Permutations Ex 16.2 Q21

Since the required numbers are greater than 8000.

$\therefore$ the thousand's place can be two digits 8 or 9
So, there are 2 ways of filling the thousand's place.

Since repetition of digits is not allowed, so the hundred's, ten's and one's places can be filled in 4,3 and 2 ways respectively.

Hence, the required number of number $= 2 \times 4 \times 3 \times 2 = 48$

Permutations Ex 16.2 Q22

First person can be seated in a row in 6 ways.

Second person can be seated in a row in 5 ways.

Third person can be seated in a row in 4 ways.

Fourth person can be seated in a row in 3 ways.

Fifth person can be seated in a row in 2 ways.

And, sixth person can be seated in a row in 1 ways.

Hence, total number of ways in which six persons can be seated in a row
$= 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720.$

Permutations Ex 16.2 Q23

In a nine-digit number 0 cannot appear in the first digit. So, the number of ways of filling up the first-digit = 9.

Now, 9 digits are left including 0. So, second digit can be filled with any of the remaining 9 digits in 9 ways.

Similarly, remaining digits can be filled in 8,7,6,5,4,3 and 2 ways.

Hence, the total number of required numbers
$= 9 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2$
$= 9 \times (9!)$

Permutations Ex 16.2 Q24

Any number less than 1000 may be any of a number from one-digit number, two-digit number and three-digit number.

One-digit odd number:
3 possible ways are there. These numbers are 3 or 5 or 7.

Two-digit odd number:
Tens place can be filled up by 3 ways (using any of the digit among 3, 5 and 7) and then the ones place can be filled in any of the remaining 2 digits.
So, there are $3 \times 2 = 6$ such 2-digit numbers.

Three-digit odd number:
Ignore the presence of zero at ones place for some instance.

Hundreds place can be filled up in 3 ways (using any of any of the digit among 3, 5 and 7), then tens place in 3 ways by using remaining 3 digits (after using a digit, there will be three digits) and then the ones place in 2 ways.

So, there are a total of 3 × 3 × 2 = 18 numbers of 3-digit numbers which includes both odd and even numbers (ones place digit are zero). In order to get the odd numbers, it is required to ignore the even numbers i.e. numbers ending with zero.

To obtain the even 3-digit numbers, ones place can be filled up in 1 way (only 0 to be filled), hundreds place in 3 ways (using any of the digit among 3, 5, 7) and then tens place in 2 ways (using remaining 2 digits after filling up hundreds place).

So, there are a total of 1 × 3 × 2 = 6 even 3-digit numbers using the digits 0, 3, 5 and 7 (repetition not allowed)

So, number of three-digit odd numbers using the digits 0, 3, 5 and 7 (repetition not allowed) = 18 - 6 = 12.

Therefore, odd numbers less than 1000 can be formed by using the digits 0, 3, 5, 7 when repetition of digits is not allowed are 3 + 6 + 12 = 21.

Permutations Ex 16.2 Q25

The odd digits are 1,3,5,7,9

$\therefore$ Total number of odd digits = 5

Clearly, the hundred's place can be filled with any of the 5 digits 1,3,5,7 or 9
So, there are 5 ways of filling the hundred's place.

Now, 4 digits are left. So, ten's place can be filled with any of the remaining 4 digits in 4 ways.

Now, the unit's place can be filled with in any of the remaining 3 digits. So, there are 3 ways of filling the unit's place.

Hence, the total number of required number = $5 \times 4 \times 3 = 60$

*********** END **********