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 : 27-12-15**
TIME : 3:00 **2014_P2 MODEL** **MAX MARKS : 180**

KEY & SOLUTIONS

PHYSICS

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

CHEMISTRY

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

MATHEMATICS

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

MATHS

41. E_i bas has exactly i black balls.

$3 \le i \le 10$ $\quad\quad$ $P(E_i) = 1/8$.

E=three balls drawn are black

$$p\left(E_9/E\right) = \frac{P(E_9).P\left(E/E_9\right)}{\sum_{i=3}^{9} D(E_i)P\left(E/E_i\right)} = \frac{\frac{1}{8}\frac{{}^{9}C_3}{{}^{10}C_3}}{\frac{1}{8}\left\{\frac{3c_3}{{}^{10}C_3} + \frac{4c_3}{{}^{10}C_3} + \dots\dots\dots + \frac{{}^{10}C_3}{{}^{10}C_3}\right\}}$$

$$= \frac{14}{55}$$

42. $P(B^c) > P(A^c)$

$\Rightarrow P(B) > P(A)$

$$P(B/A) = \frac{P(A \cap B)}{P(A)} < \frac{P(A \cap B)}{P(B)} = P(A/B)$$

43. $\begin{pmatrix} 1 & -2 & k & -1 \\ k & -2 & 1 & -1 \\ 1 & -2k & 1 & 2 \end{pmatrix}$

$$=\sim \begin{pmatrix} 1 & -2 & k-1 & -1 \\ 0 & -2+2k & 1-k^2 & -1-k \\ 0 & 0 & 2-k^2-k & k+2 \end{pmatrix}$$

$\Rightarrow K = -2$ is the only solution

$\therefore$ required probability is $1/6$.

44. Let the number of marble be 2n(n-large) required probability

$$= \lim_{n\to\infty} \frac{n\left({}^{n}c_4\right)}{{}^{(2n)}c_5} \times \frac{\left({}^{n}c_3\right).\left({}^{n}c_2\right)}{\left({}^{2n}c_5\right)}$$

$$= \lim_{n\to\infty} \frac{50(n)^4(n-1)^3(n-2)^2(n-3)}{\left(2n(2n-1)(2n-2)(2n-3)(2n-4)\right)^2} = \frac{50}{1024} = \frac{25}{512}$$

45. $p(B \cap C) = \frac{3}{4} - \left(\frac{1}{3} + \frac{1}{3}\right) = \frac{1}{12}$

46. $\left(\tan 2x = t, \in\in(-\infty,\infty)\right)$

$\left[t^2\right] = t + a, a \in N$. $\Rightarrow$ t should be interer

$t = \frac{1 \pm \sqrt{1+49}}{2}$ $\Rightarrow 1+4a$ should be an odd interger

which is also perfect square 9, 25, ……..$(63)^2$

$\therefore$ required probability $\frac{31}{1000}$

47. $\left[\frac{(3c_3 + 3c_1)^2}{2^9} = \frac{1}{32}\right]$

48. $[P_n = n_{c_1}\left(\frac{1}{6}\right)\left(\frac{5}{6}\right)^{n-1} + n_{c_2}\left(\frac{1}{6}\right)^2\left(\frac{5}{6}\right)^{n-2} + \ldots\ldots + {}^n c_n\left(\frac{1}{6}\right)^n$

$P_n = \frac{1}{2}\left\{\left(\frac{5}{6}+\frac{1}{6}\right)^n + \left(\frac{5}{6}-\frac{1}{6}\right)^n\right\} = \frac{1}{2}\left\{\left[1-\left(\frac{2}{3}\right)^n\right]\right\}$

$P_{n-1} = \frac{1}{2}\left\{\left[1+\left(\frac{2}{3}\right)^{n-1}\right]\right\} \Rightarrow 2P_{n-1} = 1+\left(\frac{2}{3}\right)^n . \frac{3}{2}$

$\Rightarrow 6P_n - 4P_{n-1} - 1 = 0$

49. $\left[P\left(\frac{\overline{E_1}}{\overline{E_2}}\right) = 1 - P\left(\frac{E_1}{\overline{E_2}}\right)\right] = 1 - \left(\frac{1-P(E_1 \cup E_2)}{1-P(E_2)}\right) = \frac{2}{15}$

50. The total number of ways to put four identical oranges and six distinct apples into five distinct boxes is ${}^{(5+4-1)}C_4 . 5^6 = 70.5^6$

To satisfy the criteria that each box contains two objects we make three cases(based on number of oranges to go into a box)

1.Two oranges in each of the two boxes and no oranges in the other three boxes. Number of ways ${}^{(5)}C_2 . \frac{6!}{2!2!2!} = 900$

2. Two oranges in one box, one orange in each of the two other boxes $5.{}^{(4)}C_2 . \frac{6!}{2!2!1!1!} = 5400$

3. One orange in each of the four boxes $= \frac{5.6!}{2!1!1!1!} = 5x360 = 1800$

The total number of ways 900+5400+1800 = 8100

Probability $=\frac{8100}{70x5^6}=\frac{162}{21875}$

51 TO 52

Possible values of a are 3, 6, 9

Because $\frac{a^3}{3}-a^2b+3ac=0\Rightarrow -ab+3c$ is integer

Possible triple ts are $(9,4,3)$(3, 2, 1) & (6, 3, 2).

$\therefore 3/10_{C_3}=1/40$

53 TO 54

As wins, the balls must be drawn

of the following 3 ways RR, RBR, BRR.

i.e $Y(n)=\frac{2}{n+2}\frac{1}{n+1}+\frac{2}{n+2}.\frac{n}{n+1}.\frac{1}{n}+\frac{n}{n+2}.\frac{2}{n+1}.\frac{1}{n.}$

$Y(n)=6\left(\frac{1}{n+1}-\frac{1}{n+2}\right)$

$\underset{n\to\infty}{lt}\left[Y(1)+Y(2)+..........+Y(n)\right]=3.$

$x(n)=1-y(n)=1-\frac{6}{(n+1)(n+2)}=\frac{(n-1)(n+4)}{(n+1)(n+2)}$

$X(2)X(3)X(4)........X(n)=\frac{1.6}{3.4}\times\frac{2.7}{4.5}.\frac{3.8}{5.6}\times\frac{4.9}{6.7}......\frac{(n-1)(n+4)}{(n+1)(n+2)}$

$=\frac{1.2(n+3)(n+4)}{n(n+1)4.5}=1/10$

58. P) The number appearing on upper face of any dice can be 3, 4, 5 or 6 i.e. maximum 4 cases.

P(m = 3) = P(m ≥ 3) - P(m ≥ 4) = $\frac{4^5-3^5}{6^5}=\left(\frac{2}{3}\right)^5-\left(\frac{1}{2}\right)^5$

Q) The number appearing on upper face of any dice can be 1, 2, 3, or 4 i.e. maximum 4 cases.

P(n = 4) = P(n ≤ 4) - P (n ≤ 3) = $\frac{4^5-3^5}{6^5}=\left(\frac{2}{3}\right)^5-\left(\frac{1}{2}\right)^5$

R) P(2 ≤ m ≤ 4) = P(m ≥ 2) - P(m ≥ 5) $=\frac{5^5-2^5}{6^5}=\left(\frac{5}{6}\right)^5-\left(\frac{1}{3}\right)^5$

S) P(m = 2, n = 5) = P(2, 3, 4 or 5) - P(2, 3 or 4) - P (3, 4 or 5) + P(3 or 4)

$=\frac{4^5-2\times3^5+2^5}{6^5}=\left(\frac{2}{3}\right)^5-\left(\frac{1}{2}\right)^4+\left(\frac{1}{3}\right)^5$