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-P1-Model	Max Marks: 240

PAPER-I

KEY & SOLUTIONS

CHEMISTRY

1	D	2	C	3	A	4	B	5	C	6	C
7	B	8	CD	9	BC	10	ABC	11	ABD	12	B
13	A	14	B	15	D	16	C	17	2	18	6
19	2	20	2	21	6	22	3	23	8		

PHYSICS

24	B	25	C	26	A	27	D	28	B	29	C
30	D	31	C	32	AD	33	CD	34	BC	35	B
36	B	37	B	38	A	39	B	40	5	41	7
42	4	43	5	44	4	45	3	46	6		

MATHS

47	C	48	A	49	C	50	A	51	B	52	C
53	C	54	AC	55	BCD	56	BD	57	AB	58	C
59	D	60	B	61	D	62	B	63	2	64	6
65	2	66	3	67	0	68	1	69	8		

MATHS

47. $\vec{p}.\vec{a} = \vec{q}.\vec{a} = \vec{r}.\vec{a} = 64$ gives
$y^3 - 12x^2 + 48x - 64 = 0;\ z^3 - 12y^2 + 48y - 64 = 0;\ x^3 - 12z^2 + 48z - 64 = 0$
Adding, we get $(x-4)^3 + (y-4)^3 + (z-4)^3 = 0$ gives $x = y = z = 4$. So,
$\left[xi + yj - zk \quad zi - xj + yk \quad -yi + zj + xk\right] = 256$

48. D.R.s of the line joining points $(-1,2,3),(-3,5,-3)$ are $2,-3,6$
Let θ be the acute angle between the lines, $|\cos\theta| = \frac{20}{21}$

49. $\begin{vmatrix} 5 & 2 & 13-p \\ 1 & 2 & 3 \\ -1 & 2 & -3 \end{vmatrix} = 0 \Rightarrow p = -2$

50. Since $\vec{x}, \vec{y}$ and $\vec{x} \times \vec{y}$ are linearly independent, $\frac{c}{3} = \frac{a}{4} = \frac{b}{5} \Rightarrow$ the triangle is right angled

51. Equation of the plane which in passing through the line of intersection of
$\vec{r}.\vec{a} = p \,\&\, \vec{r}.\vec{b} = q$ and through $C(\vec{c})$ is $\vec{r}.\left\{\hat{c} \times (\vec{a} \times \vec{b}) + p\vec{b} - q\vec{a}\right\} = q(\hat{c}.\vec{a}) - p(\hat{c}.\vec{b})$. Hence
$\alpha = \vec{b}.\hat{c} = b\cos\theta,\ \beta = \hat{c}.\vec{a} = a\sin\theta$

52. Let A is origin and $\overline{AB} = \overline{DC} = \vec{b}; \overline{BC} = \overline{AD} = \vec{c}$
$\frac{BL}{LC} = \frac{1}{2}$ gives $\overrightarrow{AL} = \vec{b} + \frac{1}{3}\vec{c}$. AL intersects BD at P. So, $\overrightarrow{AP} = \frac{3}{4}\vec{b} + \frac{1}{4}\vec{c}$
$\frac{DM}{MC} = 2$ gives $\overrightarrow{AM} = \frac{2}{3}\vec{b} + \vec{c}$. AM intersects BD in Q. So, $\overrightarrow{AQ} = \frac{2}{5}\vec{b} + \frac{3}{5}\vec{c}$

53. $(i + j - 3k).(3i - 2j - 6k) - 5 = 13 > 0\ (2i + j - k).(3i - 2j - 6k) - 5 = 5 > 0$

54. Let the plane be $l(x-2) + m(y-3) + n(z+1) = 0$
Solving $l - 2m + 2n = 0$; $2l + 3m - n = 0$ we get $\frac{l}{-4} = \frac{m}{5} = \frac{n}{7}$
So, the plane is $4(x-2) - 5(y-3) - 7(z+1) = 0 \Rightarrow 4x - 5y - 7z = 0$

55. Take circum center as origin

56. Required plane is perpendicular to the line and plane given, and passes through $(-1,0,1)$ or any plane passing through the intersection of this plane and given plane.

58, 59 & 60
$D\left(1, \frac{5}{3}, \frac{7}{3}\right), E\left(\frac{8}{3}, \frac{1}{3}, \frac{11}{3}\right)\ F\left(\frac{8}{7}, \frac{9}{7}, \frac{19}{7}\right)$
$\overrightarrow{FP} \parallel \overrightarrow{AB} \times \overrightarrow{AC}$ hence $\overrightarrow{FP} = 2(j+k)$
$P\left(\frac{8}{7}, \frac{23}{7}, \frac{33}{7}\right)$
Volume = $\frac{1}{42}\begin{vmatrix} 8 & 9 & 19 \\ 3 & -1 & 1 \\ 0 & -3 & 3 \end{vmatrix} = \frac{14}{3}$

Vector equation of $\overrightarrow{AP}$ is $\vec{r} = 3i + j + 3k + t(13i - 16j - 12k)$

61 & 62.

$7(x-y) = 3(x^2 + xy + y^2)$. Let $x - y = 9t$. This gives $63t = 3(81t^2 + 3(9t + y)y)$

This can be written as $(2y + 9t)^2 = 28t - 27t^2$

This is possible for only $t = 1$. This gives $(x, y) = (5, -4), (4, -5)$

63. $\vec{p} = \vec{a} - \vec{a} \times \vec{b}$

64. $ax + by + cz + 1 = 0$ makes 45^0 with the line $x = y - z = 0$ ie., $\frac{x}{0} = \frac{y}{1} = \frac{z}{1} \Rightarrow \frac{b+c}{\sqrt{a^2+b^2+c^2}} = 1$ and makes 60^0 with the line $x = y = z$. $\Rightarrow \frac{a+b+c}{\sqrt{a^2+b^2+c^2}} = \frac{3}{2}$. Hence $\frac{a}{\sqrt{a^2+b^2+c^2}} = \frac{1}{2} \Rightarrow k = 3$

65. $\vec{a} \times \left(\vec{b} \times \vec{c}\right) = \left(\vec{a}.\vec{c}\right)\vec{b} - \left(\vec{a}.\vec{b}\right)\vec{c}$

$\vec{a} \times \left\{\left(\vec{r} - \vec{b}\right) \times \vec{a}\right\} + \vec{b} \times \left\{\left(\vec{r} - \vec{c}\right) \times \vec{b}\right\} + \vec{c} \times \left\{\left(\vec{r} - \vec{a}\right) \times \vec{c}\right\} = \vec{0} \Rightarrow 2\vec{r} = \vec{a} + \vec{b} + \vec{c}$

66. $\cos\theta = \frac{1}{\sqrt{6}}$

68. Volume = $\frac{6^2}{24}\begin{vmatrix} 1 & 1 & -1 \\ 1 & -1 & 1 \\ -1 & 1 & 1 \end{vmatrix} = 6$

69. The plane is 3x-3y+z=2