INDIAN SCHOOL DARSAIT
DEPARTMENT OF MATHEMATICS

Subject : Mathematics   Topic : PMI   Date of Worksheet :06/5/2019

Resource Person: Premela Isac   Date of submission:13/5/2019

Name of the Student :________________   Class & Division : XI   Roll Number : __

S.No.	Questions	Marks
	Section A (Basics):	
	<u>Steps to be followed:</u>	
	Step 1: Consider the given statement to be P(n).	
	Step 2:Prove P(1) is true.	
	Step 3:Assume P(k) is true.	
	Step 4:Prove P(k+1) is true.	
	Section B :	
	Prove the following by PMI:	
1.	$1 + 3 + 5 + \dots\dots + (2n - 1) = n^2$	4
2.	$1.3 + 2.4 + 3.5 + \dots\dots n.(n + 2) = \frac{1}{6} n(n + 1)(2n + 7)$	4
3.	$a + (a + d) + (a + 2d) + \dots\dots + (a + (n - 1)d) = \frac{n}{2}(2a + (n - 1)d)$	4
4.	$4^n + 15n - 1$ is divisible by 9 for all $n \in N$	4
5.	Prove by induction that the sum of cubes of any three consecutive natural numbers is divisible by 9.	6
6.	Prove using PMI the rule of exponents $(ab)^n = a^n b^n$, $n \in N$	4
7.	Prove that if 3^{2n} is divided by 8 , the remainder is always 1,where n is a natural number.	6
	Section C (Hots):	
1.	Using principle of mathematical induction, prove that $\cos\alpha \cos 2\alpha \cos 4\alpha \dots\dots \cos(2^{n-1}\alpha) = (\sin 2^n\alpha) / (2^n \sin\alpha)$ for all $n \in N$	6
2.	For all positive integer n, prove that $(n^7/7) + (n^5/5) + (2n^3/3) - (n/105)$ is an integer	6