ASSIGNMENT

BINOMIAL THEOREM

Class -XI

1. Expand the following by Binomial theorem:
   (i) $(x+1/x)^7$ (IV) $(1+\frac{X}{2}-\frac{2}{X})^4$
   (ii) $\left(x^2+\frac{2}{x}\right)^4, x \neq 0$ $(1+X+X^2)^5$
   (iii) $(\frac{2x}{3}-\frac{3}{2x})^6$
2. The first three terms in the expansion of $(1+X)^n$ are 1, 10, & 40. Find the expansion.
3. IF the coefficient of 2^{nd}, 3^{rd}, 4^{th} terms in the expansion of $(1+x)^{2n}$ are in A.P., show that $2n^2-9n+7=0$.
4. In the expression of $(1+x)^n$ three successive co-efficient are 462, 330, & 165 respectively. Find the value of n & r.
5. Using binomial theorem, prove that $(3^{2n+2}-8n-9)$ is divisible by 64, where n is a positive integer.
6. Find the co- efficient of x^4 in the expansion of $(1+x)^n (1-x)^n$.
7. If x^p occurs in the expansion of $(x^2+\frac{1}{x})^{2n}$, Prove that the co-efficient is $\frac{(2n)!}{\left[\frac{(4n-p)}{3}\right]![\frac{1}{3}(2n+p)]!}$.
8. Find the value of r, if the coefficient of $(2r+4)^{th}$ & $(r-2)^{th}$ term in the expansion of $(1+x)^{18}$ are equal.
9. If A be the sum of odd terms and B be the sum of even terms in the expansion of $(x+a)^n$, Prove that
   (i) $A^2-B^2=(x^2-a^2)^n$
   (ii) $2(A^2+B^2)=(x+a)^{2n}+(x-a)^{2n}$
10. Show that : $(101)^{50} > (100)^{50} + (99)^{50}$

11. Find the fifth term from the end in the expansion of $\left(\frac{x^3}{2}-\frac{2}{x^2}\right)^9$.
12. In the binomial of $(a+b)^m$, m≥5, the sum of 5^{th} & 6^{th} terms is zero. Then find $\boldsymbol{\frac{a}{b}}$.
13. If the co-efficient of three consecutive terms in the expansion of $(1+x)^n$ are in the ratio 182:84:30. prove that n = 18.
14. Given that the fourth term in the expansion of $\left(px+\frac{1}{x}\right)^n$ is $\frac{5}{2}$, find n, p.

15. Find the value of k so that the term independent of x in $\left(\sqrt{x}+\frac{k}{x^2}\right)^{10}$ is 405.

16. If a, b, c, & d be the four consecutive terms in expansion of $(1+x)^n$, prove that

$$\frac{a}{a+b}+\frac{c}{c+d}=\frac{2b}{b+c}.$$

17. Show that the middle term in the expansion of $\left(x-\frac{1}{x}\right)^{2n}$ is $\frac{1.3.5......(2n-1)}{n!}(-2)^n$.

18. If there is a term independent of x in $\left(x+\frac{1}{x^2}\right)^n$, show that it is equal to $\frac{n!}{\left(\frac{n}{3}\right)!\left(\frac{2n}{3}\right)!}$.

19. If n is a positive integer, show that $2^{5n+6}-31n-32$ is divisible by 961 if $n>1$.
20. If three consecutive coefficient in the expansion of $(1+x)^n$ are in the ratio 6:33:110.Find n & r.
21. Find the sixth term from end in the expansion of $(x-\frac{1}{x})^{10}$.

Answer Key:

(I) $x^7+7x^5+21x^3+35x+35/x+21/x^3+7/x^5+1/x^7$

(II) $x^{8+}8x^5+24x^2+32/x+16$

(III) $\frac{64}{129}x^6-\frac{32}{27}x^4+\frac{20}{3}x^2-20+\frac{135}{4x^2}-\frac{243}{8x^4}+\frac{729}{64x^6}$.

2 . n=5, x=2 , $(1+x)^5$.

4. n = 11, r =7 11. $-252x^2$ 12. a/b = $\frac{n-4}{5}$

13. 41 14. n=6, p=1/2 15. K=±3

20. n=12, r =2 21. -20_{C_5}