Permutations and combinations – 2023 Additional Math 0606

1. Nov/2023/Paper_0606/11/No.5

(a) A 4-digit code is to be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. No digit may be used more than once in any code. A code may start with 0.

(i) Find how many codes can be formed. [1]

(ii) Find how many codes form an odd number. [1]

(iii) Find how many codes form a number greater than 1000. [2]

(b) A team of 9 people is to be chosen from a group of 15 people. The group includes a family of 4 people who must not be separated. Find the number of teams that can be chosen. [3]

2. Nov/2023/Paper_0606/12/No.7

(a) A 6-digit number is to be formed using the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. Each digit can be used only once in any 6-digit number. A 6-digit number cannot start with 0.

(i) Find how many 6-digit numbers can be formed. [1]

(ii) Find how many of these 6-digit numbers are divisible by 5. [3]

(b) A committee of 7 people is to be chosen from 6 doctors, 10 nurses and 8 dentists.

(i) Find the number of committees that can be chosen. [1]

(ii) Find the number of committees that can be chosen if all the doctors have to be on the committee. [1]

(iii) Find the number of committees that can be chosen if there has to be at least one dentist on the committee. [2]

3. Nov/2023/Paper_0606/13/No.5

(a) A 5-character password is to be formed from the following 10 characters.

Letters	A	B	C	X	Y	Z
Symbols	*	$	#	&		

No character can be used more than once in any 5-character password.

(i) Find the number of passwords that can be formed. [1]

(ii) Find the number of passwords that can be formed if the password has to contain at least one symbol. [2]

(iii) Find the number of passwords that can be formed if the password has to start with two letters and end with two symbols. [2]

(b) A team of 8 people is to be chosen from 5 doctors, 4 teachers and 6 police officers.

Find how many possible teams have the same number of doctors as teachers. [5]

4. March/2023/Paper_0606/12/No.7

(a) A 5-character password is to be formed from the following 13 characters.

Letters	A	B	C	D	E
Numbers	9	8	7	6	5
Symbols	*	#	!		

No character may be used more than once in any password.

(i) Find the number of possible passwords that can be formed. [1]

(ii) Find the number of possible passwords that contain at least one symbol. [2]

(b) Given that $16 \times {}^{n}\mathrm{C}_{12} = (n-10) \times {}^{n+1}\mathrm{C}_{11}$, find the value of n. [3]

5. June/2023/Paper_0606/11/No.7

(a) A team of 8 people is to be chosen from a group of 15 people.

(i) Find the number of different teams that can be chosen. [1]

(ii) Find the number of different teams that can be chosen if the group of 15 people contains a family of 4 people who must be kept together. [3]

(b) Given that $(n+9) \times {}^{n}\mathrm{P}_{10} = (n^2+243) \times {}^{n-1}\mathrm{P}_{9}$, find the value of n. [3]

6. June/2023/Paper_0606/12/No.7

(a) Find the number of ways in which 14 people can be put into 4 groups containing 2, 3, 4 and 5 people. [3]

(b) 6-digit numbers are to be formed using the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. Each digit may be used only once in any 6-digit number. A 6-digit number must not start with 0. Find how many 6-digit numbers can be formed if

(i) there are no further restrictions [1]

(ii) the 6-digit number is divisible by 10 [1]

(iii) the 6-digit number is greater than 500 000 and even. [3]

7. June/2023/Paper_0606/23/No.5

(a) **(i)** A gardening group has 20 members. A committee of 6 members is to be selected. Anwar and Bo belong to the gardening group and at most one of them can be on the committee. How many different committees are possible? [2]

(ii) The gate for the garden has a lock with a 6-character passcode. The passcode is to be made from

Letters	G	A	R	D	E	N				
Numbers	0	1	2	3	4	5	6	7	8	9.

No character may be used more than once in any passcode.
Find the number of possible passcodes that have 4 letters followed by 2 numbers. [2]

(b) **(i)** Given that $n \geqslant 4$, show that $(n-3) \times {}^{n}C_{3} = 4 \times {}^{n}C_{4}$. [2]

(ii) Given that ${}^{n}C_{3} = 5n$, where $n \geqslant 3$, show that n satisfies the equation $n^2 - 3n - 28 = 0$. Hence find the value of n. [4]