1. June/2022/Paper_12/No.8

   (a) A team of 6 people is to be chosen from 10 people. Two of the people are sisters who must not be separated. Find the number of different teams that can be formed. [3]

   (b) A 6-character password is to be chosen from the following characters.

Digits	2	4	8
Letters	x	y	z
Symbols	*	#	!

   No character may be used more than once in any password. Find the number of different passwords that may be chosen if

   (i) there are no other restrictions, [1]

   (ii) the password starts with two letters and ends with two digits. [3]

(a) (i) A 5-digit number is to be formed from the seven digits 0, 1, 2, 3, 4, 5, 6. Each digit can be used at most once in any number and the number does not start with 0. Find the number of ways in which this can be done. [2]

(ii) Find how many of these 5-digit numbers are even. [3]

(b) A team of 7 people is to be selected from a group of 9 women and 6 men. Find the number of different teams that can be selected which include at least one man. [2]

(c) (i) Show that $^{n}C_{3} + {^{n}C_{2}} = \frac{1}{6}(n^3 - n)$ for $n \geqslant 3$. [5]

(ii) Hence solve the equation $^{n}C_{3} + {^{n}C_{2}} = 4n$ where $n \geqslant 3$. [2]