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	JEE–ADVANCE	Date: 18-10-15
Time: 3 Hours	2011-P2-Model	Max Marks: 240

KEY & SOLUTIONS

CHEMISTRY

1	D	2	A	3	D	4	B	5	B	6	D
7	C	8	B	9	A	10	BCD	11	CD	12	A
13	2	14	3	15	0	16	5	17	0	18	3
19	A-PT, B-PS, C-PQ, D-PR	20	A-PQST, B-PQR, C-PS, D-PS								

PHYSICS

21	D	22	C	23	A	24	C	25	B	26	B
27	C	28	C	29	AD	30	AD	31	AC	32	BC
33	1	34	9	35	7	36	5	37	9	38	5
39	A-S; B-QT; C-R; D-PT	40	A-PRT; B-QS; C-Q; D-S;								

MATHEMATICS

41	B	42	C	43	A	44	B	45	C	46	B
47	C	48	D	49	BC	50	ABCD	51	BD	52	AD
53	2	54	2	55	1	56	4	57	1	58	3
59	A-R, B-P, C-PQR, D-S	60	A-R, B-RS, C-RS, D-PR								

MATHEMATICS

41. $\left(\vec{a}\times\vec{c}\right).\left(\vec{b}\times\vec{d}\right)=\begin{vmatrix} 22 & 2y^2-4y+9 \\ 4x^2+16x+25 & 3 \end{vmatrix}=-3$

$\Rightarrow\left(2y^2-4y+9\right)\left(4x^2+16x+25\right)=63$. This is possible only when $y=1, x=-2$

42. Let the new plane is $(3x+8y+15z+91)+\lambda(5x+17y+29z-2)=0$. It should be same as $x-y+z=k$. Hence $\frac{3+5\lambda}{1}=\frac{8+17\lambda}{-1}=\frac{15+29\lambda}{1}=\frac{91-2\lambda}{k}\Rightarrow\lambda=-\frac{1}{2}; k=184$.

43. $\cos\theta=\frac{1}{\sqrt{3}}$

44. $\overrightarrow{NP}=\frac{3}{4}\overrightarrow{AB}-\frac{1}{2}\overrightarrow{AF}$

45. Direction ratios are proportional to $2,-7,5$

49. We have $f'=g;\ g'=h;\ h'=f$ hence $\vec{a}=f\,i+g\,j+h\,k;\quad \vec{b}=g\,i+h\,j+f\,k;\quad \vec{c}=h\,i+f\,j+g\,k$

Consider $A=f^3+g^3+h^3-3fgh$ we can see that $\frac{dA}{dx}=0$. We can see that A=1.

50. $\begin{bmatrix} a & 4 & 1 \\ 0 & 2 & 3 \\ 3 & 0 & -b \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix}=\begin{bmatrix} 0 \\ 1 \\ -2 \end{bmatrix}$

$\Delta=\begin{vmatrix} a & 4 & 1 \\ 0 & 2 & 3 \\ 3 & 0 & -b \end{vmatrix}=30-2ab, \Delta_1=\begin{vmatrix} 0 & 4 & 1 \\ 1 & 2 & 3 \\ -2 & 0 & -6 \end{vmatrix}=4b-20\ \ \Delta_2=6a-ab-3,\ \ \Delta_3=-4a+12$

If $ab\neq15$,system has unique solution

If ab = 15, $\Delta_1=\frac{60}{a}-20,\ \Delta_2=6a-18, \Delta_3=-4a+12$

For a = 3, $\Delta_1=\Delta_2=\Delta_3=0$

For $a\neq3$ or $b\neq5$, at least one of $\Delta_1,\Delta_2,\Delta_3$ is non zero

51. Take i, j as sides of right triangle.

52. $\overrightarrow{AB}+\overrightarrow{AC}+\overrightarrow{AD}=\vec{a}$. $\overrightarrow{AB}\times\overrightarrow{AC}=\vec{b}; \overrightarrow{AB}\times\overrightarrow{AD}=\vec{c}$

$\overrightarrow{AB}.\vec{a}=3=\overrightarrow{AC}.\vec{a}\Rightarrow\overrightarrow{AD}.\vec{a}=3$; $\overrightarrow{AB}-\overrightarrow{AC}=\frac{1}{3}\left(\vec{a}\times\vec{b}\right); \overrightarrow{AB}-\overrightarrow{AD}=\frac{1}{3}\left(\vec{a}\times\vec{c}\right)$

53. We have $\overrightarrow{AD}.\overrightarrow{BC}=\frac{1}{4}\left|\overrightarrow{AD}\right|\left|\overrightarrow{BC}\right| \Rightarrow 4\vec{d}.(\vec{c}-\vec{b})=\left|\vec{d}\right|\left|\vec{c}-\vec{b}\right|=\left|\vec{d}\right|\left|\vec{b}\right|$ as the triangle ABC is equilateral.

This gives $4\left(3\left|\vec{b}\right|-6\left|\vec{b}\right|\cos\alpha\right)=6\left|\vec{b}\right| \Rightarrow \cos\alpha=\frac{1}{4}$

54. $m=\dfrac{3-\frac{32}{9}}{\frac{32}{9}-4}=\frac{5}{4}$. $\left|(2mi+j-k).(i+2mj+3k)\right|=|4m-3|=2$

56. Take $\vec{r}=x\hat{\alpha}+y\hat{\beta}+z(\hat{\alpha}\times\hat{\beta})$

57. Direction ratios of the line of intersection of $2x+y+z=0$ and $x+y+2z=0$ are $1,-3,1$

58. P(3, 5, 2)

59. We have $ab+bc+ca=1;(a-b)^2+(b-c)^2+(c-a)^2=1$. This gives $\sum a^2=\frac{3}{2}$. Hence $(a+b+c)^2=\frac{3}{2}+2=\frac{7}{2}$. We know, if $x+y+z=0; x^2+y^2+z^2=1$ then $|9xyz|^2\le\frac{3}{2}$

$\left|\left[\overrightarrow{OP}\quad \overrightarrow{OQ}\quad \overrightarrow{OR}\right]\right|=\left|\left(\sum a\right)\left(\sum a^2-\sum ab\right)\right|=\frac{1}{2}\sqrt{\frac{7}{2}}$

60. A) $\left(\vec{x}+\vec{y}\right)\times\left(\vec{x}\times\vec{y}\right)=\vec{a}\times\vec{b}\Rightarrow\frac{3}{2}\left(\vec{x}-\vec{y}\right)=\vec{a}\times\vec{b}$ and $\vec{x}+\vec{y}=\vec{a}$ then $\vec{x}=\frac{1}{2}\vec{a}+\frac{1}{3}(\vec{a}\times\vec{b})$ then $\frac{1}{q}+4p=5$

B) $\left(2\vec{a}\times3\vec{b}\right)\times\left(\vec{r}\times4\vec{c}\right)+\left(3\vec{b}\times2\vec{c}\right)\times\left(\vec{r}\times4\vec{a}\right)+\left(2\vec{c}\times4\vec{a}\right)\times\left(\vec{r}\times3\vec{b}\right)=48[\vec{a}\,\vec{b}\,\vec{c}]\vec{r}=\frac{16\lambda(\lambda-2)}{5}[\vec{a}\,\vec{b}\,\vec{c}]\vec{r}$ implies $\lambda=5,-3$

C) Given $\vec{a}\perp\vec{c}, \vec{b}\perp\vec{c}\Rightarrow\vec{c}=p(\vec{a}\times\vec{b})$. We have $(\vec{a}\times\vec{b})\times(\vec{b}\times\vec{c})=\frac{\vec{c}.\vec{c}}{p}\vec{b}=\frac{36}{p}\vec{b}$

Hence $m=\frac{6}{\sqrt{14p}}$

We have $\vec{c}=p(\vec{a}\times\vec{b})\Rightarrow 36=p^2 9.25.\frac{\sqrt{224}}{9.25}\Rightarrow p=\pm\frac{3}{2\sqrt{14}}$ this gives $m=\pm4$

D) pq=6, p+q=r+1=5 then the value of $3p-2q$ is 0 or 5