DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth **SUBJECT : MATHS**
DATE : **DPP NO. :1**

Topic :-PRINCIPLE OF MATHEMATICAL INDUCTION

1. For all positive integral values of $n, 3^{2n} - 2n + 1$ is divisible by
   a) 2 b) 4 c) 8 d) 12

2. $3 + 13 + 29 + 51 + 79 + \cdots$ to n terms $=$
   a) $2n^2 + 7n^3$ b) $n^2 + 5n^3$ c) $n^3 + 2n^2$ d) None of these

3. If $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$,then which one of the following holds for all $n \geq 1$, by the principle of mathematical induction?
   a) $A^n = 2^{n-1}A + (n-1)I$ b) $A^n = nA + (n-1)I$
   c) $A^n = 2^{n-1}A - (n-1)I$ d) $A^n = nA - (n-1)I$

4. If $(n): 1 + 3 + 5 + \ldots + (2n-1) = n^2$ is
   a) True for all $n \in N$ b) True for $n > 1$ c) True for no n d) None of these

5. For a positive integer n, Let $a(n) = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \ldots + \frac{1}{(2^n)-1}$. Then
   a) $a(100) \leq 100$ b) $a(100) > 100$ c) $a(200) \leq 100$ d) None of these

6. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then for $n \in N$, A^n is equal to
   a) $\begin{bmatrix} \cos^n\theta & \sin^n\theta \\ -\sin^n\theta & \cos^n\theta \end{bmatrix}$ b) $\begin{bmatrix} \cos n\theta & \sin n\theta \\ -\sin n\theta & \cos n\theta \end{bmatrix}$ c) $\begin{bmatrix} n\cos\theta & n\sin\theta \\ -n\sin\theta & n\cos\theta \end{bmatrix}$ d) None of the above

7. The sum of the cubes of three consecutive natural numbers is divisible by
   a) 7 b) 9 c) 25 d) 26

8. For all $n \in N, \sum n$
   a) $< \frac{(2n+1)^2}{8}$ b) $> \frac{(2n+1)^2}{8}$ c) $= \frac{(2n+1)^2}{8}$ d) None of these

9. The product of three consecutive natural numbers is divisible by
   a) 5 b) 7 c) 6 d) 4

10. For all $n \in N, 5^{2n} - 1$ is divisible by
    a) 6 b) 11 c) 24 d) 26

11. $7^{2n} + 3^{n-1}.2^{3n-3}$ is divisible by
    a) 24 b) 25 c) 9 d) 13

12. For $n \in N, 10^{n-2} \geq 81n$ is

a) $n > 5$ b) $n \geq 5$ c) $n < 5$ d) $n > 8$

13. For all $n \in N, \frac{n^5}{5} + \frac{n^3}{3} + \frac{7}{15n}$ is
a) An integer b) A natural number c) A positive fraction d) None of these

14. Let $S(k) = 1 + 3 + 5....+(2k - 1) = 3 + k^2$. Then, which of the following is true?
a) $S(1)$is correct b) $S(k) \Longrightarrow S(k + 1)$
c) $S(k) \nRightarrow S(k + 1)$ d) Principle of mathematical induction can be used to prove the formula

15. The smallest positive integer n for which $n! < \left(\frac{n+1}{2}\right)^n$ holds, is
a) 1 b) 2 c) 3 d) 4

16. The remainder when 5^{99} is divided by 13, is
a) 6 b) 8 c) 9 d) 10

17. $10^n + 3(4^{n+2}) + 5$ is divisible by $(n \in N)$
a) 7 b) 5 c) 9 d) 17

18. For all $n \in N, n^3 + 2n$ is divisible by
a) 3 b) 8 c) 9 d) 11

19. For all $n \in N, 7^{2n} - 48n - 1$ is divisible by
a) 25 b) 26 c) 1234 d) 2304

20. $10^n + 3(4^{n+2}) + 5$ is divisible by $(n \in N)$
a) 7 b) 5 c) 9 d) 17