Binomial Theorem

JEE-MAINS (PREVIOUS YEAR)

MCQ-Single Correct

1. The value of $\left({}^{21}C_1 - {}^{10}C_1\right) + \left({}^{21}C_2 - {}^{10}C_2\right) + \left({}^{21}C_3 - {}^{10}C_3\right) + \left({}^{21}C_4 - {}^{10}C_4\right) + \ldots + \left({}^{21}C_{10} - {}^{10}C_{10}\right)$ is :

(1) $2^{21} - 2^{11}$ (2) $2^{21} - 2^{10}$

(3) $2^{20} - 2^{9}$ (4) $2^{20} - 2^{10}$ **[2017]**

2. If the number of terms in the expansion of $\left(1 - \frac{2}{x} + \frac{4}{x^2}\right)^n$, $x \neq 0$, is 28, then the sum of the coefficients of all the terms in this expansion, is :

(1) 2187 (2) 243

(3) 729 (4) 64 **[2016]**

3. The sum of coefficients of integral powers of x in the binomial expansion of $\left(1 - 2\sqrt{x}\right)^{50}$ is :

(1) $\frac{1}{2}\left(3^{50}\right)$ (2) $\frac{1}{2}\left(3^{50} - 1\right)$

(3) $\frac{1}{2}\left(2^{50} + 1\right)$ (4) $\frac{1}{2}\left(3^{50} + 1\right)$ **[2015]**

4. If the coefficients of x^3 and x^4 in the expansion of $(1 + ax + bx^2)(1 - 2x)^{18}$ in powers of x are both zero, then (a,b) is equal to

(1) $\left(16, \frac{251}{3}\right)$ (2) $\left(14, \frac{251}{3}\right)$

(3) $\left(14, \frac{272}{3}\right)$ (4) $\left(16, \frac{272}{3}\right)$ **[2014]**

5. The term independent of x in the expansion of $\left(\frac{x+1}{x^{2/3} - x^{1/3} + 1} - \frac{x-1}{x - x^{1/2}}\right)^{10}$ is

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(1) 120 (2) 210

(3) 310 (4) 4 **[2013]**

6. If n is a positive integer, then $\left(\sqrt{3}+1\right)^{2n}-\left(\sqrt{3}-1\right)^{2n}$ is

(1) an even positive integer.

(2) a rational number other than positive integers.

(3) an irrational number.

(4) an odd positive integer. **[2012]**

7. The remainder left out when $8^{2n}-(62)^{2n+1}$ is divided by 9 is

(1) 0 (2) 2

(3) 7 (4) 8 **[2009]**

8. In a binomial distribution B$\left(n, p=\frac{1}{4}\right)$, if the probability of at least one success is greater than or equal to $\frac{9}{10}$, then n is greater than

(1) $\frac{1}{\log_{10}4-\log_{10}3}$ (2) $\frac{1}{\log_{10}4+\log_{10}3}$

(3) $\frac{9}{\log_{10}4-\log_{10}3}$ (4) $\frac{4}{\log_{10}4-\log_{10}3}$ **[2009]**

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

(1) $-{}^{20}C_{10}$ (2) $\left(\frac{1}{2}\right){}^{20}C_{10}$

(3) 0 (4) ${}^{20}C_{10}$ **[2007]**

10. In the binomial expansion of $(a-b)^n$, n ≥ 5 the sum of 5[th] and 6[th] terms is zero, then a/b equals

(1) $\frac{5}{n-4}$ (2) $\frac{6}{n-5}$

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(3) $\frac{n-5}{6}$ (4) $\frac{n-4}{5}$ **[2007]**

11. For natural numbers m, n if $(1-y)^m(1+y)^n = 1+a_1y+a_2y^2+......$, and $a_1 = a_2 = 10$, then (m,n) is

(1) (20,45) (2) (35,20)

(3) (45,35) (4) (35,45) **[2006]**

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

(1) ${}^{55}C_4$ (2) ${}^{55}C_3$

(3) ${}^{56}C_3$ (4) ${}^{56}C_4$ **[2005]**

13. If the coefficient of x^7 in $\left[ax^2+\left(\frac{1}{bx}\right)\right]^{11}$ equals the coefficient of x^{-7} in $\left[ax^2-\left(\frac{1}{bx}\right)\right]^{11}$, then a and b satisfy the relation

(1) a – b = 1 (2) a + b = 1

(3) $\frac{a}{b}=1$ (4) ab = 1 **[2005]**

14. If x is so small that x^3 and higher powers of x may be neglected, then $\frac{(1+x)^{3/2}-(1+x/2)^3}{(1-x)^{1/2}}$ may be approximated as

(1) $1-\frac{3}{8}x^2$ (2) $3x+\frac{3}{8}x^2$

(3) $-\frac{3}{8}x^2$ (4) $\frac{x}{2}-\frac{3}{8}x^2$ **[2005]**

15. 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

(1) -5/3 (2) 3/5

(3) -3/10 (4) 10/3 **[2004]**

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16. The coefficient of x^n in expansion of $(1 + x)(1 – x)^n$ is

(1) $(n – 1)$ (2) $(-1)^n(1-n)$

(3) $(-1)^{n-1}(n-1)^2$ (4) $(-1)^{n-1}n$ **[2004]**

17. If $S_n = \sum_{r=0}^{n} \frac{1}{{}^nC_r}$ and $t_n = \sum_{r=0}^{n} \frac{r}{{}^nC_r}$, then $\frac{t_n}{S_n}$ is equal to

(1) n/2 (2) n/2 -1

(3) n -1 (4) n – ½ **[2004]**

18. The number of integral terms in the expansion of $\left(\sqrt{3}+\sqrt[8]{5}\right)^{256}$ is

(1) 32 (2) 33

(3) 34 (4) 35 **[2003]**

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

(1) 7^{th} term (2) 5^{th} term

(3) 8^{th} term (4) 6^{th} term **[2003]**

20. The positive integer just greater than $(1 + .0001)^{1000}$ is

(1) 4 (2) 5

(3) 2 (4) 3 **[2002]**

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

(1) 3r (2) 3r + 1

(3) 2r (4) 2r + 1 **[2002]**

22. The coefficients of x^p and x^q in the expansion of $(1 + x)^{p+q}$ are

(1) equal (2) equal with opposite signs

(3) reciprocals of each other (4) none of these **[2002]**

23. If the sum of the coefficients in the expansion of $(a+b)^n$ is 4096, then the greatest coefficient in the expansion is

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(1) 1594 (2) 792

(3) 924 (4) 2924 **[2002]**

Assertion – Reason Type

1. Let $S_1 = \sum_{j=1}^{10} j(j-1)\,{}^{10}C_j$, $S_2 = \sum_{j=1}^{10} j\,{}^{10}C_j$ and $S_3 = \sum_{j=1}^{10} j^2\,{}^{10}C_j$ **[2010]**

Statement – I : $S_3 = 55 \times 2^9$

Statement – II : $S_1 = 90\times2^8$ and $S_2 = 10\times2^8$

2. **Statement-I :** $\sum_{r=0}^{n} (r+1)\,{}^{n}C_r = (n+2)2^{n-1}$. **[2008]**

Statement-II : $\sum_{r=0}^{n} (r+1)\,{}^{n}C_r x^r = (1+x)^n + nx(1+x)^{n-1}$

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