MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 86

Total Marks : 38

Max. Time : 43 min.

Topic : Mathematical Induction

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1,2,3	**(3 marks, 3 min.)**	**[9, 9]**
Multiple choice objective (no negative marking) Q.4	**(5 marks, 4 min.)**	**[5, 4]**
Subjective Questions (no negative marking) Q.5,6,7,8,9,10	**(4 marks, 5 min.)**	**[24, 30]**

1. If p(n) : $n^2 > 100$ then

(A) p(1) is true

(B) p(4) is true

(C) p(k) is true $\forall$ $k \geq 5$, $k \in N$

(D) p(k + 1) is true whenever p(k) is true where $k \in N$

2. $1 + 2 + 3 + ... + n < \frac{(n+2)^2}{8}$, $n \in N$, is true for

(A) $n \geq 1$ (B) $n \geq 2$ (C) all n (D) none of these

3. $n^3 + (n + 1)^3 + (n + 2)^3$ is divisible for all $n \in N$ by

(A) 3 (B) 9 (C) 27 (D) 81

4. By principle of mathematical induction, $3^{2n+2} - 8n - 9$ is divisible for every natural number n by

(A) 16 (B) 8 (C) 64 (D) 9

5. Let P(n) be the statement "$n^3 + n$ is divisible by 3". Write P(1), P(4)

6. Prove that $\frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + ... + \frac{1}{2^n} = 1 - \frac{1}{2^n}$, $n \in N$.

7. By using PMI, prove that $2 + 4 + 6 + ... + 2n = n(n + 1)$, $n \in N$

8. By using PMI, prove that $1.3 + 2.3^2 + 3.3^3 + ... + n.3^n = \frac{(2n-1)3^{n+1}+3}{4}$, $n \in N$

9. Prove that $2^n > n$, $n \in N$.

10. If 3^{2n}, where n is a natural number, is divided by 8, prove that the remainder is always 1.

Answers Key

1. (D) **2.** (D) **3.** (B) **4.** (A)(B)(C)

5. P(1) : $1^3 + 1$ is divisible by 3,
P(4) : $4^3 + 4$ is divisible by 3