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_P1 MODEL	MAX MARKS : 180

KEY & SOLUTIONS

PHYSICS

1	**AB**	2	**ABD**	3	**CD**	4	**BD**	5	**BD**	6	**D**
7	**AC**	8	**ABC**	9	**ACD**	10	**BCD**	11	**6**	12	**3**
13	**6**	14	**1**	15	**4**	16	**9**	17	**5**	18	**4**
19	**3**	20	**1**								

CHEMISTRY

21	**ACD**	22	**D**	23	**BD**	24	**AC**	25	**ABD**	26	**ABD**
27	**BD**	28	**BC**	29	**D**	30	**AC**	31	**2**	32	**5**
33	**3**	34	**9**	35	**5**	36	**6**	37	**1**	38	**2**
39	**0**	40	**1**								

MATHEMATICS

41	**AC**	42	**BCD**	43	**AB**	44	**ABD**	45	**ABC**	46	**ACD**
47	**ACD**	48	**ACD**	49	**ABCD**	50	**ABCD**	51	**0**	52	**8**
53	**2**	54	**9**	55	**6**	56	**4**	57	**3**	58	**6**
59	**7**	60	**6**								

MATHS

41. Q = $P(0Hor2Hor4H)$ = $p^4+6p^2(1-p)^2+(1-p)^4=\frac{(2p-1)^4+1}{2}$

42. For K = 2, each element has four possibility and three out of tour are favorable for the event.

Hence required probability . $\left(\frac{3}{4}\right)^n$

For K = 3, Probability that intersection is empty is $\left(\frac{7}{8}\right)^n$

For K = 3, Probability that intersection is singleton $\frac{n}{8}\left(\frac{7}{8}\right)^{n-1}$

43. Probability that exactly 2 persons will get nothing $\frac{{}^{(n)}C_2\ n!}{(n+2)^n}=\frac{(n+1)!}{2(n+2)^{n-1}}$

Probability that exactly 3 persons will get nothing $\frac{{}^{(n+2)}C_3\ (n-1)\ {}^{n}C_2(n-2)!}{(n+2)^n}$

44. let A_1, A_2 …… A_{2n} be the vertices of regular polygon of n sides.

Now select A_1 and the remaining vertices from the right hand side i.e., $n-1_{C_2}$.

Similarly on the left hand side also.

($\because$ circumcentre always lies outside the obtuse triangle)

So required probability = $\frac{\frac{2\times 2n\times n-1_{C_2}}{2}}{2n_{C_3}}$(Here 2n is even) or when n is odd

$$\frac{2\left(\frac{n-1}{2}\right)_{C_2}.n}{2\left(n_{C_3}\right)}$$

45. c) favourable (when 9 is not included) $\frac{{}^8C_3.{}^8C_3-{}^8C_3}{2}$ and

required probability is $\frac{{}^8C_3.{}^8C_3-{}^8C_3}{2.{}^9C_3.{}^8C_3}+\frac{1}{3}$= 37/56

46. a.I N D E P E N D E N C E

1 2 3 4 5 6 7 8 9 10 11 12

There are consonants in 7 positions (2, 3, 5, 7, 8, 10, 11) and vowels in remaining 5 positions

Req. prob = $\frac{\left({}^{7}C_4\right)}{\left({}^{12}C_4\right)}=\frac{7}{99}$

c.Out of 3 Ns, 4 Es, I, P, C (in diff. positions), the number of ways of choosing 2 diff. letters.

$={}^{10}C_2-\left({}^{3}C_2+{}^{4}C_2\right)=45-9=36$

Req. prob = $\frac{36}{\left({}^{12}C_4\right)}=\frac{4}{55}$

d.Req. prob = $\left[\frac{{}^{7}C_4}{{}^{7}C_2\times{}^{5}C_2+{}^{7}C_3\times{}^{5}C_1+{}^{7}C_4}\right]=\left[\frac{35}{21\times10+35\times5+35}\right]=\frac{1}{6+5+1}=\frac{1}{12}$

47. $\alpha\sqrt{P\left(\frac{A}{B}\right)}+\beta\sqrt{P\left(\frac{\overline{A}}{B}\right)}\le\sqrt{\alpha^2+\beta^2}\sqrt{P\left(\frac{A}{B}\right)+P\left(\frac{\overline{A}}{B}\right)}$

$\frac{2}{3}\le\sqrt{\alpha^2+\beta^2}\Rightarrow\alpha^2+\beta^2\ge\frac{4}{9}$

48. a) required probability $\left(\frac{1}{1}.\frac{1}{2}.\frac{1}{3}.......\frac{1}{n}\right)\left(\frac{1}{2}.\frac{1}{3}.\frac{1}{4}......\frac{1}{n+1}\right)$

c) repaired probability $\left(\frac{1}{1}.\frac{1}{2}.\frac{1}{3}.\frac{1}{4}.......\frac{1}{n}\right)\left(\frac{1}{2}.\frac{2}{3}.\frac{3}{4}......\frac{n}{n+1}\right)$

$=\frac{1}{(n+1)!}$

d) $\left(\frac{1}{2}\frac{1}{6}\right)\left(\frac{2}{3}\frac{6}{7}\right)=\frac{1}{21}$

49. P(EUF)=P(E)+D(F)-P(EnF)

$={}^{1}\!/_{6^3}+{}^{1}\!/_{6^3}-{}^{1}\!/_{6^6}=\frac{431}{6^6}$

51. let no of red balls be ‘n’ and total no.of balls be ‘p’ then no of blue balls = p-r then

$\frac{n(n-1)+(p-n)(p-n-1)}{p(p-1)}={}^{1}\!/_{2}$

$\Rightarrow\quad 4n^2-4pn+p^2-p=0$

$\Rightarrow$ $(2n-p)^2 = p$

P, n are positive integers

$\Rightarrow$ p is a perfect square

P is 1, 4, 9 or 16

$\Rightarrow$ $n = \frac{p+\sqrt{p}}{2}$

P	$N = \frac{p+\sqrt{p}}{2}$	B p-n	Probability
1	1	0	1
4	3	1	½
9	6	3	11/24
16	10	6	1/2

Maximum no of red balls is 10

Hence n – 10 = 0

52. Let the no. of socks be 2n forming n-pairs of socks

. $P(A) = \frac{{}^{n}C_1}{{}^{2n}C_2} = \frac{1}{15} \Rightarrow n = 8$

53. 5=4+1 4=3+1 3=2+1 or 2=1+1

=3+2 =1+3 =1+2

=2+3 =2+2

=1+4

$\Rightarrow \frac{4}{5^3} + \frac{3}{5^3} + \frac{2}{5^3} + \frac{1}{5^3} = \frac{10}{5^3}$

54. Required probability

$\frac{3}{10}\frac{3}{9} + \frac{3}{10}\frac{2}{9} + \frac{1}{10}\frac{2}{9} + \frac{2}{10}\frac{1}{9} = \frac{19}{90}$

55. 9 + 8 + 6 + 5 + 4 = 32

set P(A, B, C, D, E, F) = (2, 3, 4, 5, 6, 8, 9)

$n(S) = {}^7C_5.5!$

Total numbers divisible by 5, is = ${}^6C_4.5!$ required probability is $\frac{6}{7}$

Total numbers divisible by 3, is = 6.5! required probability is $\frac{2}{7}$

Therefore

56. The probability that he get marks $= \frac{1}{31}$

The probability that he get marks in second trial is $\frac{30}{31} \times \frac{1}{30} = \frac{1}{31}$

The probability that he get marks in third trial is $\frac{1}{31}$

Continuing this process the probability from *r* trial is $\frac{r}{31} > \frac{1}{8}$

$\Rightarrow r > \frac{31}{8}$

$r = 4$

57. Number of ways of distributing 10 identical pens to 15 students such that a particular student receive exactly 3 pens is $6_{c_3} = 20$

$\therefore$ Req probability = $\frac{20}{9_{c_4}} = \frac{10}{63}$

58. Total cases are with numbers ending with 3, 5, 7 or 8.
Favourable cases are with numbers ending with 3, 7 or 8.
So, the required probability = 3/4

59. P(A) = 1/4, P(B/A) = 5/7, P(B/$\bar{A}$) = 6/7

$$P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{1/4 \times 5/7}{1/4 \times 5/7 + 3/4 \times 6/7} = \frac{5}{23}$$

$$P(A/\bar{B}) = \frac{P(A \cap \bar{B})}{P(\bar{B})} = \frac{\frac{1}{4} \times \frac{2}{7}}{1 - \frac{23}{28}} = \frac{2}{5}$$