Binomial Theorem - Set 2

1. r and n are positive integers $r > 1, n > 2$ and coefficients of $(r+2)^{th}$ term and $3r^{th}$ term in the expansion of $(1+x)^{2n}$ are equal, then n equals

   (a) 3r
   (b) 3r +1
   (c) 2r
   (d) 2r +1

   [Ans. c]

2. If x is positive, the first negative term in the expansion of $(1+x)^{\frac{27}{5}}$ is

   (a) 6th term
   (b) 7th term
   (c) 5th term
   (d) 8th term

   [Ans. d]

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

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

   [Ans. c]

4. The coefficient of x^n in expansion of $(1+x)(1-x)^n$ is

   (a) $(-1)^{n-1}n$
   (b) $(-1)^n(1-n)$
   (c) $(-1)^{n-1}(n-1)^2$
   (d) $(n-1)$

   [Ans. b]

5. The value of ${}^{50}C_4 + \sum_{r=1}^{6} {}^{56-r}C_3$ is

   (a) ${}^{55}C_4$
   (b) ${}^{55}C_3$
   (c) ${}^{56}C_3$
   (d) ${}^{56}C_4$

   [Ans. d]

6. The sum of the series ${}^{20}C_0 - {}^{20}C_1 + {}^{20}C_2 - {}^{20}C_3 + ... - ..... + {}^{20}C_{10}$ is

   (a) 0
   (b) ${}^{20}C_{10}$
   (c) $-{}^{20}C_{10}$
   (d) $\frac{1}{2}{}^{20}C_{10}$

[Ans. d]

7. If n is a positive integer, then $(\sqrt{3}+1)^{2n} - (\sqrt{3}-1)^{2n}$ is
   (a) an irrational number
   (b) an odd positive integer
   (c) an even positive integer
   (d) a rational number other than positive integers

   [Ans. a]

8. Expand by binomial theorem: $(1-x+x^2)^4$ [Ans. $1-4x+10x^2-16x^3+19x^4-16x^5+10x^6-4x^7+x^8$]
9. Find the term independent of x in $(x^2+\frac{1}{x})^9$ [Ans. 7th term]
10. If coefficients of a^{r-1}, a^r, a^{r+1} in $(1+a)^n$ are in A.P., prove:
$$n^2 - n(4r+1) + 4r^2 - 2 = 0$$
11. If in $(1+x)^m(1-x)^n$, coeff. of x is 3 and of x^2 is -6, find m. [Ans. 12]
12. Find ${}^{4n}C_0 + {}^{4n}C_4 + {}^{4n}C_8 + \cdots + {}^{4n}C_{4n}$ [Ans. $2^{4n-2} + (-1)^n 2^{2n-1}$]
13. If $a_k = \frac{1}{k(k+1)}$, prove $\left(\sum_{k=1}^{n} a_k\right)^2 = \left(\frac{n}{n+1}\right)^2$
14. If $(r+1)$th term of $\left(\frac{a^{1/3}}{b^{1/6}} + \frac{b^{1/2}}{a^{1/6}}\right)^{21}$ has equal powers of a, b, find r. [Ans. 9]
15. Coefficient of x^{20} in $(1+3x+3x^2+x^3)^{20}$ [Ans. ${}^{60}C_{40}$]
16. Two consecutive equal coefficients in $(3+2x)^{74}$ [Ans. 30, 31]
17. Coefficient of x^r in $(1-x)^{-2}$ [Ans. $r+1$]