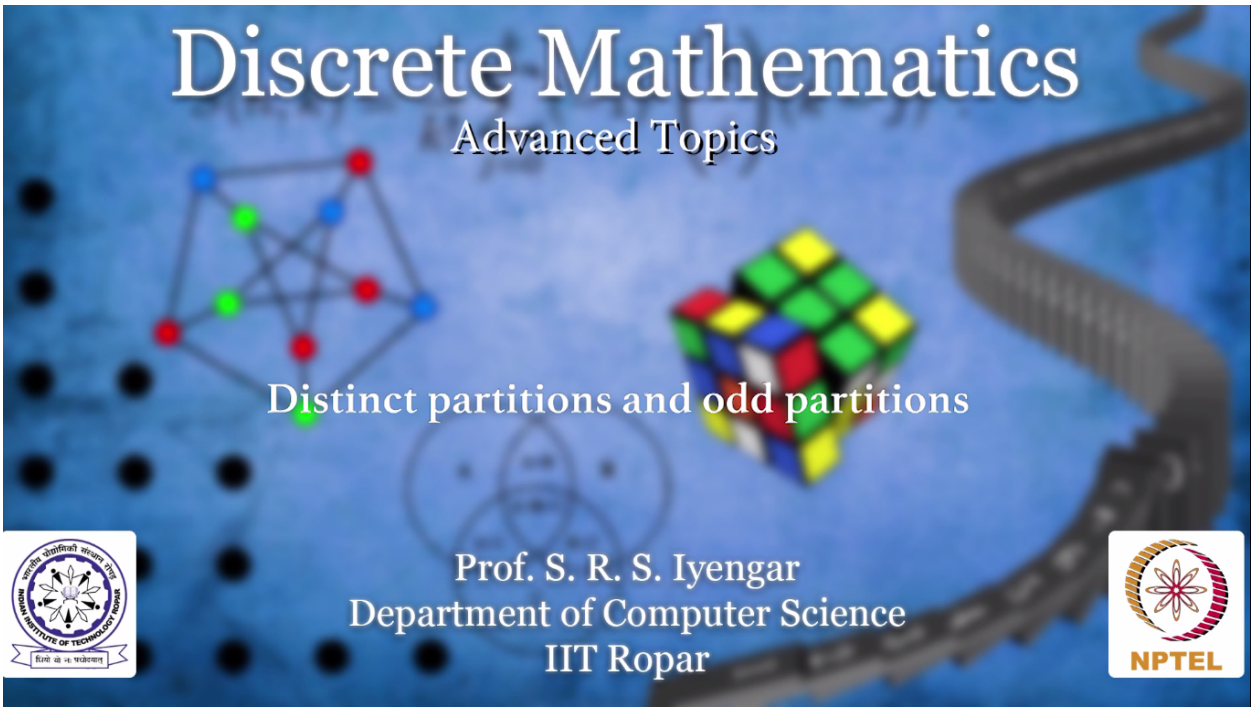
Discrete Mathematics

Functions

Advanced Topics

Distinct partitions and odd partitions



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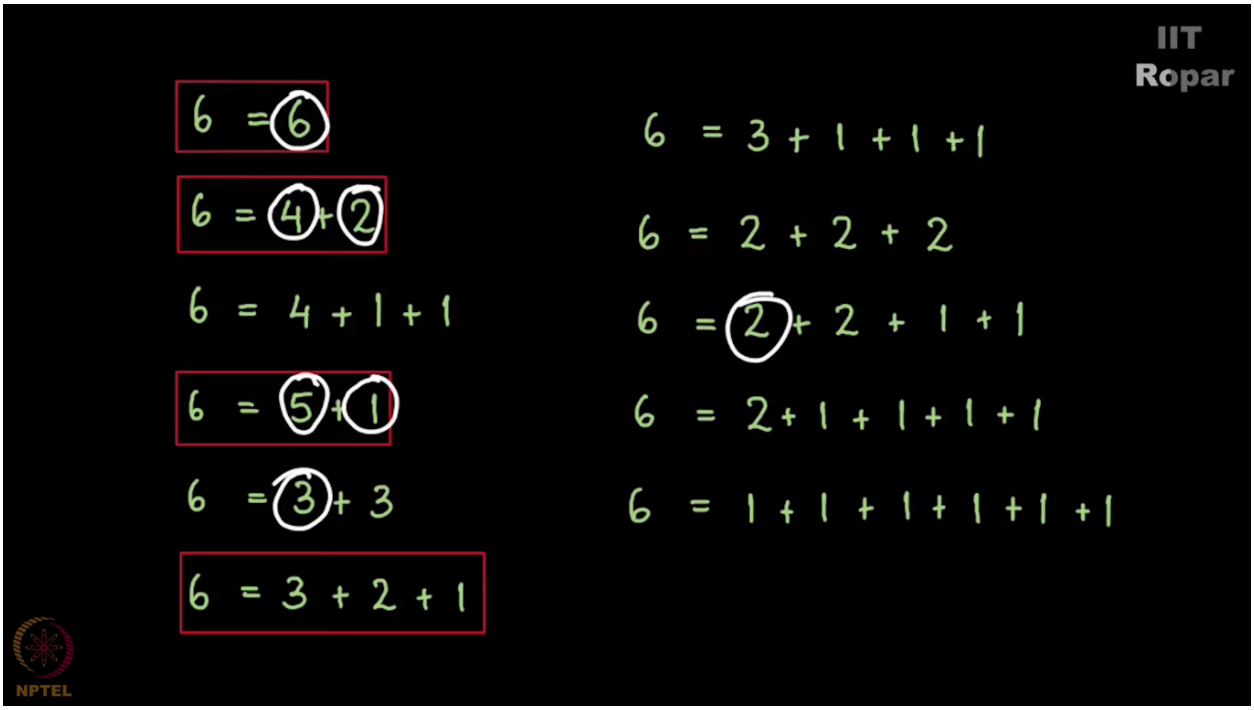
Here is something very interesting. Look at these partitions of 6. 6 can be written as 6. 4 plus2. 4 plus1 plus 1. 5 plus 1. 3 plus 3. 3 plus 2 plus 1. 3 plus 1 plus 1 plus1. 2 plus 2 plus 2. 2 plus 2 plus 1 plus 1. 2 plus 1 plus 1 plus 1 plus 1. 1. plus 1 plus 1 plus 1 plus 1 plus 1 plus 1. All 1s. Now these are the partitions of 6. Observe something now.

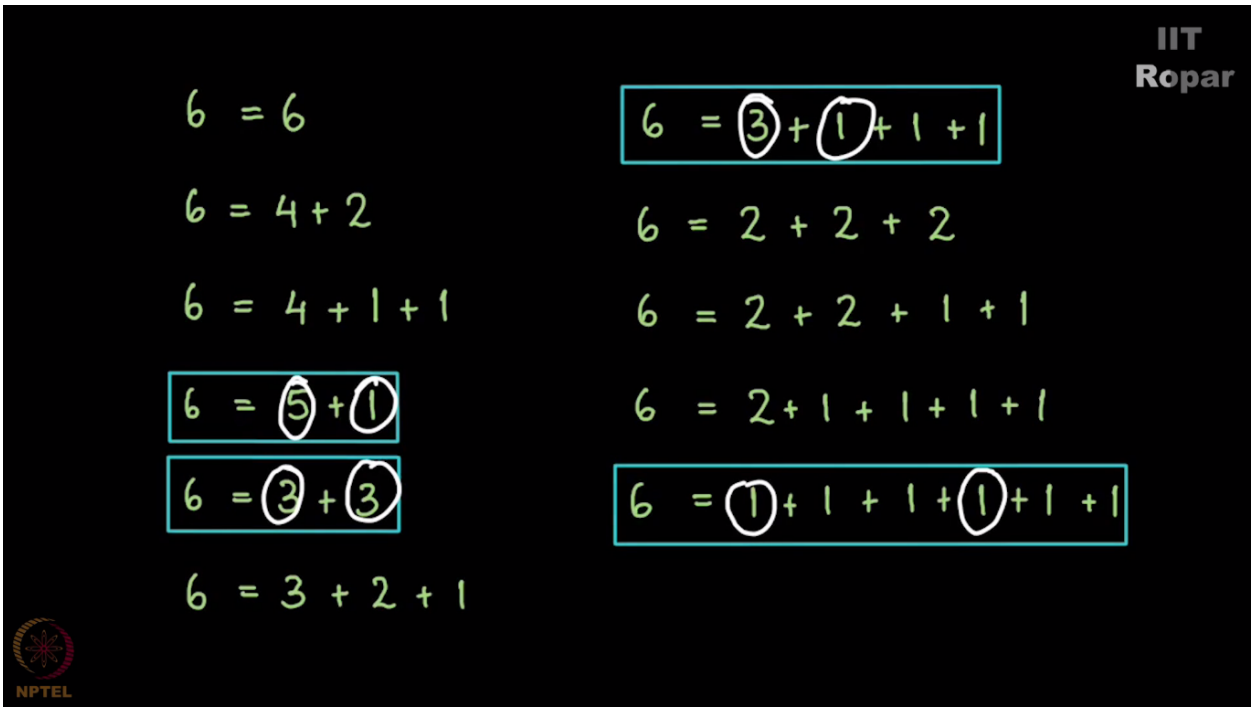
I am going to box some partitions like this. Keenly observe this partitions. 6 equals 6. 4 plus 2. 5 plus1. 3, 2, 1. Take a minute's pause observe these and observe the unboxed ones and you will be able to find out something very interesting. Now I hope you have taken a pause. Here is the observation.

These partitions have all distinct summands. What do I mean by summands? If this is one part 6, 4 plus 2 these are called summands. 5 and 1 are called as summands and so on. So I hope you have understood what is a summand. 5 is a summand. 1 is a summand. So what constitutes the partition the integers which constitutes the partitions are called as summands. 3 is a summand. Here 2 is a summand. So on.



So now observe these boxed partitions. What did we see? We saw that all of them have distinct summands. The partitions wit distinct summands. I am going to write the mass Pd of n in and for in general we have seen what was Pd of 6, d stands for distinct which is in the subscript. So Pd of n or Pd of 6 for n equal 6 is 4. Now again observe the partitions of 6. 4 plus 1 , 1. 3, 3. 3, 2, 1. 3, 1, 1, 1. 2, 2, 2. 2, 2, 1, 1. 2, 1, 1, 1, 1. And all 1s. I have again written down all the partitions.

Now observe these partitions. 5,1. 3, 3. 3, 1, 1, 1 and all 1s. Observe these boxed partitions. Earlier we saw that the summands were distinct. What can you comment upon the summands of these partitions.



Do you observe that here we have all odd summands. 5, 1. 3, 3. 1s here. All are 1s and here it is 3,1, 1 so on. Do you observe that all are odd in the partitions which are boxed. Now we have seen the partitions with odd summands. All of them were odd. I have not boxed those which had even one even summand. I am going to represent it as Po of n O stands for odd here. We have seen what was Po of 6 it is 4. Well remember whatever we have learned in this video we will be seeing something more in the next one.

Partitions with odd summands.

$$P_o(6) = 4$$

odd