\frac{\alpha + 2\beta + 2\gamma}{3} = \frac{2\alpha + 3\beta + 6\gamma}{7} = \frac{3\alpha + 4\beta + 12\gamma}{13}$

$$\left.\begin{aligned} \alpha + 5\beta - 4\lambda &= 0 \\ 5\alpha + 11\beta - 6\lambda &= 0 \end{aligned}\right\} 11^{5} \overset{-4}{-6} \;\; \overset{1}{5} \, \overset{5}{11} \; \frac{\alpha}{14} = \frac{\beta}{-14} = \frac{\lambda}{-14}$$

$\overrightarrow{OD} \parallel (1,-1,-1)\ NOW\ \left|\overrightarrow{OD}\right| = 1 \Rightarrow \overrightarrow{OD} = \left(\frac{1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}\right)(or)\left(\frac{-1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right)$

$$V_{\min} = \frac{1}{6}\left|\left(\overrightarrow{DA}\,\overrightarrow{DB}\,\overrightarrow{DC}\right)\right| = \frac{1}{6}\begin{vmatrix} -2 & -1 & -1 \\ -3 & -2 & -11 \end{vmatrix} = \frac{1}{6}\begin{vmatrix} 0 & 0 & -1 \\ 7 & 3 & -5 \\ 18 & 8 & -11 \end{vmatrix} = \frac{1}{6}(2) = Y_3(D = (-1,1,1)$$

$$V_{\max} = \frac{1}{6}\begin{vmatrix} 0 & -3 & -3 \\ -1 & -4 & -7 \\ -2 & -5 & -13 \end{vmatrix} = \frac{1}{6}\begin{vmatrix} 0 & 0 & -1 \\ -1 & 3 & -7 \\ -2 & 8 & -13 \end{vmatrix} = \frac{1}{6}(6) = 1\left(D = (1,-1,-1)\right)$$

46. $\frac{x-1}{0} = \frac{y-0}{2-\alpha} = \frac{z-0}{3(1-\alpha)}; \frac{x-2}{0} = \frac{y-0}{1-\alpha} = \frac{z-0}{\alpha}$

$$\text{Copular} \Rightarrow \begin{vmatrix} 0 & 2-\alpha & 3(1-\alpha) \\ 0 & 1-\alpha & \alpha \\ 1 & 0 & 0 \end{vmatrix} = 0 \Rightarrow \alpha(2-\alpha) - 3(1-\alpha)^2 = 0$$

$\Rightarrow 2\alpha - \alpha^2 - 3 + 6\alpha - 3\alpha^2 = 0$

$\Rightarrow 4\alpha^2 - 8\alpha + 3 = 0 \Rightarrow (2\alpha - 3)(2\alpha - 1) = 0 \Rightarrow \alpha = \frac{3}{2}, \alpha = \frac{1}{2}$

$$\alpha = \frac{3}{2} \Rightarrow \frac{x-1}{0} = \frac{y}{\frac{1}{2}} = \frac{3}{-\frac{3}{2}} \ \& \frac{x-2}{0} = \frac{y}{-\frac{1}{2}} = \frac{z}{\frac{3}{2}} \Rightarrow L_1 \parallel L_2$$

$$\alpha = \frac{1}{2} \Rightarrow \frac{x-1}{0} = \frac{y}{\frac{3}{2}} = \frac{z}{\frac{3}{2}} \ \& \frac{x-2}{0} = \frac{y}{\frac{1}{2}} = \frac{z}{\frac{1}{2}} \Rightarrow L_1 \parallel L_2$$

48.

$$\begin{array}{c} i\ j\ k \\ 1\ 2\ 1 \\ 6\ 8\ 3 \\ \hline -2\ 3\ -4 \end{array} \therefore (-2,3,-4).(\alpha,\mu,1)=0 \Rightarrow -2\alpha+3\mu-4=0 \Rightarrow 3\mu-2\alpha=4$$

49. $\frac{x}{1}=\frac{y}{2}=\frac{z-5}{0};\ \frac{x}{1}=\frac{y}{-2}=\frac{z+5}{0}\ \ \cos\theta=\left|\frac{1-4+0}{\sqrt{5}\ \sqrt{5}}\right|=0.6<\frac{1}{\sqrt{2}}\theta>45^0$

$d_1^2=d_2^2 \Rightarrow 4(z-5)^2+(z-5)^2+(2x-y)^2=4(z+5)^2+(2x+y)^2 \Rightarrow 2xy+25z=0$

50. $p=5\,|\,q=-4 \Rightarrow \left.\begin{array}{c} P=(2,5,0) \\ Q=(-4,13,0) \\ \hline R_x=\frac{2+(-4)}{2}=-1 \\ \Rightarrow R_y=1 \end{array}\right\} \Rightarrow R=(-1,1)$

51. $M=57 \Rightarrow G.E=\frac{57-39}{6}=\frac{18}{6}=3$

52. $GE \Rightarrow (x-2y)^2+(2y-z)^2+(z-x)^2=0 \Rightarrow x=2y=z \Rightarrow \frac{x-0}{1}=\frac{y-0}{\frac{1}{2}}=\frac{z-0}{1} \Rightarrow \frac{x}{2}=\frac{y}{1}=\frac{z}{2}$

Ref. distance $=\left|\frac{(1,2,3)\times(2,1,2)}{(2,1,2)}\right|=\frac{\sqrt{1+16+9}}{\sqrt{4+1+4}}=\frac{\sqrt{26}}{3} \Rightarrow G.E=\left[\sqrt{26}\right]=5$

53. dot with $=\bar{a} \Rightarrow 1+0=\bar{a}.\bar{c} \Rightarrow \bar{a}.\bar{c}=1$

dot with $\bar{c} \Rightarrow \bar{a}.\bar{c}+\left[\overline{abc}\right]=\left|\bar{c}\right|^2 \Rightarrow \left[\overline{abc}\right]=\left|\bar{c}\right|^2-1$

$V=\frac{1}{6}\left|\left[\overline{abc}\right]\right|=\frac{1}{6}\left|\left|\bar{c}\right|^2-1\right| \in \left[\frac{1}{6},\frac{5}{6}\right] \Rightarrow 3(\beta-\alpha)=2$

55. $p_1=9-2\sqrt{8}$

$\Rightarrow \beta=9$

$\alpha=8$

$$\overline{}$$

$\beta-\alpha=1$

56. Number of pieces = 6

57. Nearest line is $\frac{x-2}{7}=\frac{y-2}{-6}=\frac{z+1}{1} \Rightarrow (\alpha,\beta,\gamma)=(9-4,0) \therefore \alpha+2\beta+\gamma=9-8+0=1$

58. Let $(\bar{a},\bar{b})=\alpha,((\bar{a}\times\bar{b}),\bar{c})=\beta$

Clearly $\sin\alpha.\cos\beta=1 \Rightarrow \sin\alpha=1,\cos\beta=1 \Rightarrow \alpha=90^0,\beta=0^0$

$\Rightarrow \bar{a},\bar{b},\bar{c}$ are maturely perpendicular

$$\left[\overline{bcd}\right]=0 \Rightarrow \begin{vmatrix} 4 & 0 & 1 \\ 0 & 9 & \bar{c}.\bar{d} \\ 0 & \bar{c}.\bar{d} & 1 \end{vmatrix}=0 \Rightarrow \bar{c}.\bar{d}=\pm\frac{3\sqrt{3}}{2}$$

We have $\bar{a}.\bar{d}=0$

$$\left|\bar{a}\times\bar{c}.\bar{d}\right|^2=\begin{vmatrix} 1 & 0 & 0 \\ 0 & 9 & \frac{3\sqrt{3}}{2} \\ 0 & \frac{3\sqrt{3}}{2} & 1 \end{vmatrix}=\frac{9}{4}$$

Also $\therefore \left|(\bar{a}\times\bar{c})\times\bar{d}\right|^2=\left|(\bar{a}.\bar{d})\bar{c}-(\bar{a}.\bar{c})\bar{d}\right|^2=\left|\frac{3\sqrt{3}}{2}\bar{a}\right|^2=\frac{27}{4}$

$\therefore GE=\frac{9}{4}+\frac{27}{4}=9$

60. $\left(2+\frac{r}{3},-1+\frac{r}{3},3+\frac{r}{3}\right)$ lies on $x+2y-z=2$

$\Rightarrow r=3$