

SWOT INSTITUTE
MATHEMATICAL INDUCTION
XI-TEST

Time : 1 hr.

Prove :

1. $1^3 + 2^3 + 3^3 + \dots + n^3 = \left(\frac{n(n+1)}{2}\right)^2$
2. $1.2.3 + 2.3.4 + \dots + n(n+1)(n+2) = \frac{n(n+1)(n+2)(n+3)}{4}$
3. $1.3 + 3.5 + 5.7 + \dots + (2n-1)(2n+1) = \frac{n(4n^2 + 6n - 1)}{3}$
4. $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots + \frac{1}{2^n} = 1 - \frac{1}{2^n}$.
5. $a + ar + ar^2 + \dots + ar^{n-1} = \frac{a(r^n - 1)}{r - 1}$.
6. $1 + 2 + 3 + \dots + n < \frac{1}{8}(2n+1)^2$
7. $x^{2n} - y^{2n}$ is divisible by $x + y$.
8. $41^n - 14^n$ is a multiple of 27.