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: 23-08-15
Time: 3 Hours	2011-P1-Model	Max Marks: 240

PAPER-I

KEY & SOLUTIONS

CHEMISTRY

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

PHYSICS

24	D	25	C	26	C	27	C	28	A	29	D
30	A	31	ABD	32	CD	33	BC	34	ABCD	35	C
36	B	37	B	38	B	39	A	40	2	41	2
42	4	43	4	44	8	45	3	46	3		

MATHS

47	C	48	A	49	A	50	B	51	A	52	C
53	D	54	ABCD	55	AB	56	ABC	57	ABCD	58	B
59	A	60	C	61	D	62	A	63	6	64	2
65	2	66	7	67	5	68	8	69	9		

MATHS

47 . $[z = x + iy \Rightarrow y = 3 \,\&\, x = \sqrt{20}$

$z = \sqrt{20} + 3i = e^a e^{ib} = \sqrt{20} + 3i$

$\Rightarrow e^a = \ln[(29)]$

48. $[z^n - 1 = 0 \Rightarrow z = e^{\frac{2\lambda\pi i}{n}}$

$z^m - 1 = 0 \Rightarrow z = e^{\frac{2\mu\pi i}{m}}$

If m & n are co-primes, then the only solution is z=1]

50. $t = \frac{z_1}{2z_2} \Rightarrow t_1^2 - it + 1 = 0 \Rightarrow t = \left(\frac{\sqrt{5}-1}{2}\right)(-i) = \left(\frac{\sqrt{5}+1}{2}\right)(i)$

$\Rightarrow \left.\begin{matrix}\cot\alpha = \sqrt{5}+1 \\ \cot\beta = \sqrt{5}-1\end{matrix}\right\} \Rightarrow \cot\alpha + \cot\beta = 2\sqrt{5}$

51. $[\, z = \frac{1+\sqrt{3}i}{2} \Rightarrow |z| = 1 \,]$

54. [One root is z=0. Other roots are z,iz, z+iz.

$\therefore$ z+iz+(z+iz)=-a

$iz^2 + z^2 + iz^2 + iz^2 - z^2 = 12 + 9i$

$= 3i(1+i) = -b$

$\Rightarrow a = \pm(2i+6) \quad b = \pm(9+13i)$

56. $\sqrt{z_1}\left(1 - |z_2|\right) = \sqrt{2}i\left(1 + |z|\right)$

$\frac{\sqrt{z_1}}{\sqrt{z_2}} =$ purely imaginary $\Rightarrow \frac{z_1}{z_2} =$ purely real (negative)

$\frac{\sqrt{z_1}}{\sqrt{z_2}} + \frac{\sqrt{\overline{z_1}}}{\sqrt{\overline{z_2}}} = 0$

Also $\sqrt{z_1} - i\sqrt{z_2} = \sqrt{z_1\overline{z_2}}\sqrt{z_1} + i\sqrt{z_1\overline{z_1}}\sqrt{z_2} \Rightarrow \left(1 - i\sqrt{\overline{z_1}z_2}\right)\left(\sqrt{z_1} - i\sqrt{z_2}\right) = 0$

$\overline{z_1}z_2 = -1 \quad$ or $\quad \frac{z_1}{z_2} = -1$

57. $\left.\begin{matrix}az^2 + z + 1 = 0 \,\& \\ \overline{a}z^2 - z + 1 = 0\end{matrix}\right\} \Rightarrow$ eliminating z.

$\Rightarrow -\sin^2\theta + \cos\theta = 0$

$\Rightarrow \cos\theta = \sin^2\theta$

$f'(x) = 3x^2 - 6x + 3(1+\cos\theta)$

$D < 0 \Rightarrow -36\cos\theta = -36\sin^2\theta < 0$

58&59.

[Radius is $k/\sqrt{2}$ & B is $|z-k| > |z-2k|$, in the region, to the right of $x = \frac{3k}{2}$ & points of contact of circle are

$\left(\frac{K}{2}, \pm\frac{K}{2}\right)$, $\left(\frac{3K}{2}, \pm\frac{K}{2}\right)$, & x > 3k

$\therefore$ we have no points

60. $C\left(\frac{1}{z_1}\right), B(-z_1)$ $\therefore$ D is $\frac{1}{z_1} - z_1$

61. $2\theta + \frac{\alpha}{2} = \pi/2$

62. $E(az_1), H(z_1 + az_1), F(2az_1)$

$\therefore$ G is $\frac{z_1 + 3az_1}{2}$

63. $\left[\frac{z^2+z+1}{z^2+z-1} = \text{real} \Rightarrow \frac{z^2+z+1}{z^2+z-1} = \frac{\bar{z}^2+\bar{z}+1}{\bar{z}^2+\bar{z}-1} \Rightarrow |z| = 1\right]$

64. $[(z^3-50)(2^3+49) = 0 \Rightarrow z = 50^{1/3}, 50^{1/3}\omega, 50^{1/3}\omega^2, -49^{1/3}, -49^{1/3}\omega, -49^{1/3}\omega^2$

$\Rightarrow \alpha = 3, \beta = 3, \gamma = 2, \delta = 2\,]$

65. $[z = \lim_{n\to\infty} \frac{\pi}{2}.\frac{1}{n}\sum_{r=0}^{n-1} e^{\frac{\pi r}{2n}} = \frac{\pi}{2}\int_0^1 e^{i\frac{\pi}{2}x}dx, = \frac{1}{i}(i-1)$

$\Rightarrow |z|^2 = 2\,]$

66. $[\bar{a}\,\bar{z}^2 + \bar{z} + 1 = 0 \;\&\; az^2 + z + 1 = 0$

eliminating z, using $z + \bar{z} = 0$.

$\Rightarrow (\bar{a} - a)^2 + 2(a + \bar{a}) = 0$

$\Rightarrow (-2i\sin\theta)^2 + 2(2\cos\theta) = 0 \qquad \Rightarrow \cos^2\theta + \cos\theta + 6 = 7\,]$

68. $z^6(1+i) = \bar{z}(i-1)$

$\Rightarrow |z|^6 = |z| \Rightarrow |z| = 0$ or 1

$\Rightarrow z = 0$ or $|z| = 1 \Rightarrow z\overline{z} = 1$

$\therefore z^6(1+i) = \frac{1}{z}(-1+i)$

$\Rightarrow z^7 = \left(\frac{1-i}{1+i}\right) = i$

$z = e^{i\left(2k\pi+\frac{\pi}{2}\right)\frac{1}{7}}, k = 0,1,2,...,6$

$\therefore$ total 8 solutions

69. $\frac{PA}{PB} = \frac{P'A}{P'B} = 2$

$\Rightarrow 2k_2 = 4k_1 \Rightarrow k_2 = 2k_1$

$PP' = 2cP = 3(k_2 - k_1)$

$CA = CP + PA = \frac{3(K_2 - K_1)}{2} + 3K_1 = \frac{9K_1}{2}$

$CB = \frac{3(k_2 - k_1)}{2} - k_1 = \frac{k_1}{2}$

$\frac{CA}{CB} = 9$