BT

LEVEL–I

1. The co-efficient of x in the expansion of $(1-2x^3+3x^5)[1+(1/x)]^8$ is
(A) 56 (B) 65
(C) 154 (D) 62

2. If the fourth term in the expansion of $(px+1/x)^n$ is 5/2 then the value of p is
(A) 1 (B) 1/ 2
(C) 6 (D) 2

3. If x = 1/3, Then the greatest term in the expansion of $(1+4x)^8$ is
(A) $56\left(\frac{3}{4}\right)^4$ (B) $56\left(\frac{4}{3}\right)^5$
(C) $56\left(\frac{3}{4}\right)^5$ (D) $56\left(\frac{2}{5}\right)^4$

4. The two consecutive terms in the expansion of $(3+2x)^{74}$ whose coefficients are equal is
(A) 30^{th} and 31^{st} term terms (B) 29^{th} and 30^{th} terms
(C) 31^{st} and 32^{nd} terms (D) 28^{th} and 29^{th} terms

5. If $z=\left(\frac{\sqrt{3}}{2}+\frac{i}{2}\right)^5+\left(\frac{\sqrt{3}}{2}-\frac{i}{2}\right)^5$, then
(A) Re(z) =0 (B) $I_m(Z)=0$
(C) Re(z) >0, $I_m(z)>0$ (D) Re(z) >0, $I_m(z)<0$

6. The coefficient of x^n in $\left(1-x+\frac{x^2}{2!}-\frac{x^3}{3!}+....+\frac{(-1)^n x^n}{n!}\right)^2$ is
(A) $\frac{(-n)^n}{n!}$ (B) $\frac{(-2)^n}{n!}$
(C) $\frac{1}{(n!)^2}$ (D) $-\frac{1}{(n!)^2}$

7. The sum of coefficients of even powers of x in the expansion of $\left(x+\frac{1}{x}\right)^{11}$ is
(A) $11\times{}^{11}C_5$ (B) $\frac{11}{2}\times{}^{11}C_6$
(C) $11\left({}^{11}C_5+{}^{11}C_6\right)$ (D) 0

8. The number of irrational terms in the expansion of $\left(5^{\frac{1}{8}}+2^{\frac{1}{6}}\right)^{100}$ is equal to;
(A) 97 (B) 98
(C) 96 (D) 99

9. In the expansion of $(1+ax)^n$, $n\in N$, then the coefficient of x and x^2 are 8 and 24 respectively. Then
(A) a = 2, n = 4 (B) a = 4, n = 2

(C) a = 2, n = 6 (D) none of these

10. In the coefficients of the (m + 1)th term and the (m + 3) th term in the expansion of $(1 + x)^{20}$ are equal then the value of m is
(A) 10 (B) 8
(C) 9 (D) none of these

11. The number of distinct terms in the expansion of $(2x + 3y - z + \omega - 7\mu)^n$ is
(A) n + 1 (B) ${}^{(n+4)}C_4$
(C) ${}^{(n+5)}C_5$ (D) ${}^{n}C_5$

12. The coefficient of x^5 in the expansion of $(1 - x + 2x^2)^4$ is…………

13. The two successive terms in the expansion of $(1+x)^{24}$ whose coefficients are in the ratio 4 :1 are
(A) 3rd and 4th (B) 4th and 5th
(C) 5th and 6th (D) 6th and 7th

14. The expression ${}^{n}C_0 + 4.{}^{n}C_1 + 4^{2}\,{}^{n}C_2 + ...4^{n}\,{}^{n}C_n$, equals
(A) 2^{2n} (B) 2^{3n} (C) 5^n (D) None of these

15. 2^{60} when divided by 7 leaves the remainder
(A) 1 (B) 6 (C) 5 (D) 2

16. The sum of the coefficients in the expansion of $(1 + x - 3x^2)^{2163}$ is
(A) 1 (B) –1 (C) 0 (D) None of these

17. The value of $\left(1 + \frac{{}^{n}C_1}{{}^{n}C_0}\right)\left(1 + \frac{{}^{n}C_2}{{}^{n}C_1}\right)..........\left(1 + \frac{{}^{n}C_n}{{}^{n}C_{n-1}}\right)$ is equal to
(A) $\frac{(n+1)^{n+1}}{n!}$ (B) $\frac{(n+1)^{n}}{n!}$ (C) $\frac{n^{n-1}}{(n-1)!}$ (D) $\frac{(n+1)^{n-1}}{(n-1)!}$

18. The sum of the rational terms in the expansion of $\left(\sqrt{2} + 3^{\frac{1}{5}}\right)^{10}$ is ………………

19. If in the expansion of $(1 + x)^m (1 - x)^n$, the co-efficient of x and x^2 are 3 and –6 respectively, then m is ……………

20. For $2 \le r \le n$, ${}^{n}C_r + 2\,{}^{n}C_{r-1} + {}^{n}C_{r-2}$ is equal to ………………

21. If $(1 + x + 2x^2)^{20} = a_0 + a_1x + a_2x^2 + ……………+ a_{40}x^{40}$ then $a_1 + a_3 + a_5 + ……….+a_{37}$ equals to ……………

22. The largest term in the expansion of $(3 + 2x)^{50}$ where $x = \frac{1}{5}$ is ……………

23. Let $R = \left(5\sqrt{5} + 11\right)^{2n+1}$ and f = R –[R] where [.] denotes the greatest integer function, then Rf = ………………

24. $2^{3n} - 7n - 1$ is divisible by …………

25. If $(1 - x + x^2)^n = a_0 + a_1x + a_2x^2 + \ldots\ldots\ldots\ldots + a_{2n}x^{2n}$, then $a_0 + a_2 + a_4 + \ldots\ldots\ldots + a_{2n}$ equals to ………

26. If the rth term in the expansion of $\left(\frac{x}{3} - \frac{2}{x^2}\right)^{10}$ contains x^4, then r is equal to ………

27. $1.{}^nC_1 + 2.{}^nC_2 + 3.{}^nC_3 + \ldots\ldots + n.{}^nC_n$ is equal to
(A) $\frac{n(n+1)}{4}.2^n$
(B) $2^{n+1} - 3$
(C) $n.2^{n-1}$
(D) none of these

28. If the coefficient of (2r + 2)th and (r + 1)th terms of the expansion $(1 + x)^{37}$ are equal then r =
(A) 12
(B) 13
(C) 14
(D) 18

29. The value of $2C_0 + 2^2\frac{C_1}{2} + 2^3\frac{C_2}{3} + 2^4\frac{C_3}{4} + \ldots\ldots\ldots + 2^{n+1}\frac{C_n}{n+1}$ is equal to ………

30. If the co-efficient of rth, (r+1)th and (r+2)th terms in the expansion of $(1+x)^{14}$ are in A.P., then the value of r is
(A) 5
(B) 6
(C) 7
(D) 9

31. If $(1+ax)^n = 1+8x+24x^2+\text{-------}$ then
(A) a= 3
(B) n= 5
(C) a= 2
(D) n =4

32. If $ab \neq 0$ and the co-efficient of x^7 in $[ax^2+(1/bx)]^{11}$ is equal to the co-efficient of x^{-7} in $\left[ax - \frac{1}{bx^2}\right]^{11}$, then a and b are connected by the relation
(A) a = 1/b
(B) a = 2/b
(C) ab = 1
(D) ab = 2

LEVEL−II

1. Co-efficient of x^5 in the expansion of $(1+x^2)^5 (1+x)^4$ is
(A) 40
(B) 50
(C) 30
(D) 60

2. The term independent of x in the expansion of $(x+1/x)^{2n}$ is
(A) $\frac{1.3.5.--(2n-1).2^n}{n!}$
(B) $\frac{1.3.5.--(2n-1).2^n}{n!\,n!}$
(C) $\frac{1.3.5.--(2n-1)}{n!}$
(D) $\frac{1.3.5.--(2n-1)}{n!\,n!}$

3. If 6^{th} term in the expansion of $\left[\frac{1}{x^{8/3}} + x^2 \log_{10} x\right]^8$ is 5600, then x is equal to
(A) 5
(B) 4
(C) 8
(D) 10

4. If coefficient of $x^2 y^3 z^4$ in $(x + y + z)^n$ is A, then coefficient of x^4y^4z is

(A) 2A　　(B) $\frac{nA}{2}$

(C) $\frac{A}{2}$　　(D) none of these

5. The coefficient of x^6 in $\{(1 + x)^6 + (1 + x)^7 + \ldots\ldots + (1 + x)^{15}\}$ is

(A) ${}^{16}C_9$　　(B) ${}^{16}C_5 - {}^{6}C_5$

(C) ${}^{16}C_6 - 1$　　(D) none of these

6. If $(1 + x)^{10} = a_0 + a_1x + a_2x^2 + \ldots\ldots + a_{10}x^{10}$ then $(a_0 - a_2 + a_4 - a_6 + a_8 - a_{10})^2 + (a_1 - a_3 + a_5 - a_7 + a_9)^2$ is equal to

(A) 3^{10}　　(B) 2^{10}

(C) 2^9　　(D) none of these

7. The remainder of 7^{103} when divided by 25 is…………..

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

9. The number of irrational terms in the expansion of $\left(2^{\frac{1}{2}} + 3^{\frac{1}{10}}\right)^{55}$ is;

(A) 47　　(B) 56

(C) 50　　(D) 48

10. If $ab \neq 0$ and the co-efficient of x^7 in $(ax^2 + (1/bx))^{11}$ is equal to the co-efficient of x^{-7} in $\left(ax - \frac{1}{bx^2}\right)^{11}$, then a and b are connected by the relation

(A) a= 1/b　　(B) a =2/b

(C) ab= 1　　(D) ab=2

11. If $(1 + 2x + 3x^2)^{10} = \sum_{r=0}^{20} a_r x^r$ then a_2 is equal to;

(A) 210　　(B) 620

(C) 220　　(D) none of these

12. If P_n denotes the product of all the co-efficients in the expansion of $(1+x)^n$, then $\frac{P_{n+1}}{P_n}$ is equal to

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

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

13. Value of $\sum_{r=0}^{n} {}^{n}C_r \cdot \sin^2 \frac{r\pi}{2}$, is equal to;

(A) 2^n　　(B) 2^{n-1}

(C) 2^{-n+1}　　(D) $2^{n-1} - 1$

14. If $a+b=1$, then $\sum_{r=0}^{n} {}^{n}C_r a^r b^{n-r}$ equals

(A) 1 (B) n (C) na (D) nb

15. If $\{x\}$ denotes the fractional part of x, then $\left\{\frac{3^{2n}}{8}\right\}$, $n \in N$ is

(A) 3/8 (B) 7/8 (C) 1/8 (D) None of these.

16. The coefficient of x^m in : $(1+x)^m + (1+x)^{m+1} + ...(1+x)^n$, $m \le n$ is

(A) ${}^{n+1}C_{m+1}$ (B) ${}^{n-1}C_{m-1}$ (C) ${}^{n}C_{m}$ (D) ${}^{n}C_{m+1}$

17. The expansion $\left[x+\left(x^3-1\right)^{\frac{1}{2}}\right]^5 + \left[x-\left(x^3-1\right)^{\frac{1}{2}}\right]^5$ is a polynomial of degree ……

18. In the expansion of $\left(x^3 - \frac{1}{x^2}\right)^n$, n ∈ N, if the sum of the coefficients of x^5 and x^{10} is 0 then n is

(A) 25
(B) 20
(C) 15
(D) none of these

19. The sum $\frac{1}{2}\,{}^{10}C_0 - {}^{10}C_1 + 2.\,{}^{10}C_2 - 2^2 .\,{}^{10}C_3 + \ldots\ldots + 2^9.\,{}^{10}C_{10}$ is equal to

(A) $\frac{1}{2}$
(B) 0
(C) $\frac{1}{2}.3^{10}$
(D) none of these

20. If the second, third and fourth terms in the expansion of $(a+b)^n$ are 135, 30 and 10/3 respectively, then

(A) a = 3
(B) b = 1/3
(C) n = 5
(D) all the above

LEVEL−III

1. The co-efficient of x^{53} in the expansion $\sum_{m=0}^{100} {}^{100}C_m (x-3)^{100-m} 2^m$ is

(A) ${}^{100}C_{53}$
(B) $-\,{}^{100}C_{53}$
(C) ${}^{65}C_{53}$
(D) ${}^{100}C_{65}$

2. If n is an even natural number and coefficient of x^r in the expansion of $\frac{(1+x)^n}{1-x}$ is 2^n, (|x| < 1), then

(A) $r \le n/2$
(B) $r \ge \frac{n-2}{2}$
(C) $r \le \frac{n+2}{2}$
(D) $r \ge n$

3. Let n be an odd natural number and $A = \sum_{r=1}^{\frac{n-1}{2}} \frac{1}{{}^nC_r}$. Then value of $\sum_{r=1}^{n} \frac{r}{{}^nC_r}$ is equal to

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

4. $\frac{1}{1!\cdot(n-1)!} + \frac{1}{3!\cdot(n-3)!} + \frac{1}{5!\cdot(n-5)!} + ...$ is equal to

(A) $\frac{2^{n-1}}{n!}$ for even values of n only
(B) $\frac{2^{n-1}+1}{n!}$ for odd values of n only
(C) $\frac{2^{n-1}}{n!}$ for all $n \in N$
(D) none of these

5. The greater of two numbers 300! and $\sqrt{300^{300}}$ is ………

6. The co-efficient of x^4 in the expansion of $(1+x+x^2+x^3)^{11}$ is
(A) 1001
(B) 990
(C) 900
(D) 895

7. Value of $\sum_{r=1}^{n}\left(\sum_{m=0}^{r} {}^nC_r \cdot {}^rC_m\right)$ is equal to;

(A) $2^n - 1$
(B) $3^n - 1$
(C) $3^n - 2^n$
(D) none of these

8. Value of $\sum_{r=0}^{n} r\cdot\left({}^nC_r\right)^2$ is equal to

(A) $n \,.\, {}^{2n}C_n$
(B) $\frac{n\cdot {}^{2n}C_n}{2}$
(C) $n^2 \,.\, {}^{2n}C_n$
(C) $\frac{n^2 \cdot {}^{2n}C_n}{2}$

9. If $\sum_{r=1}^{n} \frac{r}{{}^nC_r} = \lambda$, then value of $\sum_{r=0}^{n} \frac{1}{{}^nC_r}$ is equal to;

(A) $\frac{n\lambda}{2}$
(B) $\frac{2\lambda}{n}$
(C) $\frac{n}{2\lambda}$
(D) none of these

10. Value of $\sum_{r=0}^{n} {}^nC_r \cos rx \cdot \sin(n-r)x$ is;

(A) $2^{n-1}\sin nx$
(B) $2^{n-1}\cos nx$
(C) $2^n \cos nx$
(D) $2^n \sin nx$

11. Value of $\sum_{0 \le i < j \le n}\sum i\,{}^nC_j$ is;

(A) $n.2^{n-3}$
(B) $(n-1) \,.\, 2^{n-3}$
(C) $n(n-1) \,.\, 2^{n-3}$
(D) none of these

12. The coefficient of x^n in the polynomial $(x+{}^nC_0)(x+3\,{}^nC_1)(x+5\,{}^nC_2)\ldots\ldots(x+(2n+1)\,{}^nC_n)$ is
(A) $n2^n$
(B) $n2^{n+1}$
(C) $(n+1)2^n$
(D) $n2^n+1$

13. Value of $\sum_{r=0}^{2n} r\left({}^{2n}C_r\right).\frac{1}{r+2}$ is equal to
(A) $\frac{2^{n+1}\left(2n^2-n+1\right)-2}{(2n+1)(2n+2)}$
(B) $\frac{2^{2n+1}\left(2n^2+n-1\right)+2}{(2n+1)(2n+2)}$
(C) $\frac{2^{2n+1}\left(2n^2+2n-1\right)}{(2n+1)(2n+2)}$
(D) None of these

14. If R = $\left(5\sqrt{3}+8\right)^{2n+1}$ and f = R – [R]; where [·] denotes G. I. F., then R · f is equal to
(A) 11^{2n}
(B) 11^{2n-1}
(C) 11^{2n+1}
(D) 11

15. Value of $\sum_{0\le i<j\le n}\left({}^nC_i+{}^nC_j\right)^2$ is
(A) $n.\,{}^{2n}C_n+2^{2n}$
(B) $(n+1)\,{}^{2n}C_n+2^{2n}$
(C) $(n-1)\,{}^{2n}C_n-2^{2n}$
(D) $(n-1)\,{}^{2n}C_n+2^{2n}$

16. The remainder when 7^{103} is divided by 25 is
(A) 0
(B) 18
(C) 16
(D) 9

17. The number $101^{100}-1$ is divisible by
(A) 10
(B) 10^2
(C) 10^3
(D) 10^4

18. Integral part of $\left(5\sqrt{5}+11\right)^{2n+1}$ is
(A) Even
(B) Odd
(C) Neither
(D) Can't Say

19. Let $f(n)=10^n+3\cdot 4^{n+2}+5;\ n\in N$. The greatest value of the integer which divides f(n) for all 'n' is
(A) 27
(B) 9
(C) 3
(D) None

20. If $\sum_{r=0}^{n}\left(\frac{r+2}{r+1}\right){}^nC_r=\frac{2^8-1}{6}$, then 'n' is
(A) 8
(B) 4
(C) 6
(D) 5

ANSWERS

LEVEL –I

1.	C	2.	B	3.	B	4.	A
5.	B	6.	B	7.	D	8.	A
9.	A	10.	C	11.	B	12.	−56
13.	C	14.	C	15.	A	16.	B
17.	B	18.	41	19.	12	20.	${}^{n+2}C_r$
21.	$2^{39} - 2^{19}$	22.	${}^{50}C_6\ 3^{44}\ (2x)^6$	23.	4^{2n+1}	24.	49
25.	$\frac{3^n + 1}{2}$	26.	3	27.	C	28.	A
29.	$\frac{3^{n+1} - 1}{n+1}$	30.	D	31.	C	32.	C

LEVEL –II

1.	D	2.	A	3.	D	4.	C
5.	A	6.	B	7.	−7	8.	${}^3C_0 + 2 \cdot {}^3C_1$
9.	B	10.	C	11.	A	12.	A
13.	B	14.	A	15.	C	16.	A
17.	7	18.	C	19.	A	20.	D

LEVEL –III

1.	B	2.	D	3.	B	4.	C
5.	300!	6.	B	7.	B	8.	B
9.	B	10.	A	11.	C	12.	C
13.	A	14.	C.	15.	D	16.	B
17.	A, B, C, D	18.	A	19.	B	20.	D