Chapter - 4

ASSIGNMENT

ONE AND TWO MARK QUESTIONS

1. If P(n) is the statement "$2^{3n}-1$ is an integral multiple of 7". Prove that P(1), P(2) and P(3) are true.
2. If P(n) is a statement "$n^2 > 100$", prove that P(r+1) is true whenever P (r) is true.
3. If P(n) is a statement "$2^n \geq n$", prove that P(r+1) is true whenever P (r) is true.
4. Give an example of a statement which is true for all $n \geq 4$, but P(1), P(2) and P(3) are not true
5. For which natural numbers $n^2 < 2^n$ holds?
6. If P(n): $2 \times 4^{2n+1} + 3^{3n+1}$ is divisible by λ for all n, then find the value of λ.

FOUR AND SIX MARKS QUESTIONS

Prove by PMI that

1. $1+3+5+\ldots\ldots\ldots+(2n-1) = n^2+2$, prove that P(k+1) is true whenever P(k) is true. But , P(n) is not true for all natural numbers.
2. $\left(1-\frac{1}{2^2}\right)\left(1-\frac{1}{3^2}\right)\ldots\ldots\ldots\ldots\left(1-\frac{1}{n^2}\right) = \frac{n+1}{2n}$ is true for all natural numbers greater than 2.
3. the sum of the cubes of the three consecutive natural numbers is divisible by 9.
4. 3^{2n} when divisible by 8, the remainder is always 1.
5. $\frac{n^5}{5}+\frac{n^3}{3}+\frac{7n}{15}$ is a natural number for every natural number n. (HOTS)
6. $5^{2n+2} - 24n - 25$ is divisible by 576 for every natural number n.
7. $11^{n+2} + 12^{2n+1}$ is divisible by 133 for every natural number n.
8. $x^{2n-1} + y^{2n-1}$ is divisible by x + y for every natural number n.
9. n(n + 1)(2n + 1) is divisible by 6 for every natural number n.
10. $3^n > 2^n$ for every natural number n.
11. $2^n > 3n$ for every natural number n > 4.

Pooja Anand
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