

Chapter: - Permutations, combinations and Binomial Theorem

Q1 (i) If $\frac{1}{9!} + \frac{1}{10!} = \frac{x}{11!}$, then find x **Ans.121** (ii) If ${}^{10}P_r = 5040$, find the value of r **Ans.4**

Q2. If $\frac{n!}{(n-2)!2!}$ and $\frac{n!}{(n-4)!4!}$ are in the ratio 2:1, find the value of n **Ans. 5**

Q3 Prove that $n! + 1$ is not divisible by any natural number between 2 and n.

Q4 .A room has 6 doors. In how many ways can a man enter the room through one door and come out through a different door? **Ans. 30**

Q5. For a set of five true/false questions, no student has written all correct answers and no two students have given the same sequence of answers. What is the maximum number of students in a class, for this to be possible? **Ans. 31**

Q6. How many numbers are there between 100 and 1000 such that at least one of their digits is 7? **Ans. 252.**

Q7. In a class, there are 30 boys and 18 girls. The teacher wants to select one boy and one girl to represent the class for quiz competition. In how many ways can the teacher make this selection? **Ans. 540**

Q8. How many two digit even numbers can be formed from the digit 1, 2, 3, 4 and 5 if the digit can be repeated? **Ans. 10**

Q9.A number lock on a suitcase has 3 wheels each labelled with 10 digits from 0 to 9. If opening of the lock is a particular sequence of three digits with no repeats, how many such sequence will be possible. **Ans. 720**

Q10. Each of six squares in the strip shown in figure is to be coloured with any one of ten different colours so that no two adjacent squares have the same colour. Find the number of ways of colouring the strip. **Ans. 590490**

1st	2nd	3rd	4th	5th	6th
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Q11. Find the total number of ways of answering 5 objective type questions each question having 4 choices. **Ans. 1024**

Q12.How many different five letter words can be formed out of the letters of the word 'KNIFE' if the repetition of letters is not allowed. **Ans.120**

Q13.How many numbers divisible by 5 and lying between 4000 and 5000 can be formed from the digits 4,5,6,7 and 8 **Ans.25**

Q14. (i) If $2^5 P_3 = {}^n P_4$, find the value of n **Ans.5** (ii) If ${}^5 P_r = 2^6 P_{r-1}$, find the value of r. **Ans.3**
(iii) If ${}^n C_8 = {}^n C_6$ find ${}^n C_2$ **Ans.91** (iv) ${}^n C_r : {}^n C_{r+1} = 1 : 2$ and ${}^n C_{r+1} : {}^n C_{r+2} = 2 : 3$ find n and r

Q15. Prove the following: - (i) ${}^n P_r = {}^{n-1} P_r + r {}^{n-1} P_{r-1}$ (ii) ${}^{n+1} C_{r+1} = {}^n C_r + {}^n C_{r+1}$ (iii) $\sum_{r=1}^5 {}^5 C_r = 31$

Q16.In how many ways can the word 'PENCIL' be arranged so that N is always next to E **Ans.120**

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Q17. The principal wants to arrange 5 students on the platform such that the boy 'SALIM' occupies second position and such that the girl 'SITA' is always adjacent to the girl 'RITA'. How many such arrangements are possible? . **Ans.** 8

Q18. Three married couples are to be seated in a row having six seats in a cinema hall. If the spouses are to be seated next to each other, in how many ways can they be seated? Find also the number of ways of their seating if all the ladies sit together. **Ans.** 48, 144

Q19. Find the number of 8-letter word formed from the letters of the word 'TRIANGLE' if each word is to (i) have no two vowels together (ii) have both consonants and vowels together (iii) have the relative position of the vowels and consonants unaltered. . **Ans.** 14400, 1440, 720

Q20. There are three prizes to be distributed among six students. In how many ways can it be done when (i) no students get more than one prize (ii) there is no restriction as to the number of prizes any students gets. (iii) No students get all the prizes. . **Ans.** 30, 216, 210

Q21. A polygon has 44 diagonals. Find the number of its sides . **Ans.** 11

Q22. If the letter of the word 'SACHIN' are arranged in all possible ways and these words are written out as in dictionary. Prove that the word 'SACHIN' appear at serial number 601.

Q23. In the expansion of $(1+x)^n$, the coefficient of the p th and q th terms are equal, prove that $p+q=n+2$ where $p \neq q$

Q24. Using binomial theorem, prove that:- $3^{2n+2}-8n-9$ is divisible by 64 Where n is natural number.

Q25. In the binomial expansion of $(a-b)^n$, $n \geq 5$, the sum of 5th and 6th terms is zero, prove that $\frac{a}{b} = \frac{n-4}{5}$

Q26. If the coefficient of x^7 in $\left(ax^2 + \frac{1}{bx}\right)^{11}$ equals coefficient of x^{-7} in $\left(ax - \frac{1}{bx^2}\right)^{11}$, prove that a and b satisfy the relation $ab=1$

Q27. Find the term independent of x , $x \neq 0$, in the expansion of $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^{15}$ **Ans.** $^{15}C_{10} \left(\frac{1}{6}\right)^5$

Q28. Prove that the term independent of x in the expansion of $\left(x + \frac{1}{x}\right)^{2n}$ is $\frac{1.3.5.....(2n-1)}{n!} 2^n$

Q29. find the middle terms of the expansion of (i) $\left(\frac{x}{a} - \frac{a}{x}\right)^{10}$ **Ans.** -252 (ii) $\left(3x - \frac{x^3}{6}\right)^9$

Ans. $\frac{189}{8}x^{17}, \frac{-21}{16}x^{19}$

Q30. Find the sixth term of the expansion $\left(y^{\frac{1}{3}} + x^{\frac{1}{3}}\right)^n$, if the binomial coefficient of the third term from the end is 45 **Ans.** 252 $\left(y^{\frac{5}{2}}x^{\frac{5}{3}}\right)^n$

Q31. If the coefficient of second, third and fourth terms in the expansion of $(1+x)^{2n}$ are in A.P. Show that $2n^2-9n+7=0$

-----Best of luck-----

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