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 : 06-09-15
TIME : 3:00 | 2013_P1 MODEL | MAX MARKS : 180

KEY & SOLUTIONS

PHYSICS

1	D	2	D	3	C	4	D	5	A	6	A
7	B	8	C	9	D	10	D	11	AC	12	ABCD
13	ABCD	14	AD	15	BD	16	5	17	2	18	5
19	3	20	4								

CHEMISTRY

21	C	22	D	23	A	24	C	25	C	26	A
27	D	28	D	29	B	30	D	31	AB	32	AB
33	ABCD	34	AC	35	ABCD	36	4	37	1	38	3
39	1	40	4								

MATHEMATICS

41	D	42	B	43	C	44	D	45	D	46	A
47	C	48	D	49	A	50	B	51	AC	52	ABD
53	AB	54	CD	55	ABCD	56	5	57	9	58	3
59	9	60	5								

MATHS

41. $f(x)=3^{-|x|}-3^{x}+1$ which is niether injective nor surjective.

42. Clearly m is negative and $f(1^{+})\ge f(1)\Rightarrow 2m+1\ge m-1\Rightarrow m\ge -2\ \therefore m\in[-2,0)$

43. $f(x)=1, x\in R,\ g(x)=1, x\in R,\ h(x)=1, x\in R,\ \phi(x)=1, x\in R$

45. $f(n)=(n-1)[f(n-1)+f(n-2)]\Rightarrow f(2)=1$

$f(3)=2$, $f(4)=9$, $f(5)=44$, $f(6)=265$

46. $x=0=y\Rightarrow f(0)=0$ Also differentiate w.r.t x and y and simplifying

$$\frac{f'(x)}{1+f(x)}=\frac{-1}{1+x}\Rightarrow f(x)=\frac{c}{1+x}-1\quad f(0)=0\Rightarrow f(x)=\frac{-x}{x+1}\ \therefore GF=2010\left(1+\frac{-2009}{2010}\right)=1$$

47. period = 1/2

48. $f(x)=\begin{cases}3x+1, & 0\le x<1\\ \frac{x}{7}, & 1\le x\le 2\end{cases}$ solving with inverse $f^{-1}(x)=\begin{cases}7x, & \frac{1}{7}\le x\le\frac{2}{7}\\ \frac{x-1}{3}, & 1\le x<4\end{cases}$. We get $x=\frac{1}{4},\frac{7}{4}\Rightarrow$ sum $=2$

49. $xf(x)-1=0\equiv k(x-1)(x-2)...(x-9)$

put $x=0\Rightarrow -1=(-9!)k\Rightarrow k=\frac{1}{9!}\quad \therefore f(x)=\left(\frac{(x-1)(x-2)...(x-9)}{9!}+1\right)\frac{1}{x}$

$f(10)=\frac{1}{5}$

$\therefore GE=\frac{g(-1)}{f(10)}=\frac{10}{\left(\frac{1}{5}\right)}=50$

51. Clearly $\alpha=0$ $\lim\limits_{x\to 0}\frac{x\left(1+ax+\frac{a^2x^2}{2!}+\frac{a^3x^3}{3!}+...\right)-b\left(x-\frac{x^3}{3!}+...\right)}{x^3}=L$ (finite)

$\Rightarrow \boxed{a=0},\boxed{b=1},\boxed{L=\frac{1}{6}}$

52. Clearly $4-4b<0\Rightarrow \boxed{b>1}$

$y=\frac{x^2+bx+1}{x^2+2x+b}\Rightarrow (y-1)x^2+(2y-b)x+(by-1)=0$

$x\in R\Rightarrow \Delta\ge 0\Rightarrow (2y-b)^2-4(y-1)(by-1)\ge 0\Rightarrow (4-4b)y^2+4y+(b^2-4)\ge 0$

For which both $\alpha,\frac{1}{\alpha}$ satisfy

$\therefore$ product of roots $=1\Rightarrow \frac{b^2-4}{4-4b}=1\Rightarrow b^2+4b-8=0\Rightarrow \boxed{b=2\sqrt{3}-2}$

53. $G.L=\lim\limits_{n\to\infty}\frac{a^{\frac{1}{n}}-1}{\frac{1}{n}},\ n^{k-1}\frac{(-2)}{n(n+1)}\ \frac{1}{\sqrt{\frac{n-1}{n}}+\sqrt{\frac{n+1}{n+2}}}=(\ln a)(-1).\lim\limits_{n\to\infty}\frac{n^{k-1}}{n(n+1)}=\begin{cases}0 & if\ \ k=1,2\\ -\ln a & if\ \ k=3\end{cases}$

54. If $a \in (0,1)$ $f(x) = \begin{cases} x, & x \in Q \\ x, & x \in R - Q \end{cases}$

Thus it $\underset{x \to a}{lt} f(x) = a$

$\therefore \boxed{a = \frac{2}{3}}, \boxed{a = \frac{3}{\pi}}$

55. f is even $\Rightarrow$ gof is even

$\left.\begin{matrix} f(x)\ range\ [-1,1] \\ g(x)\ range\ \ \ R \end{matrix}\right\} \Rightarrow fog(x)\ range\, is\ [-1,1] \Rightarrow gof(x)\ \ range\ is\ [5,8] \Rightarrow [5,8]$

56. $f(x) + f(-x) = 12 \Rightarrow G.E = 12 - 7 = 5$

57. Range of $g(x)$ is$\left(1, 2^{\frac{3}{4}}\right) \Rightarrow a^4 + b^4 = 9$

59. $f(x) = 10\{x\}$

$\therefore f(x) = x \Rightarrow 10\{x\} = x \Rightarrow 9\{x\} = x - \{x\} \Rightarrow 9\{x\} = [x] \Rightarrow \{x\} = \frac{[x]}{9} \Rightarrow 0 \le \frac{[x]}{9} < 1 \Rightarrow 0 \le [x] < 9$

$[x] = 0, 1, 2, ..., 8$

$\therefore x = 0, 1 + \frac{1}{9}, 2 + \frac{2}{9}, ..., 8 + \frac{8}{9}$, no. of values = 9

60. R.N.W=$1 = \frac{{}^4C_2}{2} + {}^4C_2 = 10 \Rightarrow 66 = 10 - 5 = 5$