BINOMIAL THEOREM

Single Correct Answer Type

1. If $\frac{1}{\sqrt{4x+1}}\left\{\left(1+\frac{\sqrt{4x+1}}{2}\right)^n-\left(1-\frac{\sqrt{4x+1}}{2}\right)^n\right\}$ = $a_0 + a_1x + ... + a_5 x^5$, then n =
(A) 11 (B) 9 (C) 10 (D) none of these

2. Let R = $\left(5\sqrt{5}+11\right)^{2n+1}$, f = R – [R]. Then Rf =
(A) 1 (B) 2^{n-} (C) 2^{2n} (D) 4^{2n+1}

3. If $\left(6\sqrt{6}+14\right)^{2n+1}$ = R and F = R – [R], where [R] denotes the greatest integer less than or equal to R, then RF =
(A) 4^{2n+1} (B) 4^{2n-1} (C) 20^{2n+1} (D) 20^{2n-1}

4. The middle term of $(1 - 3x + 3x^2 - x^3)^{2n}$ is
(A) ${}^{6n}C_{3n}(-x)^{3n}$ (B) ${}^{2n}C_n(-x)^{3n}$ (C) ${}^{5n}C_{2n}(-x)^{3n}$ (D) ${}^{4n}C_{3n}(-x)^{3n}$

5. The number of nonzero terms in the expansion of $(a+b\sqrt{2})^{20}-(a-b\sqrt{2})^{20}$ is
(A) 20 (B) 10 (C) 11 (D) 42

6. $3.C_0 + 7.C_1 + 11.C_2 + ... + (4n + 3).C_n$ =
(A) $(3n + 2)2^n$ (B) $(2n + 3)3^n$ (C) $(2n + 3)2^n$ (D) $(3n + 2)3^n$

7. If n is a positive integer, then value of $(3n + 2)\,{}^nC_0 + (3n - 1)\,{}^nC_1 + (3n - 4)\,{}^nC_2 + ... + 2({}^nC_n)$ is
(A) $(3n + 4)\,2^{n-1}$ (B) $(3n)^{2n}$ (C) $(3n - 1)\,2^n$ (D) $(3n - 3)\,2^n$

8. $2.C_2 + 6.C_3 + 12.C_4 + ... + n(n - 1).C_n$ =
(A) $n.(n - 1).2^{n-2}$ (B) $n.(n + 1).2^{n-2}$ (C) $n.(n + 1).2^{n-5}$ (D) $n.(n + 1).2^{n+5}$

9. $\frac{C_1}{C_0}+2.\frac{C_2}{C_1}+3.\frac{C_3}{C_2}+....+n.\frac{C_n}{C_{n-1}}$ =
(A) $\frac{n(n+1)}{2}$ (B) $\frac{n(n-1)}{2}$ (C) $\frac{(n-1)(n+1)}{2}$ (D) $\frac{n(n+2)}{2}$

10. $\frac{C_3}{4}+\frac{C_5}{6}+\frac{C_7}{8}+...$ =
(A) $\frac{(2^{n+1}-n^2-n-2)}{2(n+1)}$ (B) $\frac{(2^{n+1}+n^2+n-2)}{n+1}$ (C) $\frac{(3^{n+2}-n^2-n-2)}{n+1}$ (D) none of these

11. $\frac{2^2.C_0}{1.2}+\frac{2^3.C_1}{2.3}+.....\frac{2^{n+2}C_n}{(n+1)(n+2)}$ =
(A) $\frac{3^{n+2}-2n-5}{(n+1)(n+2)}$ (B) $\frac{3^{n+2}+2n+5}{(n+1)(n+2)}$ (C) $\frac{3^{n+5}-5n+3}{(n+1)^2}$ (D) none of these

12. $C_0C_1 + C_1C_2 + C_2C_3 + ... + C_{n-1}C_n$ =
(A) $\frac{(2n)!}{(n-1)!(n+1)!}$ (B) $\frac{(2n)!}{(n-3)!(n+1)!}$ (C) $\frac{(2n)!}{(n-2)!(n+2)!}$ (D) $\frac{(2n)!}{(n-1)!(n+2)!}$

13. If $(C_0 + C_1)(C_1 + C_2)......(C_{n-1} + C_n) = k\, C_0C_1C_2......C_n$, then k =

(A) $\frac{(n+1)^n}{n!}$ (B) $\frac{(n+1)}{n!}$ (C) $\frac{(n+2)^n}{n!}$ (D) $\frac{(n+2)}{n!}$

14. If ${}^{2n}C_r = C_r$, then $C_1^2 - 2.C_2^2 + 3.C_3^2 - ....2n.C_{2n}^2 =$

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

15. If n is a positive integer, n > 1, then $C_1(a-1)^2 - C_2(a-2)^2 + C_3(a-3)^2 + ... + (-1)^{n-1}C_n(a-n)^2 =$

(A) a (B) a^2 (C) na (D) na^2

16. The sum $\sum_{0\le} \sum_{i\le j\le 10} \left({}^{10}C_j\right)\left({}^{j}C_i\right) =$

(A) $2^{10} - 1$ (B) 2^{10} (C) $3^{10} - 1$ (D) 3^{10}

17. The term independent of x in $(1 + x)^n\left(1+\frac{1}{x}\right)^n$ is

(A) $C_0^2 + 2.C_1^2 + 3.C_2^2 + ... + (n+1).C_n^2$ (B) $(C_0 + C_1 + C_2 + ... + C_n)^2$

(C) $C_0^2 + C_1^2 + C_2^2 + ... + C_n^2$ (D) none of these

18. If $(1 + x + x^2)^n = \sum_{r=0}^{2n} a_r x^r$, then $a_0 + a_2 + a_4 + ... + a_{2n} =$

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

19. If $(1 + x + x^2)^n = \sum_{r=0}^{2n} a_r x^r$, then $a_1 - 2a_2 + 3a_3 - .... - 2na_{2n} =$

(A) 0 (B) 1 (C) n (D) –n

20. Sum of the series $S = 3^{-1}({}^{10}C_0) - {}^{10}C_1 + (3)({}^{10}C_2) - 3^2({}^{10}C_3) + ... + 3^9({}^{10}C_{10})$ is

(A) 2^9 (B) $\frac{1}{3}(2^{10} - 1)$ (C) $\frac{1}{3}(2^{11} - 2)$ (D) none of these

Numerical based

21. Find the number of divisors of the number $N = {}^{2000}C_1 + 2.{}^{2000}C_2 + 3.{}^{2000}C_3 + ... + 2000.{}^{2000}C_{2000}$

22. Find number of different dissimilar terms in the sum $(1+x)^{2012} + \left(1+x^2\right)^{2011} + \left(1+x^3\right)^{2010}$

23. Find the term independent of x in the expansion of $\left(1+x+2x^3\right)\left(\frac{3x^2}{2}-\frac{1}{3x}\right)^9$.

Up to two decimal places

24. Let $f(n) = \sum_{r=0}^{n}\sum_{k=r}^{n}\binom{k}{r}$. Find the total number of divisors of $f(11)$

25. Find the sum $\sum_{j=0}^{11}\sum_{i=j}^{11}\binom{i}{j}$ (Note: $\binom{n}{r} = {}^nC_r$)

KEY

1.	A	**2.**	D	**3.**	C	**4.**	A	**5.**	B
6.	C	**7.**	A	**8.**	A	**9.**	A	**10.**	A
11.	A	**12.**	A	**13.**	A	**14.**	C	**15.**	B
16.	C	**17.**	C	**18.**	A	**19.**	D	**20.**	D
21.	8016	**22.**	4023	**23.**	0.31	**24.**	24	**25.**	4095

❈ *Wish You all the Best* ❈