Blue Print (As per PU Board)

Topic	1 mark questions	2 marks questions	3 marks questions	5 marks questions	Total Marks
Permutation & Combination	1	–	1	1	9

One mark questions

1. **How many 4 letter code can be formed using the first 10 letters of the English alphabet. If no letter can be repeated.**
   Answer: The number of 4 letter code out of 10 letters of the English alphabet $10p_4$
   $=10\times9\times8\times7=720\times7=5040$ ways.
2. **How many 5 digits telephone numbers can be constructed using the digits 0 to 9. If each number starts with 67 and no digit appears. More than once?**
   Answer: Total number of 5 digit telephone numbers starting with 67 is given by
   $8\times7\times6=56\times6=186$ ways.
3. **How many 3 digit numbers can be formed from the digits 1,2,3,4 and 5 assuring that Repetition of the digits is allowed? Repetition of the digits is not allowed?**
   Answer: $\therefore$ Number of 3 digit numbers out of 5 digits with repetitions $=5\times5\times5=125$ ways.
   $\therefore$ Number of 3 digits numbers out of 5 digits without repetitions $=5\times4\times3=60$ ways.
4. **If $nc_8=nc_2$ find nc_2**
   Answer: We know that if $nc_a=nc_b$ then either $a=b$ or $a+b=n$, here $nc_8=nc_2\Rightarrow8+2=n\ \therefore n=10$

Two marks questions

5. **How many 2 digit even numbers can be formed from the digits. 1,2,3,4,5. If the digits can be repeated .**
   Answer: Since the required even numbers contain two digits. We keep two digits in two separate boxes.
   As the required number is even the unit plan can be filled by 2ways and the tenth place can be filled by 5ways. Therefore total number of ways $=2\times5=10$.
6. **Find the number of the different signals that can be generated by arranging at least 2 flags in order (one below the other) on a vertical staff, If five different flags are available.**
   Answer: (a) Number of possible signals with 2 flags $=5\times4=20$.
   (b) Number of possible signals with 3 flags $=5\times4\times3=60$
   (c) Number of possible signals with 4 flags is given by $5p_4$ ways $=5\times4\times3\times2=120$ ways.
   (d) Number of possible signals with 4 flags is given by $5p_5$ ways $=5\times4\times3\times2=120$ ways.
   $\therefore$ The required number of signals $=20+60+120+120=320$ ways.
7. **How many 3 digit numbers can be formed by using the digits 1 to 9 if no digit is repeated?**
   Answer: Required 3 digit numbers can be formed by arranging all the given 9 different digits taking 1 at a time. This can be done in $9\ p_3$ ways.
   $\therefore$ Required 3 digit number $=9p_3=\dfrac{9!}{(9-3)!}=\dfrac{9x\ 8x\ 7x\ 6!}{6!}=9\times8\times7=504$
8. **How many 4 digits numbers are there with no digit repeated.**
   Answer: The thousandth place can be filled by 9 digits (except 0) and the Hundredth, tenth, units place can be filled by $9p_3$ ways.
   $\therefore$ Required 4 digit numbers $=9\times9p_3=9\times504=4536$.

9. **How many3 digit even numbers can be made using the digits 1, 2, 3,4,6,7. If no digit is repeated.**
Answer: Here units place can be filled by any one number from the digit. 2,4 or 6. This can be done in 3 ways. Since the repetition of digits is not allowed therefore remaining 2 places can be filled by arranging 5 different digits. This can be done in $5p_2$ ways.
$\therefore$ Required 3 digits even numbers $=3\times 5p_2=3\times 5\times 4=60$ ways.

10. **From a committee of 8 persons, in how many ways can we choose a chairman and a vice – chairman assuming one person cannot hold more than one position?**
Answer: Since one person cannot hold more than one position.
$\therefore$ we just arrange 8 persons at 2 different position this can be done in $8p_2$ ways.
Required number of ways $8p_2=8\times 7=56$ ways.

Five marks questions

11. How many words with or without meaning ,each of 2vowels and 3 consonants can be formed from the letters of the word DAUGHTER?
Answer: DAUGHTER$\begin{cases} A, U, E \\ D,\ G,\ T,\ R \end{cases}$
It is the mixed problem of permutation and combination.
2 vowels out of 3vowels can be selected in $3c_2$ ways.
3 consonants out of 5 consonants can be selected in $5c_3$ ways.
Total number of ways to select 5 letters $=3c_2\times 5c_3=3c_1\times 5c_3=3\times\frac{5x\ 4x\ 3}{3x\ 2x\ 1}=30$ ways.
Now these selected 5 letters can be arranged in 5! Ways ,
Therefore total number of words formed $=3c_1\times 5c_3=5!=30\times 5\times 4\times 3\times 2\times 1=3600$ ways

12. **In how many can the letters of the word PERMUTATIONS be arranged if the**
(i) Words start with P and end with 5
(ii) Vowels are together.
(iii) There are always 4 letters between P and S the word PERMUTATIONS contains 12 letters out of which T occurs 2times.
Answer: (i) Since each word start with P and with S therefore first and last place of each word is reserved for letters P and S respectively.
The remaining 10 places can be filled up by remaining 10 letters. This can be done in $10p_{10}$ or 10! Ways.
But the letter T occurs twice
Required number of words formed $=\frac{10!}{2!}$
(ii) Vowels are together.
PERMUTATIONS$\begin{cases} \text{vowels}(\text{A, E, I, O, U}) \\ \text{consonants}(\text{P, R, M, T, T, N, S}) \end{cases}$
Let us consider all the vowels as a single letters say X, now we have 8 letters (P, R, M, T, T, S, X). These 8 letters can be shuffled in $\frac{8!}{2!}$ ways.
But 5 vowels can interchange their positions in 5! Ways
Required number of words formed $=\frac{8!}{2!}\times 5!=8\times 7\times 6\times 5\times 4\times 3\times 120=2419200$.
(iii) Exactly 4 letters between P & S can be placed

Position of P	1	2	3	4	5	6	7
Position of S	6	7	8	9	10	11	12

$\therefore$ there are 7 ways in which P and S can be placed. But P and S can interchange their position in 2 ways.

Number of ways in P and S can be placed such that there are exactly 4 letters between them $=7\times2=14$

Now the remaining 10 letters in $\frac{10!}{2!}$ ways ($\because$ the letter T is repeating twice)

$\therefore$ total number of ways $=14\times\frac{10!}{2!}=25401600$.