MATHEMATICS
WORKSHEET_231125
CHAPTER 06 PERMUTATION AND COMBINATIONS

SUBJECT: MATHEMATICS **MAX. MARKS : 40**
CLASS : XI **DURATION : 1½ hrs**

General Instructions:
(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv). There is no overall choice.
(v). Use of Calculators is not permitted

SECTION – A
Questions 1 to 10 carry 1 mark each.

1. The number of triangles that are formed by choosing the vertices from a set of 12 points, seven of which lie on the same line is
(a) 105 (b) 15 (c) 175 (d) 185

2. If ${}^{n}C_{12} = {}^{n}C_{8}$, then n is equal to
(a) 20 (b) 12 (c) 6 (d) 30

3. There are 10 points in a plane, out of which 4 points are collinear. The number of triangles formed with vertices at these points is
(a) 20 (b) 120 (c) 116 (d) none of these

4. 10 students are participating in a competition. In how many different ways can the first prize be won? (There are 3 prizes)
(a) 720 (b) 60 (c) 30 (d) 120

5. If ${}^{15}P_r = 2730$, then ${}^{5}P_r$.
(a) 3 (b) 30 (c) 15 (d) 20

6. Total number of words formed by 2 vowels and 3 consonants taken from 4 vowels and 5 consonants is equal to
(a) 60 (b) 120 (c) 7200 (d) 720

7. All the letters of the word 'EAMCOT' are arranged in different possible ways. The number of such arrangements in which no two vowels are adjacent to each other is
(a) 360 (b) 144 (c) 72 (d) 54

8. The number of different four digit numbers that can be formed with the digits 2, 3, 4, 7 and using each digit only once is
(a) 120 (b) 96 (c) 24 (d) 100

For Q9 and Q10, a statement of assertion (A) is followed by a statement of reason (R). Choose the correct answer out of the following choices.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

9. **Assertion (A):** If the letters W, I, F, E are arranged in a row in all possible ways and the words (with or without meaning) so formed are written as in a dictionary, then the word WIFE occurs in the 24th position.
Reason (R): The number of ways of arranging four distinct objects taken all at a time is C(4,4).

10. **Assertion (A):** The number of ways of distributing 10 identical balls in 4 distinct boxes such that no box is empty is ${}^{9}C_{3}$.
Reason (R): The number of ways of choosing any 3 places, from 9 different places is ${}^{9}C_{3}$.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. If ${}^{9}P_{5} + 5.\ {}^{9}P_{4} = {}^{10}P_{r}$, then find r.

12. Find r, if : ${}^{15}C_{r} : {}^{15}C_{r-1} = 11:5$

13. How many words can be formed using all the letters of the word EQUATION so that (*i*) all the vowels are together, (*ii*) consonants occupy the odd places ?

14. A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done ? How many of these committees would consist of one man and two women?

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. If ${}^{n}P_{r} = 336$, ${}^{n}C_{r} = 56$. Find n and r and hence find ${}^{n-1}C_{r-1}$.

16. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has at least one boy and one girl ?

17. Find the number of words with or without meaning which can be made using all the letters of the word AGAIN. If these words are written as in a dictionary, what will be the 50th word ?

SECTION – D

Questions 18 carry 5 marks.

18. (a) Find the number of different 8-letter arrangements that can be made from the letters of the word DAUGHTER so that
(*i*) all vowels occur together.
(*ii*) all vowels do not occur together.
(b) Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements,
(*i*) do all the vowels always occur together
(*ii*) do all the vowels never occur together
(*iii*) do the words begin with I and end in P ?

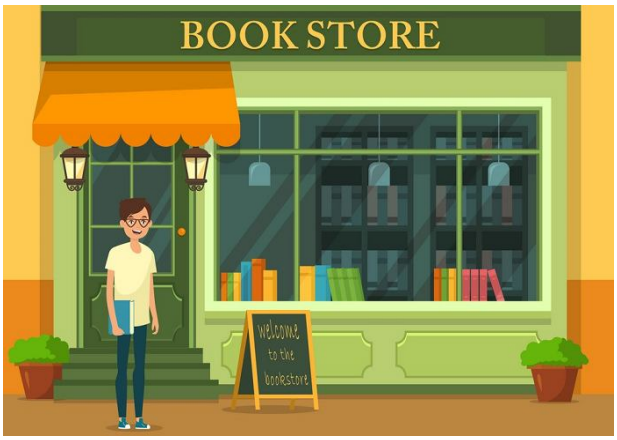
OR

What is the number of ways of choosing 4 cards from a pack of 52 playing cards ? In how many of these (*i*) four cards are of the same suit? (*ii*) four cards belong to four different suits?
(*iii*) are face cards? (*iv*) two are red cards and two are black cards?
(*v*) cards are of the same colour?

SECTION – E (Case Study Based Questions)

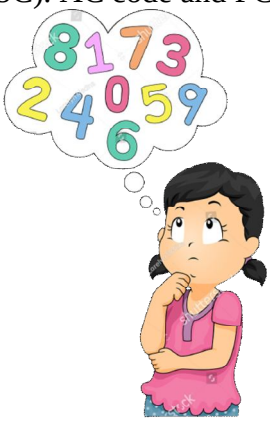
Questions 19 to 20 carry 4 marks each.

19. Raj works at a book store. While arranging some books on the book shelf, he observed that there are 5 History books, 3 Mathematics books and 4 Science books which are to be arranged on the shelf.



(i) In how many ways can he select either a History book or a Maths book? (1)
(ii) If he selects 2 History books, 1 Maths book and 1 Science book to arrange them, then find the number of ways in which selection can be made. (1)
(iii) Find the number of ways, if the books of same subject are put together. (1)
(iv) Find the number of arrangements, if he selects 3 History books, 2 Maths Books, 2 Science books. (1)

20. Seema wants a mobile number having 10 digits. It is not just a group of numbers strung out at random. All mobile numbers have 3 things in common. a 2-digit Access code (AC), a 3-digit provider code (PC), and a 5 digit subscriber code (SC). AC code and PC code are fixed, then



(i) How many mobile numbers are possible if no start with 98073 and no other digit can repeat? (1)
(ii) How many AC code are possible if both digit in AC code are different and must be greater than 6? (1)
(iii)How many mobile numbers are possible if AC and PC code are fixed and digits can repeat? (1)
(iv) How many mobile numbers are possible with AC code 98 and PC code 123 and digit used in AC and PC code will not be used in SC code? (1)