BINOMIAL THEOREM

1. If $x+y=1$, then $\sum_{r=0}^{n} r^2\, {}^nC_r x^r y^{n-r}$ equals

(a) nxy (b) $nx(x + yn)$ (c) $nx(nx + y)$ (d) None of these

2. Let $f(x) = (\sqrt{x^2+1} + \sqrt{x^2-1})^6 + \left(\frac{2}{\sqrt{x^2+1}+\sqrt{x^2-1}}\right)^6$. Then

(a) $f(x)$ is a polynomial of the sixth degree in x (b) $f(x)$ has exactly two terms

(c) $f(x)$ is not a polynomial in x (d) Coefficient of x^6 is 64

3. In the expansion of $(x+a)^n$, the sum of odd terms is P and sum of even terms is Q, then the value of $(P^2 - Q^2)$ will be

(a) $(x^2+a^2)^n$ (b) $(x^2-a^2)^n$ (c) $(x-a)^{2n}$ (d) $(x+a)^{2n}$

4. The sum of the coefficients in the binomial expansion of $\left(\frac{1}{x}+2x\right)^n$ is equal to 6561. The constant term in the expansion is

(a) ${}^8C_4$ (b) $16 \cdot {}^8C_4$ (c) ${}^6C_4 \cdot 2^4$ (d) None of these

5. The greatest value of the term independent of x in the expansion of $(x \sin\alpha + x^{-1}\cos\alpha)^{10}, \alpha \in R$, is

(a) 2^5 (b) $\frac{10\,!}{(5\,!)^2}$ (c) $\frac{1}{2^5} \cdot \frac{10\,!}{(5\,!)^2}$ (d) None of these

6. The sum of the coefficients of even power of x in the expansion of $(1+x+x^2+x^3)^5$ is

(a) 256 (b) 128 (c) 512 (d) 64

7. The coefficient of x^5 in the expansion of $(1+x)^{21} + (1+x)^{22} + ... + (1+x)^{30}$ is

(a) ${}^{51}C_5$ (b) ${}^9C_5$ (c) ${}^{31}C_6 - {}^{21}C_6$ (d) ${}^{30}C_5 + {}^{20}C_5$

8. The coefficient of each middle term in the expansion of $(1+x)^n$, when n is odd, is

(a) $\frac{1.3.5....(n-1)}{2.4.6....n}2^n$ (b) $\frac{1.3.5.....n}{2.4.6....n}2^n$ (c) $\frac{1.3.5....(n+1)}{2.4.6....n}2^n$ (d) $\frac{1.3.5....n}{2.4.6....(n+1)}2^n$

9. If the rth term is the middle term in the expansion of $\left(x^2 - \frac{1}{2x}\right)^{20}$ then the $(r + 3)$th term is

(a) ${}^{20}C_{14} \cdot \frac{1}{2^{14}} \cdot x$ (b) ${}^{20}C_{12} \cdot \frac{1}{2^{12}} \cdot x^2$ (c) $-\frac{1}{2^{13}} \cdot {}^{20}C_7 \cdot x$ (d) None of these

10. The coefficient of the middle term in the binomial expansion in powers of x of $(1+\alpha x)^4$ and of $(1-\alpha x)^6$ is the same if α equals

(a) $\frac{3}{5}$ (b) $\frac{10}{3}$ (c) $\frac{3}{10}$ (d) $\frac{-3}{10}$

11. If n is even positive integer, then the condition that the greatest term in the expansion of $(1+x)^n$ may have the greatest coefficient also, is

(a) $\frac{n}{n+2} < x < \frac{n+2}{n}$ (b) $\frac{n+1}{n} < x < \frac{n}{n+1}$ (c) $\frac{n}{n+4} < x < \frac{n+4}{4}$ (d) None of these

12. The interval in which x must lie so that the numerically greatest term in the expansion of $(1-x)^{21}$ has the numerically greatest coefficient is

(a) $\left[\frac{5}{6}, \frac{6}{5}\right]$ (b) $\left(\frac{5}{6}, \frac{6}{5}\right)$ (c) $\left(\frac{4}{5}, \frac{5}{4}\right)$ (d) $\left[\frac{4}{5}, \frac{5}{4}\right]$

13. If $\frac{(1-3x)^{1/2} + (1-x)^{5/3}}{\sqrt{4-x}}$ is approximately equal to $a + bx$ for small values of x, then (a, b) =

(a) $\left(1, \frac{35}{24}\right)$ (b) $\left(1, -\frac{35}{24}\right)$ (c) $\left(2, \frac{35}{12}\right)$ (d) $\left(2, -\frac{35}{12}\right)$

14. In the expansion of $\left(\frac{1+x}{1-x}\right)^2$, the coefficient of x^n will be

(a) $4n$ (b) $4n - 3$ (c) $4n + 1$ (d) None of these

15. The coefficient of x^3 in the expansion of $\frac{(1+3x)^2}{1-2x}$ will be

(a) 8 (b) 32 (c) 50 (d) None of these