BINOMIAL THEOREM

SELECT THE CORRECT ALTERNATIVE (ONLY ONE CORRECT ANSWER)

1. If the coefficients of x^7 & x^8 in the expansion of $\left[2+\frac{x}{3}\right]^n$ are equal, then the value of n is -

(A) 15 (B) 45 (C) 55 (D) 56

2. The sum of the binomial coefficients of $\left[2x+\frac{1}{x}\right]^n$ is equal to 256. The constant term in the expansion is -

(A) 1120 (B) 2110 (C) 1210 (D) none

3. The sum of the co–efficients in the expansion of $(1 - 2x + 5x^2)^n$ is 'a' and the sum of the co–efficients in the expansion of $(1 + x)^{2n}$ is b. Then -

(A) a = b (B) $a = b^2$ (C) $a^2 = b$ (D) ab = 1

4. Given that the term of the expansion $(x^{1/3} - x^{-1/2})^{15}$ which does not contain x is 5m where $m \in N$, then m is equal to -

(A) 1100 (B) 1010 (C) 1001 (D) none

5. The expression $\frac{1}{\sqrt{4x+1}}\left[\left[\frac{1+\sqrt{4x+1}}{2}\right]^7-\left[\frac{1-\sqrt{4x+1}}{2}\right]^7\right]$ is a polynomial in x of degree -

(A) 7 (B) 5 (C) 4 (D) 3

6. In the binomial $(2^{1/3} + 3^{-1/3})^n$, if the ratio of the seventh term from the beginning of the expansion to the seventh term from its end is 1/6, then n is equal to -

(A) 6 (B) 9 (C) 12 (D) 15

7. The term independent of x in the product $(4+x+7x^2)\left(x-\frac{3}{x}\right)^{11}$ is -

(A) $7.{}^{11}C_6$ (B) $3^6.\ {}^{11}C_6$ (C) $3^5.\ {}^{11}C_5$ (D) $-12.\ 2^{11}$

8. If 'a' be the sum of the odd terms & 'b' be the sum of the even terms in the expansion of $(1+x)^n$, then $(1-x)^n$ is equal to -

(A) a – b (B) a + b (C) b – a (D) none

9. The sum of the co–efficients of all the even powers of x in the expansion of $(2x^2 - 3x + 1)^{11}$ is -

(A) $2 . 6^{10}$ (B) $3 . 6^{10}$ (C) 6^{11} (D) none

10. The greatest terms of the expansion $(2x + 5y)^{13}$ when x = 10, y = 2 is -

(A) ${}^{13}C_5 . 20^8 . 10^5$ (B) ${}^{13}C_6 . 20^7 . 10^4$ (C) ${}^{13}C_4 . 20^9 . 10^4$ (D) none of these

11. Number of rational terms in the expansion of $\left(\sqrt{2}+\sqrt[4]{3}\right)^{100}$ is -

(A) 25 (B) 26 (C) 27 (D) 28

12. If $\binom{p}{q}=0$ for p < q, where p, q ∈ W, then $\sum_{r=0}^{\infty}\binom{n}{2r}=$

(A) 2^n (B) 2^{n-1} (C) 2^{2n-1} (D) ${}^{2n}C_n$

13. $\binom{47}{4}+\sum_{j=1}^{5}\binom{52-j}{3}=\binom{x}{y}$, then $\frac{x}{y}=$

(A) 11 (B) 12 (C) 13 (D) 14

14. If $n \in N$ & n is even, then $\frac{1}{1.(n-1)!}+\frac{1}{3!(n-3)!}+\frac{1}{5!(n-5)!}+.....+\frac{1}{(n-1)!1!}$ =

(A) 2^n (B) $\frac{2^{n-1}}{n!}$ (C) $2^n n!$ (D) none of these

15. Let $R=(5\sqrt{5}+11)^{31}=I+f$, where I is an integer and f is the fractional part of R, then R f is equal to -

(A) 2^{31} (B) 3^{31} (C) 2^{62} (D) 1

16. The value of $\sum_{r=0}^{10}\binom{10}{r}\binom{15}{14-r}$ is equal to -

(A) $^{25}C_{12}$ (B) $^{25}C_{15}$ (C) $^{25}C_{10}$ (D) $^{25}C_{11}$

17. $\frac{C_0}{1}+\frac{C_1}{2}+\frac{C_2}{3}+.....+\frac{C_{10}}{11}$ is equal to (here $C_r = {}^{10}C_r$)

(A) $\frac{2^{11}}{11}$ (B) $\frac{2^{11}-1}{11}$ (C) $\frac{3^{11}}{11}$ (D) $\frac{3^{11}-1}{11}$

18. If $a_n=\sum_{r=0}^{n}\frac{1}{{}^nC_r}$, then $\sum_{r=0}^{n}\frac{r}{{}^nC_r}$ equals - **[JEE 98]**

(A) (n -1) a_n (B) n a_n (C) n $a_n/2$ (D) none of these

19. The last two digits of the number 3^{400} are -

(A) 81 (B) 43 (C) 29 (D) 01

SELECT THE CORRECT ALTERNATIVES (ONE OR MORE THAN ONE CORRECT ANSWERS)

20. If the coefficients of three consecutive terms in the expansion of $(1 + x)^n$ are in the ratio of 1 : 7 : 42, then n is divisible by -

(A) 9 (B) 5 (C) 3 (D) 11

21. In the expansion of $\left(\sqrt[3]{4}+\frac{1}{\sqrt[4]{6}}\right)^{20}$ -

(A) the number of irrational terms = 19 (B) middle term is irrational

(C) the number of rational terms = 2 (D) 9^{th} term is rational

22. If $(1 + x + x^2 + x^3)^{100} = a_0 + a_1x + a_2x^2 + ... + a_{300}x^{300}$, then -

(A) $a_0 + a_1 + a_2 + a_3 + ...+ a_{300}$ is divisible by 1024

(B) $a_0 + a_2 + a_4 + ...+ a_{300} = a_1 + a_3 + ... + a_{299}$

(C) coefficients equidistant from beginning and end are equal

(D) $a_1 = 100$

23. The number $101^{100} - 1$ is divisible by -

(A) 100 (B) 1000 (C) 10000 (D) 100000

24. If $\left(9+\sqrt{80}\right)^n = I + f$ where I, n are integers and $0 < f < 1$, then -

(A) I is an odd integer (B) I is an even integer

(C) $(I + f)(1 - f) = 1$ (D) $1 - f = \left(9-\sqrt{80}\right)^n$

25. In the expansion of $\left(x^{2/3}-\frac{1}{\sqrt{x}}\right)^{30}$, a term containing the power x^{13} -

(A) does not exist (B) exists and the co-efficient is divisible by 29

(C) exists and the co-efficient is divisible by 63 (D) exists and the co-efficient is divisible by 65

26. The co-efficient of the middle term in the expansion of $(1+x)^{2n}$ is -

(A) $\frac{1.3.5.7.....(2n-1)}{n!}\ 2^n$

(B) ${}^{2n}C_n$

(C) $\frac{(n+1)(n+2)(n+3)....(2n-1)(2n)}{1.2.3.....(n-1)\ n}$

(D) $\frac{2.6.10.14.....(4n-6)(4n-2)}{1.2.3.4.....(n-1)\ .\ n}$

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	C	A	A	C	D	B	B	A	B	C
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	B	B	C	B	C	D	B	C	D	B,D
Que.	21	22	23	24	25	26				
Ans.	A,B,C,D	A,B,C,D	A,B,C	A,C,D	B,C,D	A,B,C,D				

EXTRA PRACTICE QUESTIONS ON BINOMIAL THEOREM

SELECT THE CORRECT ALTERNATIVES (ONE OR MORE THAN ONE CORRECT ANSWERS)

1. The coefficient of x^r $(0 \le r \le n-1)$ in the expression :
$(x+2)^{n-1} + (x+2)^{n-2} \cdot (x+1) + (x+2)^{n-3} \cdot (x+1) + \ldots\ldots + (x+1)^{n-1}$ is -

(A) ${}^nC_r(2^r - 1)$ (B) ${}^nC_r(2^{n-r} - 1)$ (C) ${}^nC_r(2^r + 1)$ (D) ${}^nC_r(2^{n-r} + 1)$

2. If $(1 + x + x)^{25} = a_0 + a_1x + a_2x + \ldots\ldots + a_{50} \cdot x^{50}$ then $a_0 + a_2 + a_4 + \ldots\ldots + a_{50}$ is -

(A) even (B) odd & of the form 3n

(C) odd & of the form $(3n-1)$ (D) odd & of the form $(3n+1)$

3. The co-efficient of x^4 in the expansion of $(1 - x + 2x^2)^{12}$ is -

(A) ${}^{12}C_3$ (B) ${}^{13}C_3$ (C) ${}^{14}C_4$ (D) ${}^{12}C_3 + 3\,{}^{13}C_3 + {}^{14}C_4$

4. Let $(1 + x^2)^2 (1 + x)^n = A_0 + A_1x + A_2x^2 + \ldots\ldots$ If A_0, A_1, A_2 are in A.P. then the value of n is -

(A) 2 (B) 3 (C) 5 (D) 7

5. If $\sum_{k=1}^{n-r} {}^{n-k}C_r = {}^xC_y$ then -

(A) $x = n+1$; $y = r$ (B) $x = n$; $y = r+1$

(C) $x = n$; $y = r$ (D) $x = n+1$; $y = r+1$

6. Co-efficient of α^t in the expansion of $(\alpha + p)^{m-1} + (\alpha + p)^{m-2}(\alpha + q) + (\alpha + p)^{m-3}(\alpha + q)^2 + \ldots\ldots (\alpha + q)^{m-1}$ where $\alpha \ne -q$ and $p \ne q$ is -

(A) $\frac{{}^mC_t\left(p^t - q^t\right)}{p-q}$ (B) $\frac{{}^mC_t\left(p^{m-t} - q^{m-t}\right)}{p-q}$ (C) $\frac{{}^mC_t\left(p^t + q^t\right)}{p-q}$ (D) $\frac{{}^mC_t\left(p^{m-t} + q^{m-t}\right)}{p-q}$

7. The co-efficient of x^{401} in the expansion of $(1 + x + x^2 + \ldots\ldots + x^9)^{-1}$, $(|x| < 1)$ is -

(A) 1 (B) -1 (C) 2 (D) -2

8. Number of terms free from radical sign in the expansion of $(1 + 3^{1/3} + 7^{1/7})^{10}$ is -

(A) 4 (B) 5 (C) 6 (D) 8

9. The value r for which $\binom{30}{r}\binom{15}{r} + \binom{30}{r-1}\binom{15}{1} + \ldots\ldots + \binom{30}{0}\binom{15}{r}$ is maximum is/are -

(A) 21 (B) 22 (C) 23 (D) 24

10. If the 6^{th} term in the expansion of $\left(\frac{3}{2} + \frac{x}{3}\right)^n$ when $x = 3$ is numerically greatest then the possible integral value(s) of n can be -

(A) 11 (B) 12 (C) 13 (D) 14

11. In the expansion of $(1 + x)^n (1 + y)^n (1 + z)^n$, the sum of the co-efficients of the terms of degree 'r' is -

(A) ${}^{n^3}C_r$ (B) ${}^nC_{r^3}$ (C) ${}^{3n}C_r$ (D) $3 \cdot {}^{2n}C_r$

12. $\binom{35}{6} + \sum_{r=0}^{10}\binom{45-r}{5} = \binom{x}{y}$, then $x - y$ is equal to -

(A) 39 (B) 29 (C) 52 (D) 40

13. The value of $\sum_{\substack{r=0 \\ r \le s}}^{s}\sum_{s=1}^{n} {}^nC_s\,{}^sC_r$ is -

(A) $3^n - 1$ (B) $3^n + 1$ (C) 3^n (D) $3(3^n - 1)$

14. In the expansion of $\left(x^3 + 3.2^{-\log_{\sqrt{2}}\sqrt{x^3}}\right)^{11}$ -

(A) there appears a term with the power x^2

(B) there does not appear a term with the power x^2

(C) there appears a term with the power x^{-3}

(D) the ratio of the co-efficient of x^3 to that of x^{-3} is $\frac{1}{3}$

15. The sum of the series $(1+1).1! + (2+1).2! + (3+1).3! + ... + (n+1).n!$ is -

(A) $(n+1)\,.\,(n+2)!$ (B) $n\,.\,(n+1)!$ (C) $(n+1)\,.(n+1)!$ (D) none of these

16. The binomial expansion of $\left(x^k + \frac{1}{x^{2k}}\right)^{3n}$, $n \in N$ contains a term independent of x -

(A) only if k is an integer (B) only if k is a natural number

(C) only if k is rational (D) for any real k

17. Let $n \in N$. If $(1+x)^n = a_0 + a_1x + a_2x^2 + ...+ a_nx^n$ and a_{n-3}, a_{n-2}, a_{n-1} are in AP, then -

(A) a_1, a_2, a_3 are in AP (B) a_1, a_2, a_3 are in HP

(C) $n = 7$ (D) $n = 14$

18. Set of values of r for which, ${}^{18}C_{r-2} + 2\,.\,{}^{18}C_{r-1} + {}^{18}C_r \geq {}^{20}C_{13}$ contains -

(A) 4 elements (B) 5 elements (C) 7 elements (D) 10 elements

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	B	A	D	A,B	B	B	B	C	B,C	B,C,D
Que.	11	12	13	14	15	16	17	18		
Ans.	C	D	A	B,C,D	B	D	A,C	C		