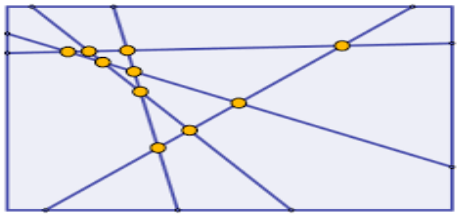
CHAPTER-7

PERMUTATIONS & COMBINATIONS

04 MARK TYPE QUESTIONS

| Q. NO | QUESTION | MARK |
|---|---|---|
| 1. | The letter of the word 'RANDOM' are written in all possible orders and these words are written out as in a dictionary. Find the rank of the word 'RANDOM'. | 4 |
| 2. | There are 10 points in a plane, no three of which are in the same straight line, excepting 4 points, which are collinear. Find the (i) number of straight lines obtained from the pairs of these points; (ii) number of triangles that can be formed with the vertices as these points.  | 4 |
| 3. | Riya and her five friends went for a trip to Shimla. They stayed in a hotel. There were 4 vacant rooms A, B, C & D. Out of these 4 vacant rooms two rooms A & B were double share rooms & Two rooms C & D Can contain one person each.<br>i) Find the number of ways in which room A can be filled.<br>ii) If room A & B are already filled, then find the number of ways in which room C can be filled.<br>iii) If room A is filled with 2 person, then find the number in which rooms C & D can be filled. | 4 |
| 4. | Sumit works at a book shop, while arranging some books on the book shelf, he observed that there are 5 history books , 3 Maths books & 4 science books which are to be arranged on the shelf.<br>i) In how many ways can he select a history or a math book .<br>ii) If he select 2 history books, 1 math book & 1 science book to arrange them , then find the number of ways in which selection can be made.<br>iii) Find the number of ways , if the book of the same subject are put together. | 4 |
| 5. | A bag contains six white marbles and five red marbles. Find the number of ways in which four marbles can be drawn from the bag if<br>(a) they can be of any colour.<br>(b) two must be white and two red.<br>(c) they must all be of the same colour. | 4 |
| 6. | In how many ways can the letters of the word PERMUTATIONS be arranged if the<br>(i) words start with P and end with S,<br>(ii) there are always 4 letters between P and S? | 4 |
| 7. | In a cinema hall 4 doors to enter and 3 other doors to exit.<br>(a) How many ways a person can enter?<br>(b) How many ways a person can exit?<br>(c) How many ways a person can enter and then exit?<br>(d) How many ways a person can enter and then exit but he can't enter and exit from the same door. | 4 |
| 8. | A committee of 5 is to be formed out of 6 Gents and 4 ladies. In how many ways this can be | 4 |

| | | |
|---|---|---|
| | done, when<br>(i) At least two ladies are included?<br>(ii) At most two ladies are included? | |

**ANSWERS:**

| Q. NO | ANSWER | MARKS |
|---|---|---|
| 1. | In a dictionary the words at each stage are arranged in alphabetical order. In the given problem we must therefore consider the words beginning with A, D, M, N, O, R in order. A will occur in the first place as often as there are ways of arranging the remaining 5 letters all at a time i.e. A will occur 5! times. Similarly, D, M, N, O will occur in the first place the same number of times.<br>Number of words starting with A= 5!= 120<br>Number of words starting with D = 5!= 120<br>Number of words starting with M = 5! = 120<br>Number of words starting with N=5!= 120<br>Number of words starting with O=5! = 120<br>Number of words beginning with R is 5!, but one of these words is the word RANDOM. So, we first find the number of words beginning with RAD and RAM.<br>Now, the words beginning with 'RAN' must follow. There are 3! words beginning with RAN One of these words is the word RANDOM itself,<br>No. of words starting with RAD = 3! = 6 No. of words starting with RAM = 3! = 6<br>The first word beginning with RAN is the word RANDMO and the next word is RANDOM Rank of RANDOM = 5x120 +2x6+2= 614 ways. | 4 |
| 2. | (i) Number of straight lines formed joining the 10 points, taking 2 at a time<br>= $^{10}C_2$ = 45 ways<br>Number of straight lines formed by joining the four points, taking 2 at a time = $^4C_2$= 6<br>But, 4 collinear points, when joined pairwise give only one line. Required number of straight lines = 45-6+1=40.<br>(ii) Number of triangles that can be formed with the vertices as these points<br>Number of triangles formed by joining the points, taking 3 at a time = $^{10}C_3$=120.<br><br>Number of triangles formed by joining the 4 points, taken 3 at a time = $^4C_3$ = $^4C_1$ =4.<br>But, 4 collinear points cannot form a triangle when taken 3 at a time. So, Required number of triangles = $120 - 4 = 116$. | 4 |
| 3. | i) Total numbers = 6<br>Room A is a double shared room.<br>The number of ways in which room A can be filled = $6c_2$ = 15<br><br>ii) Now, rooms A and B can be filled with 2 members each and room C can be | 4 |

| | | |
|---|---|---|
| | filled with 1 person.<br>Required number of ways = $2c_1$ = 2<br><br>iii) As room A is filled with 2 persons. Now, the remaining persons = 4<br>Given that room C and D can occupy 1 person each.<br>The number of ways in which rooms C and D can be filled = $4c_1\ X\ 3c_1 = 12$ | |
| 4. | i) A History book can be selected in 5 ways and a Math book can be selected in 3 ways. Required number of ways = 5 + 3 = 8<br>ii) Now 2 History books can be chosen in $5p_2$ ways, I math book can be chosen in $4p_1$ ways.<br>Required number of ways = $5p_2\ X\ 3p_1\ X\ 4p_1$ = 240<br>iii) Number of ways of arranging History books = 5!<br>Number of ways of arranging Math books = 3!<br>Number of ways of arranging Science books = 4!<br>Required number of ways if the books of same subject are put together =3! . 4! . 5! | 4 |
| 5. | Total number of marbles=6+5=11<br>(a) Required number of ways=$^{11}C_4$<br>(b) Required number of ways=$^{6}C_2 \times {}^{5}C_2$=150<br>(c) Required number of ways=$^{6}C_4+{}^{5}C_4$=20 | 4 |
| 6. | (i) If P and S are fixed at the extreme ends, then 10 letters are left.<br>In this case Required number of arrangements=$\frac{10!}{2!}$=1814400<br>(ii) The letters have to arranged in such a way that there are always 4 letters between P and S.<br>So, in a way the places of P and S are fixed.The remaining 10 letters in which there2 Ts can be arranged in $\frac{10!}{2!}$ ways<br>Also the letters P and S can be placed such that there are 4 letters between them in 2× 7=14 ways.<br>Therefore required number of arrangements=$\frac{10!}{2!} \times 14 = 25401600$ | 4 |
| 7. | (a)Number of ways a person can enter= 4ways<br>(b)Number of ways a person can exit = 3 ways<br>(c) Number of ways a person can enter and exit = 3x4 = 12<br>(d)ways enter and exit but can not enter and exit from same door= 12 -8<br>= 8 | 4 |
| 8. | (i)The total number of ways of forming the committee<br>$=4_{c_2}X\ \ 6_{C_3}+ 4_{C_3}X6_{C_2} +\ 4_{C_4}X\ 6_{C_1}$<br>=120+60 +6=186<br><br>(ii)Total number of ways of forming the committee<br>$=6_{C_5}+ 6_{C_4}X\ 4_{C_1}+6_{C_3}X\ 4_{C_2}$<br>=6 + 60 +120 = 186. | 4 |