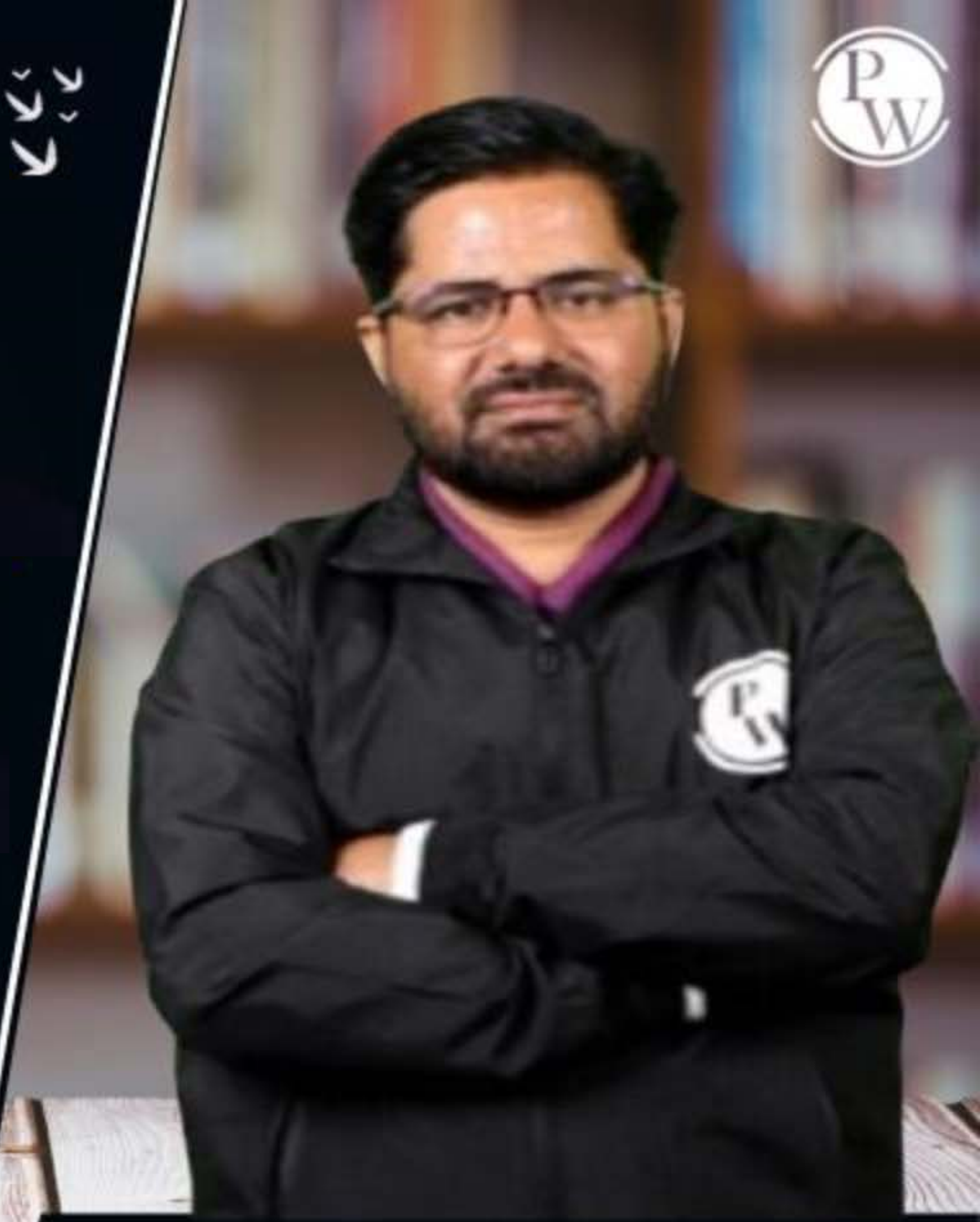
CS & DA

Probability and Statistics

DPP- 01

Discussion Notes



By- Dr. Puneet Sharma Sir

[MCQ]

1 2 3 4 5 6 7 8

#Q. Homer, Gomer, Plato, Euclid, Socrates, Aristotle, Homerina and Gomerina form the board of directors of the Lawyer and Poodle Admirers Club. They will choose from amongst themselves a Chairperson, Secretary, and Treasurer. No person will hold more than one position. How many different outcomes are possible?

RNA

$$\text{Req Ans} = \frac{8}{Ch} \times \frac{7}{Sec} \times \frac{6}{Tr}$$

A 336

B 24

C 512

D 21

[MCQ]

#Q. Erasmus is trying to guess the combination to his combination lock. The "combination" is a sequence of three numbers, where the numbers range from 1 to 12, with no numbers repeated. How many different "combinations" are possible if he knows that the last number in the combination is either 1 or 11?

Req Combinations = $\underset{P_1}{\underline{10 \text{ ways}}}\ \underset{P_2}{\underline{11 \text{ ways}}}\ \underset{P_3}{\underline{2 \text{ ways}}} = 10 \times 11 \times 2$

$= 220$

A 264

B 1320

C 220

D 288

[NAT]

#Q. The Egotists' Club has 6 members: A, B, C, D, E, and F. They are going to line up, from left to right, for a group photo. After lining up in alphabetical order (ABCDEF), Mr. F complains that he is always last whenever they do things alphabetically, so they agree to line up in reverse order (FEDCBA) and take another picture. Then Ms. D complains that she's always stuck next to Mr. C, and that she never gets to be first in line. Finally, in order to avoid bruised egos, they all agree to take pictures for every possible left-to-right line-up of the six people. How many different photos must be taken?

RNA = $6! = 720$ Ans.

[NAT]

#Q. There are 6 multiple choice questions in an examination. How many sequences of answers are possible, if the first three questions have 4 choices each and the next three have 2 each ?

Total possible Ans $= \left(\underset{Q_1}{4} \times \underset{Q_2}{4} \times \underset{Q_3}{4}\right) \times \left(\underset{Q_4}{2} \times \underset{Q_5}{2} \times \underset{Q_6}{2}\right)$

$= 4^3 \times 2^8$

$= 64 \times 256$

[NAT]

#Q. How many five-digit number license plates can be made if :

(i) First digit cannot be zero and the repetition of digits is not allowed.

(ii) The first digit cannot be zero, but the repetition of digits is allowed ?

Sol. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 $\longrightarrow$ (1) $\underline{9} \times \underline{9} \times \underline{8} \times \underline{7} \times \underline{6} = 81 \times 56 \times 6 = ?$

(2) $\underline{9} \times \underline{10} \times \underline{10} \times \underline{10} \times \underline{10} = 9 \times 10^4 = ?$

[MCQ]

0, 2, 4, 6

#Q. The number of 4 digit even numbers that can be formed using 0, 1, 2, 3, 4, 5, 6 without repetition is -

RHA

Case I: $\underline{4} \times \underline{5} \times \underline{6}\ \underline{0} = 120$ Nos

Case II: $\underline{5} \times \underline{5} \times \underline{4} \times \underline{3 \text{ ways}} = 300$

(2 or 4 or 6)

or

420 Nos

A 120

B 300

C 420

D More than one of the above

E None of the above

[MCQ]

$${}^{n}C_{r} + {}^{n}C_{r-1} = {}^{n+1}C_{r}$$

#Q. If ${}^{18}C_{15} + 2\left({}^{18}C_{16}\right) + {}^{17}C_{16} + 1 = {}^{n}C_{3}$, then n =

$${}^{18}C_{15} + {}^{18}C_{16} + {}^{18}C_{16} + {}^{17}C_{16} + {}^{17}C_{17} = {}^{n}C_{3}$$

$$\underbrace{{}^{18}C_{16} + {}^{18}C_{15}} + {}^{18}C_{16} + \underbrace{{}^{17}C_{17} + {}^{17}C_{16}} = {}^{n}C_{3}$$

$${}^{19}C_{16} + \underbrace{{}^{18}C_{16} + {}^{18}C_{17}} = {}^{n}C_{3}$$

$${}^{19}C_{16} + {}^{19}C_{17} = {}^{n}C_{3}$$

$${}^{20}C_{17} = {}^{n}C_{3} \Rightarrow n = 20$$

A 19

B 20

C 18

D More than one of the above

E None of the above

[MCQ]

#Q. Three Men have 6 coats 5 belts and 4 caps. The number of ways the can wear them is ?

Total ways = (Coat) × (Belt) × (Caps)
(RNA)

$$= \left(\underset{M_1}{6} \times \underset{M_2}{5} \times \underset{M_3}{4}\right) \times \left(\underset{M_1}{5} \times \underset{M_2}{4} \times \underset{M_3}{3}\right) \times \left(\underset{M_1}{4} \times \underset{M_2}{3} \times \underset{M_3}{2}\right)$$

$= ?$

A 172800

B 172500

C 174800

D None of the above

[MCQ]

#Q. If there are 6 girls and 5 boys who sit in a row the possible number of ways in which no two boys sit together -

(first arrange Girls) = ✓ G_1 ✓ G_2 ✓ G_3 ✓ G_4 ✓ G_5 ✓ G_6 ✓

$= 6! \times {}^7P_5$

$= 6! \times \frac{7!}{2!}$

(A) $\frac{6!6!}{2!11!}$

(B) $\frac{7!5!}{2!11!}$

(C) $\frac{6!7!}{2!11!}$

(D) None of these.

[NAT]

#Q. Find the number of different permutation of the letters of the word MISSISSIPPI.

$$\underbrace{SSSS}_{1\,2\,3\,4}\ \underbrace{IIII}_{5\,6\,7\,8}\ \underbrace{PP}_{9\,10}\ \underset{11}{M} \quad \text{ie } n = 11 \quad \text{So Ans} = \frac{11!}{4!\,4!\,2!}$$

[NAT]

#Q. If a coin is tossed six times, how many different outcomes consisting of 4 heads and 2 tails are there ?

Sol: Total outcomes $= \underset{c_1}{\underline{2}} \times \underset{c_2}{\underline{2}} \times \underset{c_3}{\underline{2}} \times \underset{c_4}{\underline{2}} \times \underset{c_5}{\underline{2}} \times \underset{c_6}{\underline{2}} = 2^6 = 64$

fav. outcomes = eg $\{(HHTHTH) \ldots\ldots\} = \frac{6!}{4!\,2!} = {}^6C_4$

$= {}^6C_2 = 15$ Ans

[NAT]

#Q. A shopping mall has a straight row of 5 flagpoles at its main entrance plaza. It has 3 identical green flags and 2 identical yellow flags. How many distinct arrangements of flags on the flagpoles are possible ?

$\underbrace{G\,G\,G}\ \underbrace{Y\,Y} \Rightarrow n = 5$ So Ans $= \dfrac{5!}{3!\,2!} = {}^5C_2 = 10$ Ans

[NAT]

#Q. How many words can be formed by using the letters from the word "DRIVER" such that all the vowels are never together ?

DRIVER

D I V E R R
1 2 3 4 5 6

So Total arrangements $= \frac{6!}{2!}$

Vowels are together = ?

(IE) D V RR $= \frac{5!}{2!} \times 2!$
1 2 3 4 5

So Vowels never together = Total − V. always together

$= \frac{6!}{2!} - \frac{5!}{2!} \times 2!$

$= 360 - 120 = 240$

[MCQ]

#Q. In a chess competition involving some boys and girls of a school, every student had to play exactly one game with every other student. It was found that in 45 games both the players were girls and in 190 games both the players were boy. The number of games in which one player was a boy and other was girl is ?

A. 200

B. 216

C. 235

D. 256

$^{g}C_2 = 45$ & $^{b}C_2 = 190$ So Ans $= {}^{g}C_1 \times {}^{b}C_1$

$\frac{g(g-1)}{2} = 45$

$g(g-1) = 90$

$g(g-1) = 10 \times 9$

$g = 10$

$\frac{b(b-1)}{2} = 190$

$b(b-1) = 380$

$b(b-1) = 20 \times 19$

$b = 20$

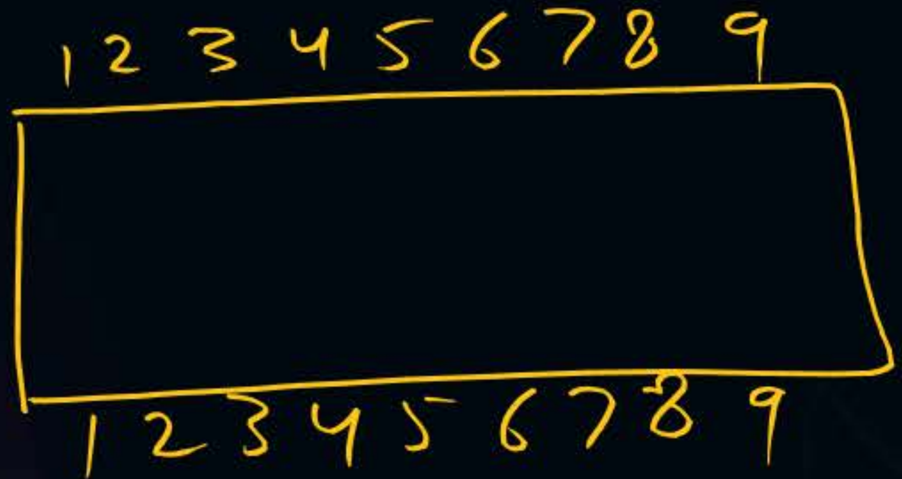
$= {}^{10}C_1 \times {}^{20}C_1$

$= 10 \times 20$

$= 200$

[MCQ]

#Q. 18 guests have to be seated, half on each side of a long table. Four particular guests desired to sit on one particular and three others on the other side, then how many seating arrangements can be made ?



$^{9}P_4 \times {}^{9}P_3 \times 11!$

A $^{18}C_4 . {}^{14}C_3 . 9! . 9!$

B $^{2}C_1 . {}^{9}P_4 . {}^{9}P_3 . 11!$

C $^{9}P_4 . {}^{9}P_3 .$ [illegible] $. 11!$

D $^{2}C_1 . \frac{9!}{4!} . \frac{9!}{3!}$

[MCQ]

#Q. In how many ways can 8 Directors, 1 Vice-Chairman & 1 Chairman of a firm be seated at a round table, if the Chairman has to sit between Vice-Chairman & Director?

Ans $= (9-1)! \times 2!$

A. $2 \times 9!$

B. $2 \times 8!$ ✓

C. $2 \times 7!$

D. $3! \times 9!$

[MCQ]

#Q. $f:\{1, 2, 3, 4, 5\} \rightarrow \{1, 2, 3, 4, 5\}$ that are onto and $f(i) \neq i \, \forall i$, the number of such functions will be?

$\because$ f is onto and f is finite $\Rightarrow$ f is one-one also. (RNA)

Total arrangements (Total func^n) $= n! = 5! = 120$

No. of Dearrangements (for $n=5$)

$$= 5!\left[1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!}\right] = 44$$

A. 9

B. 44 ✓

C. 119

D. 120

[MCQ]

R, W, W, W, B, B

#Q. One red flag, three white flags and two blue flags are arranged in a row such that,

(i) No two adjacent flags are of same color.

(ii) The flags at the two ends of the line are of different color.

In how many different ways can the flags be arranged?

A 6

B 4

C 10

D 2

Case I

$\underset{1}{\underline{W}}\ \underset{2}{\underline{B}}\ \underset{3}{\underline{W}}\ \underset{4}{\underline{B}}\ \underset{5}{\underline{W}}\ \underset{6}{\underline{R}} = \frac{3!}{3!} \times \frac{3!}{2!} = 1 \times 3$

or

Case II

$\underset{1}{\underline{R}}\ \underset{2}{\underline{W}}\ \underset{3}{\underline{B}}\ \underset{4}{\underline{W}}\ \underset{5}{\underline{B}}\ \underset{6}{\underline{W}} = \frac{3!}{3!} \times \frac{3!}{2!} = 1 \times 3$

Ans = 6

[MCQ]

#Q. The number of words of four letters containing equal number of vowels and consonants (Repetition allowed) ?

5 V & 21 C

Case I (Two V diff & 2 C diff) $\rightarrow {}^5C_2 \times {}^{21}C_2 \times 4!$

or

Case II (Two V alike & Two C diff) $\rightarrow {}^5C_1 \times {}^{21}C_2 \times \frac{4!}{2!}$

(u u t m)

or

Case III (Two V diff & Two C alike) $\rightarrow {}^5C_2 \times {}^{21}C_1 \times \frac{4!}{2!}$

(a e h h)

or

Case IV (Two V alike & Two C alike) $\rightarrow {}^5C_1 \times {}^{21}C_1 \times \frac{4!}{2!2!}$

(e e t t)

Ans =

Add

A) 60×210

B) 210×243

C) 210×315

D) 630

[MCQ]

#Q. The total numbers of four letter words that can be formed out of the letters of the word "COMMITTEE"?

MM, TT, EE C, O, I

Case I → All diff = ${}^6C_4 \times 4! = 360$
(M, T, E, C, O, I)

" II → Two alike & Two alike $= {}^3C_2 \times \frac{4!}{2!\,2!} = 18$
(MM TT)

" III → Two alike & two diff $= {}^3C_1 \times {}^5C_2 \times \frac{4!}{2!}$
(TT, C, M)
(M, E, C, O, I)
$= 360$

Ans = Add = 738

A 360

B 738

C 414

D None

THANK - YOU