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 ADVANCED	DATE : 09-08-15
TIME : 02:00 AM TO 05: 00 PM	2013_P2 MODEL	MAX MARKS : 180

KEY & SOLUTIONS

PHYSICS

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

CHEMISTRY

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

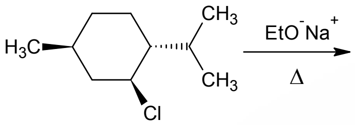
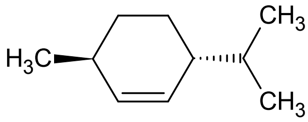
MATHEMATICS

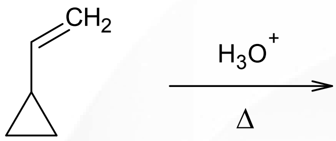
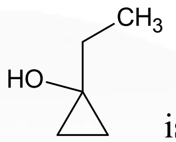
41	**ABC**	42	**BC**	43	**BD**	44	**ABC**	45	**ABCD**	46	**D**
47	**ABC**	48	**AC**	49	**B**	50	**C**	51	**C**	52	**B**
53	**B**	54	**C**	55	**B**	56	**A**	57	**B**	58	**D**
59	**A**	60	**C**								

CHEMISTRY

21. H_2 / Pd–$BaSO_4$;H_2 / Ni_2B(P-2 Catalyst)&B_2H_6-THF;CH_3COOH gives syn addition

22. Wurtz reaction gives good yield for symmetrical alkanes

25.  gives majorly  due to anti elimination

26.  in this reaction  is not formed

27. Cl_2 at high temperatures; SO_2Cl_2 in presence of light & Me_3COCl in presence of light gives freeradical substitution

31. This reaction is E^1cb

33 & 34. A & B are positional isomers

35. 1,3-butadiene has more heat of hydrogenation

36. Cis-2-butene is most reactive towards catalytic hydrogenation

MATHS

41. The points A and B are $(4t, 2t^2), (-4t, 2t^2)$, P is $(0,\ 4+2t^2)$

The circle is $x^2+y^2+2(t^2-1)y-4t^2=0$

42. R is (9, 0) and S is (-1, 0)

The circle passing through P, Q and length of whose tangent from origin has the equation $x^2+y^2-27x+18=0$

43. Let the points are $(t^2, 2t), (s^2, 2s)$ with $2(t+s)=3$. Chord joining them is $4x-3y+4ts=0$

It can pass through origin also, so the minimum distance is zero.

If it is focal chord, then $ts=-1$ and its length is $\frac{25}{4}$

The normals drawn at these points meet at $(p,q)=(t^2+s^2+ts+2,-ts(t+s))$ which lies on the line $y+\left(-\frac{3}{2}\right)x=2\left(-\frac{3}{2}\right)+\left(-\frac{3}{2}\right)^3$ which is a normal

Area = $\int_{2s}^{2t}\left(\frac{3y}{4}-ts-\frac{y^2}{4}\right)dy$

44. Given circle is circum circle of excentral triangle ABC of triangle PQR. Orthocenter of the excentral triangle is the incenter of the triangle. Image of orthocenter in any side lies on the circumcircle. Hence the required locus is $x^2+y^2+6x-14y+38=0$

45. Conceptual

46. The conormal points are given by $t_1=2, t_2=3, t_3=-5$. So, there will be three cases for T. Required circle is circle with TR as diameter.

48. Conceptual

49, 50

Normal at A(t) on $y^2=64x$ is $y+xt=32t+16t^3$. If it passes through C(25, 12) then $16t^3+7t-12=0 \Rightarrow (4t)^3+7(4t)-48=0$ gives 4t=3. Hence A is (9, 24). As AC=20, P is midpoint of AC. So, P is (17, 18). The tangent at P is $4x-3y=14$. If this meets $y^2=-28x$ at $T(-7t^2,14t)$, then $2t^2+3t+1=0$. Hence T can be $\left(-\frac{7}{4},-7\right)$ or $(-7,-14)$. The line $4x-2y-7=0$ is tangent at $\left(-\frac{7}{4},-7\right)$ and $x+y+21=0$ is normal at $(-7,-14)$

51, 52

Observe that triangle ABC is right angled at C. Slope of BC=$\frac{3}{4}$. So, BC in new position is $3x-4y+3=0$ or $3x-4y-47=0$. Nearer to B is $3x-4y+3=0$

Similarly, Slope of AC=$-\frac{4}{3}$. So, AC in new position is

$4x+3y-21=0$ or $4x+3y+79=0$. Nearer to A is $4x+3y-21=0$. Hence the required tangents for the first question are $3x-4y+3=0$, $4x+3y-21=0$. The new position for C is (3, 3)

So, $CB'=CA'=5$ (length of tangents to the circles from C)

We observe that $AC=20, BC=15, AB=25$. Hence the required perimeter is $50+5\sqrt{2}$

The other pair of tangents meet at $(-7,-17)$ the lengths of tangents are 25, 15. Hence the required distance is $5\sqrt{34}$

53, 54

Vertices are given by $A_n = \left(n(n-1), \frac{\sqrt{3}}{2}(2n-1)\right)$. They lie on the parabola $4y^2-12x-3=0$ whose directrix is $x=-1$. Hence focal radius of $A_{10} = \left(90, \frac{19}{2}\sqrt{3}\right)$ is 91

55, 56.

The required locus is the circle described on AB as diameter.

The required point is the orthocenter of triangle ABC and given triangle is right triangle.

57. P) Circle $(x-2)^2+(y-2)^2+2\lambda(x+3y-8)=0$ should have center on y-axis. So, $\lambda=2$

So, $(\alpha-2)^2+(\beta-2)^2+4(\alpha+3\beta-8)=0 \Rightarrow \alpha^2+\beta^2+8\beta-24=0$

$\Rightarrow \alpha^2+(\beta+4)^2=40 \Rightarrow \alpha^2 \le 40$

Q) Smallest circles are at the intersection of radical axis and circles.

R) $4y^2-3y+6x+1=0 \Rightarrow \left(y-\frac{3}{8}\right)^2 = \frac{-6x}{4}-\frac{7}{64}$

If normals at 3 points are con current then centroid lie on the axis $8y-3=0$ of parabola

S) Equation of circle is $x^2+y^2+\lambda(2x-y)=0$ …(1)

Equation of common chord is

$(x^2+y^2+2x+6y-7)-(x^2+y^2+\lambda(2x-y))=0$

$\Rightarrow (2x+6y-7)-\lambda(2x-y)=0$

This passes through point $\left(\frac{1}{2},1\right)$.

58. Let the center of the required circle is (x, y) and radius is r. Given $A(0,6), B(0,0)$ and $C(8,0)$. Eliminate x, y from the equations $x^2+y^2=(r\pm2)^2$; $(x-8)^2+y^2=(r\pm2)^2$; $x^2+(y-6)^2=(r\pm2)^2$ accordingly.

59. P) The circle $x^2+y^2-2\alpha x-2\alpha y+5\alpha-6=0$ cannot be in the third quadrant

i) either lie in first quadrant or

ii) can touch both axes

$\alpha^2 \le 5\alpha - 6 \Rightarrow \alpha \in [2,3]$

Q) D is $\left(\frac{25}{2}, 6\right)$

R) Angle subtended at center is $\frac{\pi}{2}$.

S) $\sqrt{ab}$ is equal to the length of tangent from $(3,-2)$ to the given circle

60. P) Circum circle of ΔPQR always passes through vertex of the parabola (0, 0)

Q) $x^2 + y^2 + 2xy - 7x - 5y + 14 = 0$

$(x+y-3)^2 = (x-y-5)$

$$2\left(\frac{x+y-3}{\sqrt{2}}\right)^2 = \sqrt{2}\left(\frac{x-y-5}{\sqrt{2}}\right)$$

Then parabola is $Y^2 = \frac{1}{\sqrt{2}}X$ where $Y = \frac{x+y-3}{\sqrt{2}},\ X = \frac{x-y-5}{\sqrt{2}}$

Focus is given by $X = \frac{1}{4\sqrt{2}}, Y = 0$

(α, β) satisfies $x - y - 5 = \frac{1}{4}, x + y - 3 = 0$

R) The reflected rays will always pass through focus (0,0)

S) By eliminating 't', $(x-y)^2 = 2(x+y-2)$

$$\Rightarrow \left(\frac{x-y}{\sqrt{2}}\right)^2 = \sqrt{2}\left(\frac{x+y-2}{\sqrt{2}}\right)$$

$\therefore$ Latus rectum is $\sqrt{2}$