1. Let α be the constant term in the binomial expansion of $\left(\sqrt{x}-\frac{6}{x^{\frac{3}{2}}}\right)^n, n \leq 15$. If the sum of the coefficients of the remaining terms in the expansion is 649 and the coefficient of x^{-n} is $\lambda\alpha$, then λ is equal to ________.

2. The number of integral terms in the expansion of $\left(3^{\frac{1}{2}}+5^{\frac{1}{4}}\right)^{680}$ is equal to

3. If the 1011^{th} term from the end in the binomial expansion of $\left(\frac{4x}{5}-\frac{5}{2x}\right)^{2022}$ is 1024 times 1011^{th} term from the beginning, then $32|x|$ is equal to
(1) 15
(2) 10
(3) 12
(4) 8

4. If the constant term in the binomial expansion of $\left(\frac{x^{\frac{5}{2}}}{2}-\frac{4}{x^l}\right)^9$ is -84 and the coefficient of x^{-3l} is $2^\alpha\beta$ where $\beta<0$ is an odd number, then $|\alpha l-\beta|$ is equal to _____ .

5. The coefficient of x^{301} in $(1+x)^{500}+x(1+x)^{499}+x^2(1+x)^{498}+\ldots..+x^{500}$ is:
(1) ${}^{501}C_{302}$
(2) ${}^{500}C_{301}$
(3) ${}^{500}C_{300}$
(4) ${}^{501}C_{200}$

6. Let the coefficients of three consecutive terms in the binomial expansion of $(1+2x)^n$ be in the ratio $2:5:8$. Then the coefficient of the term, which is in the middle of these three terms, is

7. The term independent of x in the expression of $\left(1-x^2+3x^3\right)\left(\frac{5}{2}x^3-\frac{1}{5x^2}\right)^{11}, x \neq 0$ is
(1) $\frac{7}{40}$
(2) $\frac{33}{200}$
(3) $\frac{39}{200}$
(4) $\frac{11}{50}$

8. If the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of $\left(\sqrt[4]{2}+\frac{1}{\sqrt[4]{3}}\right)^n$ is $\sqrt{6}:1$, then the third term from the beginning is:
(1) $30\sqrt{2}$
(2) $30\sqrt{3}$
(3) $60\sqrt{2}$
(4) $60\sqrt{3}$

9. If the coefficient of x^{15} in the expansion of $\left(ax^3+\frac{1}{bx^{\frac{1}{3}}}\right)^{15}$ is equal to the coefficient of x^{-15} in the expansion of $\left(ax^{\frac{1}{3}}-\frac{1}{bx^3}\right)^{15}$, where a and b are positive real numbers, then for each such ordered pair (a,b):
(1) $a=b$
(2) $ab=1$
(3) $a=3b$
(4) $ab=3$

10. Let the sum of the coefficient of first three terms in the expansion of $\left(x-\frac{3}{x^2}\right)^n$; $x=0,\ n \in N$ be 376. Then, the coefficient of x^4 is equal to:

11. The coefficient of x^{101} in the expression
$(5+x)^{500}+x(5+x)^{499}+x^2(5+x)^{498}+\ldots\ldots+x^{500}, x>0$ is
(1) ${}^{501}C_{101}\times 5^{399}$
(2) ${}^{501}C_{101}\times 5^{400}$
(3) ${}^{501}C_{100}\times 5^{400}$
(4) ${}^{500}C_{101}\times 5^{399}$

12. The ratio of the coefficient of the middle term in the expansion of $(1+x)^{20}$ and the sum of the coefficients of two middle terms in expansion of $(1+x)^{19}$ is ___.

13. The coefficient of x^{18} in the product $(1+x)(1-x)^{10}\left(1+x+x^2\right)^9$ is
(1) 84
(2) -84
(3) -126
(4) 126

14. The remainder when $7^{2022}+3^{2022}$ is divided by 5 is
(1) 0
(2) 2
(3) 3
(4) 4

15. The remainder when $(2021)^{2023}$ is divided by 7 is
(1) 2
(2) 3
(3) 4
(4) 5

16. The remainder when $19^{200}+23^{200}$ is divided by 49, is _____ .

17. If $(2021)^{3762}$ is divided by 17, then the remainder is _______.

18. If the fractional part of the number $\frac{2^{403}}{15}$ is $\frac{k}{15}$, then k is equal to
(1) 4
(2) 14
(3) 8
(4) 6

19. Among the statements :

$(S1)$: $2023^{2022} - 1999^{2022}$ is divisible by 8.

$(S2)$: $13(13)^n - 11n - 13$ is divisible by 144 for infinitely many $n \in \mathbb{N}$

(1) Only $(S2)$ is correct
(2) Only $(S1)$ is correct
(3) Both $(S1)$ and $(S2)$ are correct
(4) Both $(S1)$ and $(S2)$ are incorrect

20. The remainder when $(2023)^{2023}$ is divided by 35 is

21. If the remainder when x is divided by 4 is 3, then the remainder when $(2020+x)^{2022}$ is divided by 8 is ___ .

22. Let $x = \left(8\sqrt{3}+13\right)^{13}$ and $y = \left(7\sqrt{2}+9\right)^{9}$. If $[t]$ denotes the greatest integer $\leq$ t, then

(1) $[x]+[y]$ is even
(2) $[x]$ is odd but $[y]$ is even
(3) $[x]$ is even but $[y]$ is odd
(4) $[x]$ and $[y]$ are both odd

23. The number of elements in the set $\{n \in \{1,2,3,\ldots,100\} \mid (11)^n > (10)^n + (9)^n\}$ is __________.

24. The coefficient of x^7 in $\left(1-x+2x^3\right)^{10}$ is __________ .

25. The constant term in the expansion of

$\left(2x+\frac{1}{x^7}+3x^2\right)^5$ is _____ .

26. If the constant term in the expansion of $\left(3x^3-2x^2+\frac{5}{x^5}\right)^{10}$ is $2^k.l$, where l is an odd integer, then the value of k is equal to

(1) 6
(2) 7
(3) 8
(4) 9

27. If $1+\left(2+{}^{49}C_1+{}^{49}C_2+\ldots.+{}^{49}C_{49}\right)\left({}^{50}C_2+{}^{50}C_4+\ldots..+{}^{50}C_{50}\right)$ is equal to $2^n.m$, where m is odd, then $n+m$ is equal to _____ .

28. Let $\left(1+x+2x^2\right)^{20} = a_0 + a_1x + a_2x^2 + \ldots + a_{40}x^{40}$, then $a_1 + a_3 + a_5 + \ldots + a_{37}$ is equal to

(1) $2^{20}\left(2^{20}-21\right)$
(2) $2^{19}\left(2^{20}-21\right)$
(3) $2^{19}\left(2^{20}+21\right)$
(4) $2^{20}\left(2^{20}+21\right)$

29. $\sum_{k=0}^{6} {}^{51-k}C_3$ is equal to

(1) ${}^{51}C_4 - {}^{45}C_4$
(2) ${}^{51}C_3 - {}^{45}C_3$
(3) ${}^{52}C_4 - {}^{45}C_4$
(4) ${}^{52}C_3 - {}^{45}C_3$

30. Let $m, n \in N$ and gcd$(2,\ n)$= 1. If $30\binom{30}{0}+29\binom{30}{1}+\ldots..+2\binom{30}{28}+1\binom{30}{29} = n.2^m$, then $n+m$ is equal to _______. (Here $\binom{n}{k} = {}^nC_k$)