# Assignment

## Expansion of Binomial theorem

### Basic Level

**1.** The approximate value of $(1.0002)^{3000}$ is **[EAMCET 2002]**

(a) 1.6 (b) 1.4 (c) 1.8 (d) 1.2

**2.** If $(1+by)^n = (1+8y+24y^2+....)$, then the value of $b$ and $n$ are respectively

(a) 4, 2 (b) 2, – 4 (c) 2, 4 (d) – 2, 4

**3.** If ${}^{15}C_{3r} = {}^{15}C_{r+3}$ then $r$ is equal to **[Rajasthan PET 1991]**

(a) 5 (b) 4 (c) 3 (d) 2

**4.** If ${}^{m}C_1 = {}^{n}C_2$, then correct statement is **[Rajasthan PET 1994]**

(a) $2m = n$ (b) $2m = n(n + 1)$ (c) $2m = n(n - 1)$ (d) $2n = m(m - 1)$

### Advance Level

**5.** If $x+y=1$, then $\sum_{r=0}^{n} r^2 \, {}^nC_r x^r y^{n-r}$ equals

(a) $nxy$ (b) $nx(x + yn)$ (c) $nx(nx+ y)$ (d) None of these

**6.** Let $f(x) = (\sqrt{x^2+1}+\sqrt{x^2-1})^6 + \left(\frac{2}{\sqrt{x^2+1}+\sqrt{x^2-1}}\right)^6$. Then

(a) $f(x)$ is a polynomial of the sixth degree in $x$ (b) $f(x)$ has exactly two terms

(c) $f(x)$ is not a polynomial in $x$ (d) Coefficient of $x^6$ is 64

**7.** In the expansion of $(x+a)^n$, the sum of odd terms is $P$ and sum of even terms is $Q$, then the value of $(P^2 - Q^2)$ will be

**[Rajasthan PET 1997; Pb. CET 1998]**

(a) $(x^2+a^2)^n$ (b) $(x^2-a^2)^n$ (c) $(x-a)^{2n}$ (d) $(x+a)^{2n}$

**8.** $n^n \left(\frac{n+1}{2}\right)^{2n}$ is **[AMU 2001]**

(a) Less than $\left(\frac{n+1}{2}\right)^3$ (b) Greater than $\left(\frac{n+1}{2}\right)^3$ (c) Less than $(n!)^3$ (d) Greater than $(n!)^3$

**9.** The expression $(2+\sqrt{2})^4$ has value, lying between **[AMU 2001]**

(a) 134 and 135 (b) 135 and 136 (c) 136 and 137 (d) None of these

**10.** The positive integer just greater than $(1+0.0001)^{10000}$ is **[AIEEE 2002]**

(a) 4 (b) 5 (c) 2 (d) 3

**11.** $(\sqrt{2}+1)^6-(\sqrt{2}-1)^6=$ **[MP PET 1984]**

(a) 101 (b) $70\sqrt{2}$ (c) $140\sqrt{2}$ (d) $120\sqrt{2}$

**12.** The value of $(\sqrt{5}+1)^5-(\sqrt{5}-1)^5$ is **[MP PET 1985]**

(a) 252 (b) 352 (c) 452 (d) 532

**13.** The greatest integer less than or equal to $(\sqrt{2}+1)^6$ is **[Rajasthan PET 2000]**

(a) 196 (b) 197 (c) 198 (d) 199

**14.** The integer next above $(\sqrt{3}+1)^{2m}$ contains

(a) $2^{m+1}$ as a factor (b) $2^{m+2}$ as a factor (c) $2^{m+3}$ as a factor (d) $2^m$ as a factor

**15.** Let $n$ be an odd natural number greater than 1. Then the number of zeros at the end of the sum $99^n+1$ is

(a) 3 (b) 4 (c) 2 (d) None of these

## *General Term*

### *Basic Level*

**16.** $6^{th}$ term in expansion of $\left(2x^2-\frac{1}{3x^2}\right)^{10}$ is

(a) $\frac{4580}{17}$ (b) $-\frac{896}{27}$ (c) $\frac{5580}{17}$ (d) None of these

**17.** $16^{th}$ term in the expansion of $(\sqrt{x}-\sqrt{y})^{17}$ is

(a) $136\, xy^7$ (b) 136 $xy$ (c) $-136\, xy^{15/2}$ (d) $-136\, xy^2$

**18.** In the binomial expansion of $(a-b)^n$, $n \geq 5$, the sum of the $5^{th}$ and $6^{th}$ terms is zero. Then $\frac{a}{b}$ is equal to

**[IIT Screening 2001; Karnataka CET 2002]**

(a) $\frac{1}{6}(n-5)$ (b) $\frac{1}{5}(n-4)$ (c) $\frac{5}{(n-4)}$ (d) $\frac{6}{(n-5)}$

**19.** The first 3 terms in the expansion of $(1+ax)^n\ (n \neq 0)$ are 1, $6x$ and $16x^2$. Then the value of $a$ and $n$ are respectively

**[Kerala (Engg.) 2002]**

(a) 2 and 9 (b) 3 and 2 (c) 2/3 and 9 (d) 3/2 and 6

**20.** If the third term in the expansion of $\left(\frac{1}{x}+x^{\log_{10} x}\right)^5$ is 1000, then the value of $x$ is

(a) 10 (b) 100 (c) 1 (d) None of these

**21.** If the ratio of the 7th term from the beginning to the seventh term from the end in the expansion of $\left(\sqrt[3]{2}+\frac{1}{\sqrt[3]{3}}\right)^x$ is $\frac{1}{6}$, then $x$ is

(a) 9 (b) 6 (c) 12 (d) None of these

**22.** The last term in the binomial expansion of $\left(\sqrt[3]{2}-\frac{1}{\sqrt{2}}\right)^n$ is $\left(\frac{1}{3\cdot\sqrt[3]{9}}\right)^{\log_3 8}$. Then the 5th term from the beginning is

(a) ${}^{10}C_6$ (b) $2\cdot {}^{10}C_4$ (c) $\frac{1}{2}\cdot {}^{10}C_4$ (d) None of these

**23.** In the expansion of $(1+x)^n$, $\frac{T_{r+1}}{T_r}$ is equal to

(a) $\frac{n+1}{r}x$ (b) $\frac{n+r+1}{r}x$ (c) $\frac{n-r+1}{r}x$ (d) $\frac{n+r}{r+1}x$

**24.** 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) 8 (b) 9 (c) 10 (d) None of these

## *Advance Level*

**25.** The value of $x$ in the expression $[x+x^{\log_{10}(x)}]^5$, if the third term in the expansion is 10,00,000 **[Roorkee 1992]**

(a) 10 (b) 11 (c) 12 (d) None of these

**26.** If $T_0, T_1, T_2, .... T_n$ represent the terms in the expansion of $(x+a)^n$, then $(T_0-T_2+T_4-....)^2+(T_1-T_3+T_5-....)^2=$

(a) $(x^2+a^2)$ (b) $(x^2+a^2)^n$ (c) $(x^2+a^2)^{1/n}$ (d) $(x^2+a^2)^{-1/n}$

**27.** The value of $x$, for which the 6th term in the expansion of $\left\{2^{\log_2\sqrt{(9^{x-1}+7)}}+\frac{1}{2^{(1/5)\log_2(3^{x-1}+1)}}\right\}^7$ is 84, is equal to **[Pb. CET 1992]**

(a) 4 (b) 3 (c) 2 (d) 1

**28.** Given that 4th term in the expansion of $\left(2+\frac{3}{8}x\right)^{10}$ has the maximum numerical value, the range of value of $x$ for which this will be true is given by **[Roorkee 1994]**

(a) $-\frac{64}{21}<x<-2$ (b) $-\frac{64}{21}<x<2$ (c) $\frac{64}{21}<x<4$ (d) None of these

**29.** If the $(r+1)^{th}$ term in the expansion of $\left(\sqrt[3]{\frac{a}{\sqrt{b}}}+\sqrt{\frac{b}{\sqrt[3]{a}}}\right)^{21}$ has the same power of $a$ and $b$, then the value of $r$ is

(a) 9 (b) 10 (c) 8 (d) 6

**30.** If the 6th term in the expansion of the binomial $\left[\sqrt{2^{\log(10-3^x)}}+\sqrt[5]{2^{(x-2)\log 3}}\right]^m$ is equal to 21 and it is known that the binomial coefficients of the 2nd, 3rd and 4th terms in the expansion represent respectively the first, third and fifth terms of an A.P. (the symbol log stands for logarithm to the base 10), then $x=$ **[Roorkee 1993]**

(a) 0 (b) 1 (c) 2 (d) 3

**31.** If the fourth term of $\left(\sqrt{x^{\left(\frac{1}{1+\log_{10}x}\right)}}+\sqrt[12]{x}\right)^6$ is equal to 200 and $x>1$, then $x$ is equal to

(a) $10\sqrt{2}$ (b) 10 (c) $10^4$ (d) $10/\sqrt{2}$

## *Independent Term*

## *Basic Level*

**32.** To make the term ${}^{3n}C_r(-1)^r x^{3n-r}$ free from $x$, necessary condition is

(a) ${}^{3n}C_r=0$ (b) $x^{3n-r}=0$ (c) $3n=r$ (d) None of these

**33.** In the expansion of $\left(2x+\frac{1}{3x^2}\right)^9$, the term independent of $x$ is

(a) ${}^9C_3\,8$ (b) $\frac{1792}{9}$ (c) ${}^9C_3\,64$ (d) ${}^9C_3\,\frac{1}{81}$

**34.** The term independent of $y$ in the expansion of $(y^{-1/6}-y^{1/3})^9$ is **[BIT Ranchi 1980]**

(a) 84 (b) 8.4 (c) 0.84 (d) – 84

**35.** The term independent of $x$ in the expansion of $\left(\frac{1}{2}x^{1/3}+x^{-1/5}\right)^8$ will be **[Roorkee 1985]**

(a) 5 (b) 6 (c) 7 (d) 8

**36.** In the expansion of $\left(x-\frac{1}{x}\right)^6$, the constant term is **[AMU 1982; MP PET 1984; MNR 1979]**

(a) – 20 (b) 20 (c) 30 (d) – 30

**37.** The term independent of $x$ in the expansion of $\left(x^2-\frac{1}{x}\right)^9$ is **[EAMCET 1982; MP PET 2003]**

(a) 1 (b) – 1 (c) – 48 (d) None of these

**38.** In the expansion of $\left(x+\frac{2}{x^2}\right)^{15}$, the term independent of $x$ is **[MP PET 1993]**

(a) ${}^{15}C_6\,2^6$ (b) ${}^{15}C_5\,2^5$ (c) ${}^{15}C_4\,2^4$ (d) ${}^{15}C_8\,2^8$

**39.** In the expansion of $\left(\frac{3x^2}{2}-\frac{1}{3x}\right)^9$, the term independent of $x$ is**[MNR 1981; AMU 1983; Rajasthan PET 1996; JMIEE 2001]**

(a) ${}^9C_3\cdot\frac{1}{6^3}$ (b) ${}^9C_3\left(\frac{3}{2}\right)^3$ (c) ${}^9C_3$ (d) None of these

**40.** The term independent of $x$ in $\left(2x-\frac{1}{2x^2}\right)^{12}$ is **[Rajasthan PET 1985]**

(a) – 7930 (b) – 495 (c) 495 (d) 7920

**41.** The term independent of $x$ in $\left[\sqrt{\frac{x}{3}}+\frac{\sqrt{3}}{x^2}\right]^{10}$ is **[EAMCET 1984; Rajasthan PET 2000]**

(a) $\frac{2}{3}$ (b) $\frac{5}{3}$ (c) $\frac{4}{3}$ (d) None of these

**42.** The term independent of $x$ in $\left(\sqrt{x}-\frac{2}{x}\right)^{18}$ is **[EAMCET 1990]**

(a) ${}^{18}C_6\,2^6$ (b) ${}^{18}C_6\,2^{12}$ (c) ${}^{18}C_{18}\,2^{18}$ (d) None of these

**43.** The ratio of the coefficient of $x^{15}$ to the term independent of $x$ in $\left(x^2+\frac{2}{x}\right)^{15}$ is

(a) 1 : 32 (b) 32 : 1 (c) 1 : 16 (d) 16 : 1

**44.** The term independent of $x$ in the expansion of $\left(2x+\frac{1}{3x}\right)^6$ is **[MNR 1995]**

(a) $\frac{160}{9}$ (b) $\frac{80}{9}$ (c) $\frac{160}{27}$ (d) $\frac{80}{3}$

**45.** The term independent of $x$ in the expansion of $\left(x^2-\frac{1}{3x}\right)^9$ is **[Roorkee 1981; Rajasthan PET 1990, 95; Pb. CET 2000]**

(a) $\frac{28}{81}$ (b) $\frac{28}{243}$ (c) $-\frac{28}{243}$ (d) $-\frac{28}{81}$

**46.** The term independent of $x$ in the expansion of $\left(x^2 - \frac{3\sqrt{3}}{x^3}\right)^{10}$ is **[Rajasthan PET 1999]**

(a) 153090 (b) 150000 (c) 150090 (d) 153180

**47.** The term independent of $x$ in the expansion of $\left(2x - \frac{3}{x}\right)^6$ is **[Pb. CET 1999]**

(a) 4320 (b) 216 (c) – 216 (d) – 4320

**48.** In the expansion of $\left(x - \frac{3}{x^2}\right)^9$, the term independent of $x$ is **[Karnataka CET 2001]**

(a) Not existent (b) ${}^9C_2$ (c) 2268 (d) – 2268

**49.** In the expansion of $\left(x + \frac{1}{x}\right)^{2n}$ $(n \in N)$, the term independent of $x$ is **[Rajasthan PET 1995]**

(a) $\frac{1.3.5.......(2n-1)}{n!}2^n$ (b) $\frac{(2n)!}{n!}$ (c) $\frac{(2n)!}{n!}2^n$ (d) $\frac{n!}{(2n)!}$

## Advance Level

**50.** The sum of the coefficients in the binomial expansion of $\left(\frac{1}{x} + 2x\right)^n$ is equal to 6561. The constant term in the expansion is

(a) ${}^8C_4$ (b) $16 \cdot {}^8C_4$ (c) ${}^6C_4 \cdot 2^4$ (d) None of these

**51.** The greatest value of the term independent of $x$ in the expansion of $(x\sin\alpha + x^{-1}\cos\alpha)^{10}, \alpha \in R$, is

(a) $2^5$ (b) $\frac{10!}{(5!)^2}$ (c) $\frac{1}{2^5}\cdot\frac{10!}{(5!)^2}$ (d) None of these

## Coefficients of any power of x

## Basic Level

**52.** If the coefficients of $p^{th}$, $(p+1)^{th}$ and $(p+2)^{th}$ terms in the expansion of $(1+x)^n$ are in A.P., then

(a) $n^2 - 2np + 4p^2 = 0$ (b) $n^2 - n(4p+1) + 4p^2 - 2 = 0$ (c) $n^2 - n(4p+1) + 4p^2 = 0$ (d) None of these

**53.** The coefficient of two consecutive terms in the expansion of $(1+x)^n$ will be equal, if

(a) $n$ is any integer (b) $n$ is an odd integer (c) $n$ is an even integer (d) None of these

**54.** In the expansion of $\left(\frac{a}{x} + bx\right)^{12}$, the coefficient of $x^{-10}$ will be

(a) $12\,a^{11}$ (b) $12\,b^{11}a$ (c) $12a^{11}b$ (d) $12a^{11}b^{11}$

**55.** If the ratio of the coefficient of third and fourth term in the expansion of $\left(x - \frac{1}{2x}\right)^n$ is 1 : 2, then the value of $n$ will be

(a) 18 (b) 16 (c) 12 (d) – 10

**56.** In the expansion of $\left(x^3 + \frac{1}{x^2}\right)^8$, the term containing $x^4$ is

(a) $70\,x^4$ (b) $60\,x^4$ (c) $56\,x^4$ (d) None of these

**57.** If the coefficients of $r^{th}$ term and $(r+4)^{th}$ term are equal in the expansion of $(1+x)^{20}$, then the value of $r$ will be **[Rajasthan PET 1985, 97; Kerala (Engg.) 2001; MP PET 2002]**

(a) 7 (b) 8 (c) 9 (d) 10

**58.** In the expansion of $\left(y^2+\frac{c}{y}\right)^5$, the coefficient of $y$ will be **[MNR 1983]**

(a) 20 c (b) 10 c (c) $10\,c^3$ (d) $20\,c^2$

**59.** If $p$ and $q$ be positive, then the coefficients of $x^p$ and $x^q$ in the expansion of $(1+x)^{p+q}$ will be **[MNR 1983; AIEEE 2002]**

(a) Equal (b) Equal in magnitude but opposite in sign

(c) Reciprocal to each other (d) None of these

**60.** If the coefficients of 5$^{th}$, 6$^{th}$ and 7$^{th}$ terms in the expansion of $(1+x)^n$ be in A.P., then $n$ = **[Roorkee 1984; Pb. CET 1999]**

(a) 7 only (b) 14 only (c) 7 or 14 (d) None of these

**61.** Two consecutive terms in the expansion of $(3+2x)^{74}$ whose coefficients are equal, are

(a) 29$^{th}$ and 30$^{th}$ (b) 30$^{th}$ and 31$^{st}$ (c) 31$^{st}$ and 32$^{nd}$ (d) None of these

**62.** The coefficient of $x^7$ in the expansion of $\left(\frac{x^2}{2}-\frac{2}{x}\right)^8$ is **[MNR 1975]**

(a) – 56 (b) 56 (c) – 14 (d) 14

**63.** If for positive integers $r > 1$, $n > 2$, the coefficient of the $(3r)^{th}$ and $(r + 2)^{th}$ powers of $x$ in the expansion of $(1+x)^{2n}$ are equal, then

**[IIT 1983; BIT 1990; Kurukshetra CEE 1992; DCE 2000; UPSEAT 1998, 2002; AIEEE 2002]**

(a) $n = 2r$ (b) $n = 3r$ (c) $n = 2r + 1$ (d) None of these

**64.** In the expansion of $(x^2-2x)^{10}$, the coefficient of $x^{16}$ is **[MP PET 1985]**

(a) – 1680 (b) 1680 (c) 3360 (d) 6720

**65.** In the expansion of $\left(\frac{x}{2}-\frac{3}{x^2}\right)^{10}$, the coefficient of $x^4$ is **[IIT 1983; EAMCET 1985; DCE 2000; Rajasthan PET 2001; UPSEAT 20**

(a) $\frac{405}{256}$ (b) $\frac{504}{259}$ (c) $\frac{450}{263}$ (d) None of these

**66.** The coefficient of $x^{32}$ in the expansion of $\left(x^4-\frac{1}{x^3}\right)^{15}$ is **[MP PET 1994; Karnataka CET 2003]**

(a) ${}^{15}C_5$ (b) ${}^{15}C_6$ (c) ${}^{15}C_4$ (d) ${}^{15}C_7$

**67.** If coefficient of $(2r + 3)^{th}$ and $(r – 1)^{th}$ terms in the expansion of $(1+x)^{15}$ are equal, then value of $r$ is

**[Rajasthan PET 1995, 2003; UPSEAT 2001]**

(a) 5 (b) 6 (c) 4 (d) 3

**68.** If $x^4$ occurs in the $r^{th}$ term in the expansion of $\left(x^4+\frac{1}{x^3}\right)^{15}$, then $r$ = **[MP PET 1995]**

(a) 7 (b) 8 (c) 9 (d) 10

**69.** If the coefficients of $x^7$ and $x^8$ in $\left(2+\frac{x}{3}\right)^n$ are equal, then $n$ is

**[EAMCET 1983; Kurukshetra CEE 1998; DCE 2000; Rajasthan PET 2001; UPSEAT 2001]**

(a) 56 (b) 55 (c) 45 (d) 15

**70.** If coefficients of $(2r + 1)^{th}$ term and $(r + 2)^{th}$ term are equal in the expansion of $(1+x)^{43}$, then the value of $r$ will be **[UPSEAT 1999]**

(a) 14 (b) 15 (c) 13 (d) 16

**71.** If the coefficient of $4^{th}$ term in the expansion of $(a+b)^n$ is 56, then $n$ is **[AMU 2000]**

(a) 12 (b) 10 (c) 8 (d) 6

**72.** If the coefficients of $x^2$ and $x^3$ in the expansion of $(3+ax)^9$ are the same, then the value of $a$ is **[DCE 2001]**

(a) $-\frac{7}{9}$ (b) $-\frac{9}{7}$ (c) $\frac{7}{9}$ (d) $\frac{9}{7}$

**73.** The coefficient of $x^3$ in the expansion of $\left(x-\frac{1}{x}\right)^7$ is **[MP PET 1997]**

(a) 14 (b) 21 (c) 28 (d) 35

**74.** If the coefficient of $(2r+4)^{th}$ and $(r-2)^{th}$ terms in the expansion of $(1+x)^{18}$ are equal, then $r =$ **[MP PET 1997]**

(a) 12 (b) 10 (c) 8 (d) 6

**75.** If $x^m$ occurs in the expansion of $\left(x+\frac{1}{x^2}\right)^{2n}$, then the coefficient of $x^m$ is **[UPSEAT 1999]**

(a) $\frac{(2n)!}{(m)!(2n-m)!}$ (b) $\frac{(2n)!3!3!}{(2n-m)!}$ (c) $\frac{(2n)!}{\left(\frac{2n-m}{3}\right)!\left(\frac{4n+m}{3}\right)!}$ (d) None of these

**76.** If coefficients of $2^{nd}$, $3^{rd}$ and $4^{th}$ terms in the binomial expansion of $(1+x)^n$ are in A.P., then $n^2-9n$ is equal to**[Rajastha**

(a) – 7 (b) 7 (c) 14 (d) – 14

**77.** The coefficient of $x^{-9}$ in the expansion of $\left(\frac{x^2}{2}-\frac{2}{x}\right)^9$ is **[Kerala (Engg.) 2001]**

(a) 512 (b) – 512 (c) 521 (d) 251

**78.** If the coefficient of $x$ in the expansion of $\left(x^2+\frac{k}{x}\right)^5$ is 270, then $k =$ **[EAMCET 2002]**

(a) 1 (b) 2 (c) 3 (d) 4

**79.** In the expansion of $(1+x)^n$ the coefficient of $p^{th}$ and $(p+1)^{th}$ terms are respectively $p$ and $q$. Then $p+q =$ **[EAMCET 200**

(a) $n+3$ (b) $n+1$ (c) $n+2$ (d) $n$

**80.** The coefficient of $x^{39}$ in the expansion of $\left(x^4-\frac{1}{x^3}\right)^{15}$ is **[MP PET 2001]**

(a) – 455 (b) – 105 (c) 105 (d) 455

**81.** If the coefficients of $T_r$, $T_{r+1}$, $T_{r+2}$ terms of $(1+x)^{14}$ are in A.P., then $r =$ **[Pb. CET 2002]**

(a) 6 (b) 7 (c) 8 (d) 9

**82.** In the expansion of $(1+x)^n$, coefficients of $2^{nd}$, $3^{rd}$ and $4^{th}$ terms are in A.P., then $n$ is equal to

**[IIT 1994; UPSEAT 2002; Rajasthan PET 2002]**

(a) 7 (b) 9 (c) 11 (d) None of these

**83.** Coefficient of $x^2$ in the expansion of $\left(x-\frac{1}{2x}\right)^8$ is **[UPSEAT 2002]**

(a) $\frac{1}{7}$ (b) $\frac{-1}{7}$ (c) – 7 (d) 7

**84.** The coefficient of $x^5$ in the expansion of $(x+3)^6$ is **[DCE 2002]**

(a) 18 (b) 6 (c) 12 (d) 10

**85.** If $A$ and $B$ are coefficients of $x^r$ and $x^{n-r}$ respectively in the expansion of $(1+x)^n$, then

(a) $A = B$ (b) $A \neq B$ (c) $A = \lambda B$ for some $\lambda$ (d) None of these

**86.** If the $r^{th}$ term in the expansion of $(x/3-2/x^2)^{10}$ contains $x^4$, then $r$ is equal to **[Roorkee 1992]**

(a) 2 (b) 3 (c) 4 (d) 5

**87.** The coefficient of $x^3$ in $\left(\sqrt{x^5}+\frac{3}{\sqrt{x^3}}\right)^6$ is **[EAMCET 1994]**

(a) 0 (b) 120 (c) 420 (d) 540

**88.** If the coefficient of $(r+1)$th term in the expansion of $(1+x)^{2n}$ be equal to that of $(r+3)$th term, then

(a) $n-r+1=0$ (b) $n-r-1=0$ (c) $n+r+1=0$ (d) None of these

**89.** $x^{-26}$ occurs in the expansion of $\left(x^2-\frac{1}{x^4}\right)^{11}$ in

(a) $T_8$ (b) $T_9$ (c) $T_{10}$ (d) None of these

**90.** In the expansion of $(1+ax)^n$, $n \in N$, 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) $a=-2, n=4$

## *Advance Level*

**91.** The coefficient of the term independent of $x$ in the expansion of $(1+x+2x^3)\left(\frac{3}{2}x^2-\frac{1}{3x}\right)^9$ is **[DCE 1994]**

(a) $\frac{1}{3}$ (b) $\frac{19}{54}$ (c) $\frac{17}{54}$ (d) $\frac{1}{4}$

**92.** The coefficient of $\frac{1}{x}$ in the expansion of $(1+x)^n\left(1+\frac{1}{x}\right)^n$ is

(a) $\frac{n!}{(n-1)!(n+1)!}$ (b) $\frac{(2n)!}{(n-1)!(n+1)!}$ (c) $\frac{(2n)!}{(2n-1)!(2n+1)!}$ (d) None of these

**93.** The coefficient of $x^4$ in the expansion of $(1+x+x^2+x^3)^n$ is **[MNR 1993; DCE 1998; Rajasthan PET 2001]**

(a) ${}^nC_4$ (b) ${}^nC_4+{}^nC_2$ (c) ${}^nC_4+{}^nC_2+{}^nC_4.{}^nC_2$ (d) ${}^nC_4+{}^nC_2+{}^nC_1.{}^nC_2$

**94.** The coefficient of $x^{53}$ in the following expansion $\sum_{m=0}^{100} {}^{100}C_m(x-3)^{100-m}.2^m$ is **[IIT 1992]**

(a) ${}^{100}C_{47}$ (b) ${}^{100}C_{53}$ (c) $-{}^{100}C_{53}$ (d) $-{}^{100}C_{100}$

**95.** The sum of the coefficients of even power of $x$ in the expansion of $(1+x+x^2+x^3)^5$ is **[EAMCET 1988]**

(a) 256 (b) 128 (c) 512 (d) 64

**96.** The coefficient of $x^5$ in the expansion of $(1+x)^{21}+(1+x)^{22}+......+(1+x)^{30}$ is **[UPSEAT 2001]**

(a) ${}^{51}C_5$ (b) ${}^{9}C_5$ (c) ${}^{31}C_6-{}^{21}C_6$ (d) ${}^{30}C_5+{}^{20}C_5$

**97.** The coefficient of $t^{32}$ in the expansion of $(1+t^2)^{12}(1+t^{12})(1+t^{24})$ is **[IIT Screening 2003]**

(a) ${}^{12}C_6+2$ (b) ${}^{12}C_5$ (c) ${}^{12}C_6$ (d) ${}^{12}C_7$

**98.** If in the expansion of $(1+x)^m(1-x)^n$, the coefficient of $x$ and $x^2$ are 3 and $-6$ respectively, then $m$ is**[IIT 1999; MP PET 2**

(a) 6 (b) 9 (c) 12 (d) 24

**99.** In the expansion of the following expression $1+(1+x)+(1+x)^2+......+(1+x)^n$, the coefficient of $x^k$ $(0 \le k \le n)$ is **[Rajasthan PET 2000]**

(a) ${}^{n+1}C_{k+1}$ (b) ${}^nC_k$ (c) ${}^nC_{n-k-1}$ (d) None of these

**100.** If there is a term containing $x^{2r}$ in $\left(x+\frac{1}{x^2}\right)^{n-3}$, then

(a) $n - 2r$ is a positive integral multiple of 3 (b) $n - 2r$ is even
(c) $n - 2r$ is odd (d) None of these

**101.** If the binomial coefficients of 2nd, 3rd and 4th terms in the expansion of $\left[\sqrt{2^{\log_{10}(10-3^x)}} + \sqrt[5]{2^{(x-2)\log_{10} 3}}\right]^m$ are in A.P. and the 6th term is 21, then the value(s) of $x$ is (are)

(a) 1, 3 (b) 0, 2 (c) 4 (d) – 1

**102.** The coefficient of $x^r (0 \le r \le (n-1))$ in the expansion of $(x+3)^{n-1} + (x+3)^{n-2}(x+2) + (x+3)^{n-3}(x+2)^2 + .... + (x+2)^{n-1}$ is

(a) ${}^nC_r(3^r - 2^n)$ (b) ${}^nC_r(3^{n-r} - 2^{n-r})$ (c) ${}^nC_r(3^r + 2^{n-r})$ (d) None of these

**103.** The coefficient of $a^8b^{10}$ in the expansion of $(a+b)^{18}$ is

(a) ${}^{18}C_8$ (b) ${}^{18}P_{10}$ (c) $2^{18}$ (d) None of these

**104.** The coefficient of $x^{65}$ in the expansion of $(1+x)^{131}(x^2 - x + 1)^{130}$ is

(a) ${}^{130}C_{65} + {}^{129}C_{66}$ (b) ${}^{130}C_{65} + {}^{129}C_{55}$ (c) ${}^{130}C_{66} + {}^{129}C_{65}$ (d) None of these

**105.** The coefficient of $x^{13}$ in the expansion of $(1-x)^5(1+x+x^2+x^3)^4$ is

(a) 4 (b) – 4 (c) 0 (d) None of these

**106.** The coefficient of $x^{17}$ in the expansion of $(x - 1)(x - 2)....(x - 18)$ is

(a) 171 (b) – 171 (c) 342 (d) 171/2

**107.** In the expansion of $(1+x+x^3+x^4)^{10}$, the coefficient of $x^4$ is **[MP PET 2000]**

(a) ${}^{40}C_4$ (b) ${}^{10}C_4$ (c) 210 (d) 310

## *Number of terms in the expansion of (a + b)$^n$, (a + b + c)$^n$ and (a + b + c + d)$^n$*

### *Basic Level*

**108.** The number of non-zero terms in the expansion of $(1+3\sqrt{2}x)^9 + (1-3\sqrt{2}x)^9$ is **[EAMCET 1991]**

(a) 9 (b) 0 (c) 5 (d) 10

**109.** The number of terms in the expansion of $(a+b+c)^n$ will be

(a) $n + 1$ (b) $n + 3$ (c) $\frac{(n+1)(n+2)}{2}$ (d) None of these

**110.** The total number of terms in the expansion of $(x+y)^{100} + (x-y)^{100}$ after simplification is

(a) 50 (b) 51 (c) 202 (d) None of these

**111.** The expression $[x + (x^3-1)^{1/2}]^5 + [x - (x^3-1)^{1/2}]^5$ is a polynomial of degree **[IIT 1992]**

(a) 5 (b) 6 (c) 7 (d) 8

**112.** The number of terms in the expansion of $[(x-3y)^2(x+3y)^2]^3$ is

(a) 6 (b) 7 (c) 8 (d) None of these

**113.** If $n$ is a negative integer and $|x| < 1$ then the number of terms in the expansion of $(1+x)^n$ is

(a) $n + 1$ (b) $n + 2$ (c) $2^n$ (d) Infinite

**114.** The number of terms in the expansion of $(1+3x+3x^2+x^3)^6$ is

(a) 18 (b) 9 (c) 19 (d) 24

**115.** The number of terms whose values depend on $x$ in the expansion of $\left(x^2 - 2 + \frac{1}{x^2}\right)^n$ is

(a) $2n + 1$ (b) $2n$ (c) $n$ (d) None of these

**116.** The number of real negative terms in the binomial expansion of $(1+ix)^{4n-2}, n \in N, x > 0$, is

(a) $n$ (b) $n + 1$ (c) $n - 1$ (d) $2n$

**117.** In the expansion of $(x+\sqrt{x^2-1})^6 + (x-\sqrt{x^2-1})^6$, the number of terms is

(a) 7 (b) 14 (c) 6 (d) 4

**118.** The number of distinct terms in the expansion of $(x+2y-3z+5w-7u)^n$ is

(a) $n + 1$ (b) ${}^{n+4}C_4$ (c) ${}^{n+4}C_n$ (d) $\frac{(n+1)(n+2)(n+3)(n+4)}{24}$

**119.** In how many terms in the expansion of $(x^{1/5}+y^{1/10})^{55}$ do not have fractional power of the variable **[Pb. CET 1992]**

(a) 6 (b) 7 (c) 8 (d) 10

## *Middle Term*

### *Basic Level*

**120.** If the middle term in the expansion of $\left(x^2+\frac{1}{x}\right)^n$ is $924\,x^6$, then $n$ =

(a) 10 (b) 12 (c) 14 (d) None of these

**121.** The middle term in the expansion of $\left(\frac{x}{a}+\frac{a}{x}\right)^{20}$ is

(a) ${}^{20}C_{11}\frac{x}{a}$ (b) ${}^{20}C_{11}\frac{a}{x}$ (c) ${}^{20}C_{10}$ (d) None of these

**122.** The middle term in the expansion of $\left(\frac{a}{x}+bx\right)^{12}$ will be

(a) $924\,a^6b^6$ (b) $924\,\frac{a^6b^6}{x}$ (c) $924\,\frac{a^6b^6}{x^2}$ (d) $924\,a^6b^6x^2$

**123.** The coefficient of middle term in the expansion of $(1+x)^{10}$ is **[UPSEAT 2001]**

(a) $\frac{10\,!}{5!6!}$ (b) $\frac{10\,!}{(5!)^2}$ (c) $\frac{10!}{5!7!}$ (d) None of these

**124.** The middle term in the expansion of $(1+x)^{2n}$ is **[DCE 2002]**

(a) $\frac{(2n)!}{n\,!}x^2$ (b) $\frac{(2n)!}{n!(n-1)!}x^{n+1}$ (c) $\frac{(2n)!}{(n\,!)^2}x^n$ (d) $\frac{(2n)!}{(n+1)!(n-1)!}x^n$

**125.** The middle term in the expansion of $\left(\frac{2x}{3}-\frac{3}{2x^2}\right)^{2n}$ is

(a) ${}^{2n}C_n$ (b) $(-1)^n\frac{(2n)!}{(n!)^2}\cdot x^{-n}$ (c) ${}^{2n}C_n\cdot\frac{1}{x^n}$ (d) None of these

**126.** The middle terms in the expansion of $(x^2-a^2)^5$ is

(a) $10x^6a^4, -10x^4a^6$ (b) $-10x^6a^4, 10x^4a^6$ (c) $10x^6a^4, 10x^4a^6$ (d) $-10x^6a^4, -10x^4a^6$

### *Advance Level*

**127.** The middle term in the expansion of $\left(x+\frac{1}{2x}\right)^{2n}$ is **[MP PET 1995]**

(a) $\frac{1.3.5.....(2n-3)}{n!}$ (b) $\frac{1.3.5.....(2n-1)}{n!}$ (c) $\frac{1.3.5.....(2n+1)}{n!}$ (d) None of these

**128.** If the coefficient of the middle term in the expansion of $(1+x)^{2n+2}$ is $p$ and the coefficients of middle terms in the expansion of $(1+x)^{2n+1}$ are $q$ and $r$, then

(a) $p + q = r$ (b) $p + r = q$ (c) $p = q + r$ (d) $p + q + r = 0$

**129.** Middle term in the expansion of $(1+3x+3x^2+x^3)^6$ is **[MP PET 1997]**

(a) $4^{th}$ (b) $3^{rd}$ (c) $10^{th}$ (d) None of these

**130.** The coefficient of each middle term in the expansion of $(1+x)^n$, when $n$ is odd, is

(a) $\frac{1.3.5....(n-1)}{2.4.6....n}2^n$ (b) $\frac{1.3.5.....n}{2.4.6....n}2^n$ (c) $\frac{1.3.5....(n+1)}{2.4.6....n}2^n$ (d) $\frac{1.3.5....n}{2.4.6....(n+1)}2^n$

**131.** If the $r$th term is the middle term in the expansion of $\left(x^2-\frac{1}{2x}\right)^{20}$ then the $(r + 3)$th term is

(a) ${}^{20}C_{14}\cdot\frac{1}{2^{14}}\cdot x$ (b) ${}^{20}C_{12}\cdot\frac{1}{2^{12}}\cdot x^2$ (c) $-\frac{1}{2^{13}}\cdot{}^{20}C_7\cdot x$ (d) None of these

**132.** 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 $\alpha$ equals **[AIEEE 2004]**

(a) $\frac{3}{5}$ (b) $\frac{10}{3}$ (c) $\frac{3}{10}$ (d) $\frac{-3}{10}$

## Greatest term and Greatest coefficient

### Basic Level

**133.** The sum of the coefficients in the expansion of $(x+y)^n$ is 4096. The greatest coefficient in the expansion is **[Kurukshetra CEE 1998; AIEEE 2002]**

(a) 1024 (b) 924 (c) 824 (d) 724

**134.** The greatest coefficient in the expansion of $(1+x)^{2n+1}$ is **[Rajasthan PET 1997]**

(a) $\frac{(2n+1)!}{n!(n+1)!}$ (b) $\frac{(2n+2)!}{n!(n+1)!}$ (c) $\frac{(2n+1)!}{[(n+1)!]^2}$ (d) $\frac{(2n)!}{(n!)^2}$

**135.** If the sum of the coefficients in the expansion of $(x+y)^n$ is 1024, then the value of the greatest coefficient in the expansion is **[Orissa JEE 2003]**

(a) 356 (b) 252 (c) 210 (d) 120

**136.** If $n$ is even, then the greatest coefficient in the expansion of $(x+a)^n$ is

(a) ${}^nC_{\frac{n}{2}+1}$ (b) ${}^nC_{\frac{n}{2}-1}$ (c) ${}^nC_{\frac{n}{2}}$ (d) None of these

**137.** 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) $56\left(\frac{2}{5}\right)^4$

**138.** The numerically greatest term of $(2+3x)^9$ when $x = 3/2$ is

(a) $T_6$ (b) $T_7$ (c) $T_8$ (d) None of these

**139.** If the sum of the coefficients in the expansion of $(x-2y+3z)^n$ is 128, then the greatest coefficient in the expansion of $(1+x)^n$ is

(a) 35 (b) 20 (c) 10 (d) None of these

**140.** If the coefficient of the 5th term be the numerically greatest coefficient in the expansion of $(1-x)^n$ then the positive integral value of $n$ is

(a) 9 (b) 8 (c) 7 (d) 10

**141.** The greatest term in the expansion of $\sqrt{3}\left(1+\frac{1}{\sqrt{3}}\right)^{20}$ is **[IIT 1966]**

(a) $T_7$ (b) $T_8$ (c) $T_9$ (d) None of these

## Advance Level

**142.** If $n$ is even positive integer, then the condition that the greatest term in the expansion of $(1+x)^n$ may have the greatest coefficient also, is

(a) $\frac{n}{n+2}<x<\frac{n+2}{n}$ (b) $\frac{n+1}{n}<x<\frac{n}{n+1}$ (c) $\frac{n}{n+4}<x<\frac{n+4}{4}$ (d) None of these

**143.** The interval in which $x$ must lie so that the numerically greatest term in the expansion of $(1-x)^{21}$ has the numerically greatest coefficient is

(a) $\left[\frac{5}{6},\frac{6}{5}\right]$ (b) $\left(\frac{5}{6},\frac{6}{5}\right)$ (c) $\left(\frac{4}{5},\frac{5}{4}\right)$ (d) $\left[\frac{4}{5},\frac{5}{4}\right]$

## Properties of Binomial coefficients

## Basic Level

**144.** $\binom{n}{0}+2\binom{n}{1}+2^2\binom{n}{2}+.........+2^n\binom{n}{n}$ is equal to **[AMU 2000]**

(a) $2^n$ (b) 0 (c) $3^n$ (d) None of these

**145.** In the expansion of $(1+x)^{50}$, the sum of the coefficient of odd powers of $x$ is **[UPSEAT 2001]**

(a) 0 (b) $2^{49}$ (c) $2^{50}$ (d) $2^{51}$

**146.** $\sum_{r=0}^{n-1}\frac{{}^nC_r}{{}^nC_r+{}^nC_{r+1}}$ is equal to

(a) $\frac{n}{2}$ (b) $\frac{n+1}{2}$ (c) $\frac{n(n+1)}{2}$ (d) $\frac{n(n-1)}{2(n+1)}$

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

(a) $\frac{(n+2)^n}{n!}$ (b) $\frac{(n+1)^{n+1}}{(n+1)!}$ (c) $\frac{(n+1)^{n+1}}{n!}$ (d) $\frac{(n+1)^n}{(n+1)!}$

**148.** ${}^nC_0-\frac{1}{2}{}^nC_1+\frac{1}{3}{}^nC_2-.....+(-1)^n\frac{{}^nC_n}{n+1}=$

(a) $n$ (b) $1/n$ (c) $\frac{1}{n+1}$ (d) $\frac{1}{n-1}$

**149.** $C_0C_r+C_1C_{r+1}+C_2C_{r+2}+......+C_{n-r}C_n=$ **[BIT Ranchi 1986]**

(a) $\frac{(2n)!}{(n-r)!(n+r)!}$ (b) $\frac{n!}{(-r)!(n+r)!}$ (c) $\frac{n!}{(n-r)!}$ (d) None of these

**150.** If $n$ is odd, then $C_0^2-C_1^2+C_2^2-C_3^2+....+(-1)^nC_n^2=$

(a) 0 (b) 1 (c) $\infty$ (d) $\frac{n!}{(n/2)^2!}$

**151.** ${}^{10}C_1 + {}^{10}C_3 + {}^{10}C_5 + {}^{10}C_7 + {}^{10}C_9 =$ **[MP PET 1982]**

(a) $2^9$ (b) $2^{10}$ (c) $2^{10} - 1$ (d) None of these

**152.** $\frac{C_1}{C_0} + 2\frac{C_2}{C_1} + 3\frac{C_3}{C_2} + ...... + 15\frac{C_{15}}{C_{14}} =$ **[IIT 1962]**

(a) 100 (b) 120 (c) – 120 (d) None of these

**153.** $\frac{C_0}{1} + \frac{C_2}{3} + \frac{C_4}{5} + \frac{C_6}{7} + ..... =$ **[Rajasthan PET 1999]**

(a) $\frac{2^{n+1}}{n+1}$ (b) $\frac{2^{n+1}-1}{n+1}$ (c) $\frac{2^n}{n+1}$ (d) None of these

**154.** $\frac{1}{1!(n-1)!} + \frac{1}{3!(n-3)!} + \frac{1}{5!(n-5)!} + ....... =$

(a) $\frac{2^n}{n!}$ (b) $\frac{2^{n-1}}{n!}$ (c) 0 (d) None of these

**155.** The sum of $C_0^2 - C_1^2 + C_2^2 - ...... + (-1)^n C_n^2$ where $n$ is an even integer, is

(a) ${}^{2n}C_n$ (b) $(-1)^n\ {}^{2n}C_n$ (c) ${}^{2n}C_{n-1}$ (d) None of these

**156.** In the expansion of $(1+x)^n$ the sum of coefficients of odd powers of $x$ is **[MP PET 1986, 93, 2003]**

(a) $2^n + 1$ (b) $2^n - 1$ (c) $2^n$ (d) $2^{n-1}$

**157.** $C_0 - C_1 + C_2 - C_3 + .... + (-1)^n C_n$ is equal to **[MNR 1991; Rajasthan PET 1995; UPSEAT 2000]**

(a) $2^n$ (b) $2^n - 1$ (c) 0 (d) $2^{2n-1}$

**158.** The value of ${}^{15}C_0^2 - {}^{15}C_1^2 + {}^{15}C_2^2 - ........ - {}^{15}C_{15}^2$ is **[MP PET 1996]**

(a) 15 (b) – 15 (c) 0 (d) 51

**159.** If $C_0, C_1, C_2, ...., C_n$ are the binomial coefficients, then $2.C_1 + 2^3.C_3 + 2^5.C_5 + ......$ equals **[AMU 1999]**

(a) $\frac{3^n + (-1)^n}{2}$ (b) $\frac{3^n - (-1)^n}{2}$ (c) $\frac{3^n + 1}{2}$ (d) $\frac{3^n - 1}{2}$

**160.** If $m, n, r$ are positive integers such that $r < m, n$, then ${}^mC_r + {}^mC_{r-1}\ {}^nC_1 + {}^mC_{r-2}\ {}^nC_2 + ..... + {}^mC_1\ {}^nC_{r-1} + {}^nC_r$ equals

(a) $({}^nC_r)^2$ (b) ${}^{m+n}C_r$ (c) ${}^{m+n}C_r + {}^mC_r + {}^nC_r$ (d) None of these

**161.** The value of $\frac{1}{81^n} - \frac{10}{81^n}\ {}^{2n}C_1 + \frac{10^2}{81^n}\ {}^{2n}C_2 - \frac{10^3}{81^n}\ {}^{2n}C_3 + ..... + \frac{10^{2n}}{81^n}$ is

(a) 2 (b) 0 (c) 1/2 (d) 1

**162.** The value of $\frac{1}{n!} + \frac{1}{2!(n-2)!} + \frac{1}{4!(n-4)!} + .....$ is

(a) $\frac{2^{n-2}}{(n-1)!}$ (b) $\frac{2^{n-1}}{n!}$ (c) $\frac{2^n}{n!}$ (d) $\frac{2^n}{(n-1)!}$

**163.** The sum of $(n + 1)$ terms of $({}^nC_0)^2 + 3.({}^nC_1)^2 + 5.({}^nC_2)^2 + ....$ is

(a) ${}^{2n-1}C_{n-1}$ (b) ${}^{2n-1}C_n$ (c) $2(n+1).{}^{2n-1}C_n$ (d) None of these

**164.** If sum of all the coefficients in the expansion of $(x^{3/2} + x^{-1/3})^n$ is 128, then the coefficient of $x^5$ is

(a) 35 (b) 45 (c) 7 (d) None of these

**165.** The sum of 12 terms of the series ${}^{12}C_1 \cdot \frac{1}{3} + {}^{12}C_2 \cdot \frac{1}{9} + {}^{12}C_3 \cdot \frac{1}{27} + .....$ is

(a) $\left(\frac{4}{3}\right)^{12} - 1$ (b) $\left(\frac{3}{4}\right)^{12} - 1$ (c) $\left(\frac{3}{4}\right)^{12} + 1$ (d) None of these

**166.** The sum of the coefficients of all the integral powers of $x$ in the expansion of $(1+2\sqrt{x})^{40}$ is

(a) $3^{40}+1$ (b) $3^{40}-1$ (c) $\frac{1}{2}(3^{40}-1)$ (d) $\frac{1}{2}(3^{40}+1)$

**167.** If $(1+2x+x^2)^n=\sum_{r=0}^{2n} a_r x^r$, then $a_r=$ **[EAMCET 1994]**

(a) $({}^nC_r)^2$ (b) ${}^nC_r\cdot{}^nC_{r+1}$ (c) ${}^{2n}C_r$ (d) ${}^{2n}C_{r-1}$

## Advance Level

**168.** If $(1+x)^n=C_0+C_1x+C_2x^2+.....+C_nx^n$, then $C_0C_2+C_1C_3+C_2C_4+C_{n-2}C_n$ equals **[Rajasthan PET 1996]**

(a) $\frac{(2n)!}{(n+1)!(n+2)!}$ (b) $\frac{(2n)!}{(n-2)!(n+2)!}$ (c) $\frac{(2n)!}{(n)!(n+2)!}$ (d) $\frac{2n!}{(n-1)!(n+2)!}$

**169.** If $(1+x)^n=C_0+C_1x+C_2x^2+....+C_nx^n$, then the value of $C_0+C_2+C_4+......$ is **[Rajasthan PET 1997]**

(a) $2^{n-1}$ (b) $2^n-1$ (c) $2^n$ (d) $2^{n-1}-1$

**170.** If $a_r$ is the coefficient of $x^r$, in the expansion of $(1+x+x^2)^n$, then $a_1-2a_2+3a_3-.....-2n\,a_{2n}=$ **[EAMCET 2003]**

(a) 0 (b) $n$ (c) $-n$ (d) $2n$

**171.** If $(1+x)^n=C_0+C_1x+C_2x^2+......+.....C_nx^n$, then $C_0^2+C_1^2+C_2^2+C_3^2....+C_n^2=$

**[MP PET 1985; Karnataka CET 1995; UPSEAT 1999]**

(a) $\frac{n!}{n!\,n!}$ (b) $\frac{(2n)!}{n!\,n!}$ (c) $\frac{(2n)!}{n!}$ (d) None of these

**172.** If $a$ and $d$ are two complex numbers, then the sum to $(n+1)$ terms of the following series $aC_0-(a+d)C_1+(a+2d)C_2-.....+.....$ is

(a) $\frac{a}{2^n}$ (b) $na$ (c) 0 (d) None of these

**173.** If $(1+x)^{15}=C_0+C_1x+C_2x^2+....+C_{15}x^{15}$, then $C_2+2C_3+3C_4+.....+14C_{15}=$ **[IIT 1966]**

(a) $14.2^{14}$ (b) $13.2^{14}+1$ (c) $13.2^{14}-1$ (d) None of these

**174.** The sum of the series $\sum_{r=0}^{n}(-1)^r\,{}^nC_r\left(\frac{1}{2^r}+\frac{3^r}{2^{2r}}+\frac{7^r}{2^{3r}}+\frac{15^r}{2^{4r}}+....m\text{ terms}\right)$ is **[IIT 1985]**

(a) $\frac{2^{mn}-1}{2^{mn}(2^n-1)}$ (b) $\frac{2^{mn}-1}{2^n-1}$ (c) $\frac{2^{mn}+1}{2^n+1}$ (d) None of these

**175.** If $n$ is a positive integer and $C_k={}^nC_k$, then the value of $\sum_{k=1}^{n}k^3\left(\frac{C_k}{C_{k-1}}\right)^2=$ **[Roorkee 1991]**

(a) $\frac{n(n+1)(n+2)}{12}$ (b) $\frac{n(n+1)^2}{12}$ (c) $\frac{n(n+2)^2(n+1)}{12}$ (d) None of these

**176.** The sum of the series $\sum_{r=0}^{10}{}^{20}C_r$ is

(a) $2^{20}$ (b) $2^{19}$ (c) $2^{19}+\frac{1}{2}\,{}^{20}C_{10}$ (d) $2^{19}-\frac{1}{2}\,{}^{20}C_{10}$

**177.** If $(1+x-2x^2)^6=1+C_1x+C_2x^2+C_3x^3+....+C_{12}x^{12}$, then the value of $C_2+C_4+C_6+....+C_{12}$ is

(a) 30 (b) 32 (c) 31 (d) None of these

**178.** If $C_0, C_1, C_2,....., C_n$ denote the binomial coefficient in the expansion of $(1+x)^n$, then the value of $aC_0 + (a+b)C_1 + (a+2b)C_2 + .... + (a+nb)C_n$ is

(a) $(a+nb)2^n$ (b) $(a+nb)2^{n-1}$ (c) $(2a+nb)2^{n-1}$ (d) $(2a+nb)2^n$

**179.** If $C_r = {}^nC_r$ and $(C_0 + C_1)(C_1 + C_2).......(C_{n-1} + C_n) = k\dfrac{(n+1)^n}{n!}$, then the value of $k$ is

(a) $C_0\, C_1 C_2 .... C_n$ (b) $C_1^2\, C_2^2 ..... C_n^2$ (c) $C_1 + C_2 + ..... + C_n$ (d) None of these

**180.** ${}^{n-1}C_r = (K^2 - 3).\, {}^nC_{r+1}$, if $K \in$ **[IIT Screening 2004]**

(a) $[-\sqrt{3}, \sqrt{3}]$ (b) $(-\infty, -2)$ (c) $(2, \infty)$ (d) $(\sqrt{3}, 2)$

**181.** The coefficient of $x^n$ in the polynomial $(x + {}^{2n+1}C_0)(x + {}^{2n+1}C_1)(x + {}^{2n+1}C_2)....(x + {}^{2n+1}C_n)$ is

(a) $2^{n+1}$ (b) $2^{2n+1} - 1$ (c) $2^{2n}$ (d) $2^{2n+1} + 1$

**182.** If $n$ is positive integer then the sum of $\left[\left({}^nC_0 - {}^nC_1 \dfrac{1+x}{1+nx} + {}^nC_2 \cdot \dfrac{1+2x}{(1+nx)^2} - {}^nC_3 \cdot \dfrac{1+3x}{(1+nx)^3} + ....\right)\right]$ is equal to

(a) 0 (b) $2\left(\dfrac{nx}{1+nx}\right)^n$ (c) $\left(\dfrac{2nx}{1+nx}\right)^n$ (d) None of these

**183.** The value of ${}^{4n}C_0 + {}^{4n}C_4 + {}^{4n}C_8 + ..... + {}^{4n}C_{4n}$ is

(a) $2^{4n-2} + (-1)^n\, 2^{2n-1}$ (b) $2^{4n-2} + 2^{2n-1}$ (c) $2^{2n-1} + (-1)^n\, 2^{4n-2}$ (d) None of these

**184.** The sum to $(n + 1)$ terms of the following series $3C_0 - 8C_1 + 13C_2 - 18C_3 + .....$ is

(a) 0 (b) 1 (c) – 1 (d) None of these

**185.** If $(1+x)^n = C_0 + C_1x + C_2x^2 + ... + C_nx^n$, then the value of $1^2C_1 + 2^2C_2 + 3^2C_3 + .... + n^2C_n$ is

(a) $n(n+1)2^{n-2}$ (b) $n(n+1)2^{n-1}$ (c) $n(n+1)2^n$ (d) None of these

**186.** The value of $\sum_{k=0}^{n} {}^nC_k . \sin(kx)\cos(n-k)x$ is

(a) $2^{n-1}.\sin(nx)$ (b) $2^n \sin(nx)$ (c) $2^{n-1}.\cos(nx)$ (d) $2^{n-1}\sin(nx)\cos x$

**187.** Let $n$ be an odd integer. If $\sin n\theta = \sum_{r=0}^{n} b_r \sin^r \theta$ for every value of $\theta$, then

(a) $b_0 = 1, b_1 = 3$ (b) $b_0 = 0, b_1 = n$ (c) $b_0 = -1, b_1 = n$ (d) $b_0 = 1, b_1 = n^2 - 3n + 3$

**188.** $\sum_{r=0}^{2n} a_r(x-2)^r = \sum_{r=0}^{2n} b_r(x-3)^r$ and $a_k = 1$ for all $k \ge n$, then **[IIT 1992]**

(a) $b_n = {}^{2n}C_n$ (b) $b_n = {}^{2n+1}C_{n-1}$ (c) $b_n = {}^{2n+1}C_{n+1}$ (d) None of these

**189.** 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 A.P. then

(a) $a_1, a_2, a_3$ are in A.P (b) $a_1, a_2, a_3$ are in H.P (c) $n = 7$ (d) $n = 14$

**190.** If $(1 + 2x + 3x^2)^{10} = a_0 + a_1x + a_2x^2 + .... + a_{20}x^{20}$, then $a_1$ equals

(a) 10 (b) 20 (c) 210 (d) 420

**191.** If $(2x - 3x^2)^6 = a_0 + a_1x + .......... . + a_{12}x^{12}$, then value of $a_0$ and $a_6$ are

(a) 0, 6 (b) $0, 2^6$ (c) 1, 6 (d) 0

**192.** If $a_1, a_2, a_3$ are in A.P. and $(1+x^2)^2(1+x)^n = \sum_{k=0}^{n+4} a_kx^k$, then $n$ is equal to

(a) 2 (b) 3 (c) 4 (d) All of these

**193.** If $(1+x)^{10} = a_0 + a_1x + a_2x^2 + ....a_{10}x^{10}$ 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

**194.** If $(1+x)^{2n} = a_0 + a_1x + a_2x^2 + ... + a_{2n}x^{2n}$ then

(a) $a_0 + a_2 + a_4 + .... = \frac{1}{2}(a_0 + a_1 + a_2 + a_3 + ....)$ (b) $a_{n+1} < a_n$

(c) $a_{n-3} = a_{n+3}$ (d) None of these

## Sum of Coefficients

### Basic Level

**195.** The sum of the coefficients in the expansion of $(1 + x - 3x^2)^{2163}$ will be **[IIT 1982]**

(a) 0 (b) 1 (c) – 1 (d) $2^{2163}$

**196.** The sum of all the coefficients in the binomial expansion of $(x^2 + x - 3)^{319}$ is **[Bihar CEE 1994]**

(a) 1 (b) 2 (c) – 1 (d) 0

**197.** The sum of the coefficients in $(x + 2y + z)^{10}$ is

(a) $2^{10}$ (b) $3^{10}$ (c) 2 (d) None of these

**198.** If the sum of the coefficients in the expansion of $(\alpha x^2 - 2x + 1)^{35}$ is equal to the sum of the coefficients in the expansion of $(x - \alpha y)^{35}$, then $\alpha =$

(a) 0 (b) 1 (c) May be any real number (d) No such value exist

**199.** The sum of coefficients in the expansion of $(x + 2y + 3z)^8$ is **[Rajasthan PET 2000]**

(a) $3^8$ (b) $5^8$ (c) $6^8$ (d) None of these

**200.** If the sum of the coefficients in the expansion of $(1 - 3x + 10x^2)^n$ is $a$ and if the sum of the coefficients in the expansion of $(1 + x^2)^n$ is $b$, then **[UPSEAT 2001]**

(a) $a = 3b$ (b) $a = b^3$ (c) $b = a^3$ (d) None of these

**201.** The sum of coefficients in $(1 + x - 3x^2)^{2134}$ is **[Kurukshetra CEE 2001]**

(a) – 1 (b) 1 (c) 0 (d) $2^{2134}$

**202.** The sum of coefficients in the expansion of is $(1 + x + x^2)^n$ **[EAMCET 2002]**

(a) 2 (b) $3^n$ (c) $4^n$ (d) $2^n$

**203.** If $n \in N$, then the sum of the coefficients in the expansion of the binomial $(5x - 4y)^n$ is

(a) 1 (b) – 1 (c) 2 (d) 0

**204.** In the expansion of $(1+x)^n(1+y)^n(1+z)^n$, the sum of the coefficients of the terms of degree $r$ is

(a) $({}^nC_r)^3$ (b) $3.{}^nC_r$ (c) ${}^{3n}C_r$ (d) ${}^nC_{3r}$

**205.** The sum of the numerical coefficients in the expansion of $\left(1 + \frac{x}{3} + \frac{2y}{3}\right)^{12}$ is

(a) 1 (b) 2 (c) $2^{12}$ (d) None of these

**206.** The sum of the coefficients in the expansion of $(1 + x - 3x^2)^{2148}$ is **[Karnataka CET 2003]**

(a) 7 (b) 8 (c) – 1 (d) 1

## Binomial theorem for any Index

### Basic Level

**207.** If $y = 3x + 6x^2 + 10x^3 + ......$ , then the value of $x$ in terms of $y$ is

(a) $1-(1-y)^{-1/3}$ (b) $1-(1+y)^{1/3}$ (c) $1+(1+y)^{-1/3}$ (d) $1-(1+y)^{-1/3}$

**208.** The coefficient of $x$ in the expansion of $[\sqrt{1+x^2} - x]^{-1}$ in ascending powers of $x$, when $|x| < 1$, is **[MP PET 1996]**

(a) 0 (b) $\frac{1}{2}$ (c) $-\frac{1}{2}$ (d) 1

**209.** If $x$ is positive, the first negative term in the expansion of $(1+x)^{27/5}$ is **[AIEEE 2003]**

(a) $7^{th}$ term (b) $5^{th}$ term (c) $8^{th}$ term (d) $6^{th}$ term

**210.** The approximate value of $(7.995)^{1/3}$ correct to four decimal places is **[MNR 1991; UPSEAT 2000]**

(a) 1.9995 (b) 1.9996 (c) 1.9990 (d) 1.9991

**211.** Cube root of 217 is

(a) 6.01 (b) 6.04 (c) 6.02 (d) None of these

**212.** If $|x| < 1$, then in the expansion of $(1+2x+3x^2+4x^3+....)^{1/2}$ , the coefficient of $x^n$ is

(a) $n$ (b) $n + 1$ (c) 1 (d) – 1

**213.** If $|x| < 1$, then the value of $1+n\left(\frac{2x}{1+x}\right)+\frac{n(n+1)}{2!}\left(\frac{2x}{1+x}\right)^2+.......\infty$ will be **[AMU 1983]**

(a) $\left(\frac{1+x}{1-x}\right)^n$ (b) $\left(\frac{2x}{1+x}\right)^n$ (c) $\left(\frac{1+x}{2x}\right)^n$ (d) $\left(\frac{1-x}{1+x}\right)^n$

**214.** The sum of $1+n\left(1-\frac{1}{x}\right)+\frac{n(n+1)}{2!}\left(1-\frac{1}{x}\right)^2+.....\infty$, will be **[Roorkee 1975]**

(a) $x^n$ (b) $x^{-n}$ (c) $\left(1-\frac{1}{x}\right)^n$ (d) None of these

**215.** The first four terms in the expansion of $(1-x)^{3/2}$ are **[Rajasthan PET 1989]**

(a) $1-\frac{3}{2}x+\frac{3}{8}x^2-\frac{1}{16}x^3$ (b) $1-\frac{3}{2}x-\frac{3}{8}x^2-\frac{x^3}{16}$ (c) $1-\frac{3}{2}x+\frac{3}{8}x^2+\frac{x^3}{16}$ (d) None of these

**216.** The coefficient of $x^n$ in the expansion of $(1-9x+20x^2)^{-1}$ is

(a) $5^n - 4^n$ (b) $5^{n+1}-4^{n+1}$ (c) $5^{n-1}-4^{n-1}$ (d) None of these

**217.** If the third term in the binomial expansion of $(1+x)^m$ is $-\frac{1}{8}x^2$, then the rational value of $m$ is

(a) 2 (b) 1/2 (c) 3 (d) 4

**218.** $\frac{1}{\sqrt{5+4x}}$ can be expanded by binomial theorem, if

(a) $x < 1$ (b) $|x| < 1$ (c) $|x| < \frac{5}{4}$ (d) $|x| < \frac{4}{5}$

**219.** $(r + 1)^{th}$ term in the expansion of $(1-x)^{-4}$ will be

(a) $\frac{x^r}{r!}$ (b) $\frac{(r+1)(r+2)(r+3)}{6}x^r$ (c) $\frac{(r+2)(r+3)}{2}x^r$ (d) None of these

**220.** If $|x| < 1$, then the coefficient of $x^n$ in the expansion of $(1+x+x^2+.....)^2$ will be **[Pb. CET 1989]**

(a) 1 (b) $n$ (c) $n + 1$ (d) None of these

**221.** The general term in the expansion of $(1-2x)^{3/4}$ is

(a) $\frac{-3}{2^r r!}x^2$ (b) $\frac{-3^r}{2^r r!}x^r$ (c) $\frac{-3^r}{2^r (2r)!}x^r$ (d) None of these

**222.** The coefficient of $x^2$ in $(1+3x)^{1/2}(1-2x)^{-1/3}$ is

(a) 6/13 (b) 55/72 (c) 7/19 (d) 2/9

**223.** The coefficient of $x^n$ in the expansion of $\frac{1}{(1-x)(1-2x)}$ is

(a) $1-2^{n+1}$ (b) $2^{n+1}-1$ (c) $(2^n-1)$ (d) $2^{n-1}-1)$

**224.** The coefficient of $x^4$ in $\frac{1+2x+3x^2}{(1-x)^2}$ is

(a) 13 (b) 15 (c) 20 (d) 22

**225.** The value of $2(x+x^3+x^5+....)$ is

(a) $(1-x)^{-1}+(1+x)^{-1}$ (b) $(1-x)^{-1}-(1+x)^{-1}$ (c) $(1+x)^{-1}-(1-x)^{-1}$ (d) $(2+x)^{-1}-(2-x)^{-1}$

**226.** The coefficient of $x^r$ in the expansion of $(1+3x+6x^2+10x^3+....)^2$ is

(a) $\frac{(r+1)(r+2)(r+3)}{5!}$ (b) $\frac{(r+2)(r+3)(r+4)}{5!}$

(c) $\frac{(r+1)(r+2)(r+3)(r+4)(r+5)}{5!}$ (d) None of these

**227.** The coefficient of $x^{50}$ in the expression $(1+x)^{1000}+2x(1+x)^{999}+3x^2(1+x)^{998}+....+1001x^{1000}$ is

(a) ${}^{1000}C_{50}$ (b) ${}^{1001}C_{50}$ (c) ${}^{1002}C_{50}$ (d) ${}^{1000}C_{51}$

**228.** The value of $\sum_{r=0}^{\infty}(-1)^r(r+1)x^r$ is

(a) $(1+x)^{-1}$ (b) $(1-x)^{-1}$ (c) $(1+x)^{-2}$ (d) $(1-x)^{-2}$

**229.** The coefficient of $x^n$ in $(1+x+2x^2+3x^3+....+nx^n)^2$ is

(a) $\frac{n(n^2+11)}{6}$ (b) $\frac{n(n^2+10)}{6}$ (c) $\frac{n(n^2+11)}{4}$ (d) $\frac{n(n^2+10)}{4}$

**230.** The coefficient of $x$ in the expansion of $(1-ax)^{-1}(1-bx)^{-1}(1-cx)^{-1}$ is

(a) $a+b+c$ (b) $a-b-c$ (c) $-a+b+c$ (d) $a-b+c$

**231.** If $x$ be so small that its 2 and higher power may be neglected, then $(1+2x)^{1/2}+(1-4x)^{-5/2}$ is equal to **[Rajasthan PET 1984**

(a) $2+x$ (b) $2+10x$ (c) $1-2x$ (d) $2+11x$

**232.** $\left(1+\frac{1}{3}x+\frac{1.4}{3.6}x^2+\frac{1.4.7}{3.6.9}x^3+....\right)^3$ is equal to **[Rajasthan PET 1986]**

(a) $(1+x)^{-1}$ (b) $(1+x)^{-2}$ (c) $(1-x)^{-1}$ (d) $(1-x)^{-2}$

**233.** The fourth term in the expansion of $(1-2x)^{3/2}$ will be **[Rajasthan PET 1989]**

(a) $-\frac{3}{4}x^4$ (b) $\frac{x^3}{2}$ (c) $-\frac{x^3}{2}$ (d) $\frac{3}{4}x^4$

**234.** $1+\frac{2}{3}\cdot\frac{1}{2}+\frac{2\cdot5}{3\cdot6}\left(\frac{1}{2}\right)^2+\frac{2\cdot5\cdot8}{3\cdot6\cdot9}\cdot\left(\frac{1}{2}\right)^3+......=$

(a) $2^{1/3}$ (b) $3^{1/4}$ (c) $4^{1/3}$ (d) $3^{1/3}$

**235.** If $(a+bx)^{-2}=\frac{1}{4}-3x+......$, then $(a, b)=$ **[UPSEAT 2002]**

(a) (2, 12) (b) (– 2, 12) (c) (2, – 12) (d) None of these

**236.** $\left(\frac{a}{a+x}\right)^{\frac{1}{2}}+\left(\frac{a}{a-x}\right)^{\frac{1}{2}}=$ **[DCE 1994; Pb. CET 2002; AIEEE 2002]**

(a) $2+\frac{3x^2}{4a^2}+...$ (b) $1+\frac{3x^2}{8a^2}+...$ (c) $2+\frac{x}{a}+\frac{3x^2}{4a^2}+.....$ (d) $2-\frac{x}{a}+\frac{3x^2}{4a^2}-.....$

## Advance Level

**237.** The coefficient of $x^n$ in the expansion of $\frac{(1+x)^2}{(1-x)^3}$ is

(a) $n^2+2n+1$ (b) $2n^2+n+1$ (c) $2n^2+2n+1$ (d) $n^2+2n+2$

**238.** $1+\frac{1}{4}+\frac{1.3}{4.8}+\frac{1.3.5}{4.8.12}+......=$ **[Rajasthan PET 1996; EAMCET 2001]**

(a) $\sqrt{2}$ (b) $1/\sqrt{2}$ (c) $\sqrt{3}$ (d) $1/\sqrt{3}$

**239.** $\frac{\frac{1}{2}\cdot\frac{2}{2}}{1^3}+\frac{\frac{2}{2}\cdot\frac{3}{2}}{1^3+2^3}+\frac{\frac{3}{2}\cdot\frac{4}{2}}{1^3+2^3+3^3}+.....n$ terms = **[EAMCET 2000]**

(a) $\left(\frac{n}{n+1}\right)^2$ (b) $\left(\frac{n}{n+1}\right)^3$ (c) $\left(\frac{n}{n+1}\right)$ (d) $\left(\frac{1}{n+1}\right)$

**240.** The sum of the series $1+\frac{1}{5}+\frac{1.3}{5.10}+\frac{1.3.5}{5.10.15}+....$ is equal to **[Roorkee 1998]**

(a) $\frac{1}{\sqrt{5}}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\sqrt{\frac{5}{3}}$ (d) $\sqrt{5}$

**241.** If $\frac{(1-3x)^{1/2}+(1-x)^{5/3}}{\sqrt{4-x}}$ is approximately equal to $a+bx$ for small values of $x$, then $(a, b)$ =

(a) $\left(1,\frac{35}{24}\right)$ (b) $\left(1,-\frac{35}{24}\right)$ (c) $\left(2,\frac{35}{12}\right)$ (d) $\left(2,-\frac{35}{12}\right)$

**242.** In the expansion of $\left(\frac{1+x}{1-x}\right)^2$, the coefficient of $x^n$ will be

(a) $4n$ (b) $4n-3$ (c) $4n+1$ (d) None of these

**243.** The coefficient of $x^3$ in the expansion of $\frac{(1+3x)^2}{1-2x}$ will be

(a) 8 (b) 32 (c) 50 (d) None of these

**244.** If $(1-x)^{-n}=a_0+a_1x+a_2x^2+....+a_rx^r+......$, then $a_0+a_1+a_2+.....+a_r$ is equal to

(a) $\frac{n(n+1)(n+2).....(n+r)}{r!}$ (b) $\frac{(n+1)(n+2).....(n+r)}{r!}$ (c) $\frac{n(n+1)(n+2).....(n+r-1)}{r!}$ (d) None of these

**245.** If $p$ is nearly equal to $q$ and $n>1$, such that $\frac{(n+1)p+(n-1)q}{(n-1)p+(n+1)q}=\left(\frac{p}{q}\right)^k$, then the value of $k$ is

(a) $n$ (b) $\frac{1}{n}$ (c) $n+1$ (d) $\frac{1}{n+1}$

**246.** If $x$ is very small compared to 1, then $(1-7x)^{1/3}(1+2x)^{-3/4}$ is equal to

(a) $1+\frac{23x}{6}$ (b) $1-\frac{23x}{6}$ (c) $1-\frac{25x}{6}$ (d) $1+\frac{25x}{6}$

**247.** If $x$ is very small and $\frac{\left(1+\frac{3x}{4}\right)^{-4}\sqrt{16-3x}}{(8+x)^{2/3}}=P+Qx$, then

(a) $P=1, Q=\frac{305}{96}$ (b) $P=1, Q=-\frac{305}{96}$ (c) $P=2, Q=\frac{305}{48}$ (d) $P=2, Q=-\frac{305}{48}$

**248.** If $a, b$ are approximately equal then the approximate value of $\left(\frac{b+2a}{a+2b}\right)$ is

(a) $(b/a)^{1/3}$ (b) $(a/b)^{1/3}$ (c) 1 (d) 9/3$b$

**249.** If $x$ is nearly equal to 1, then the approximate value of $\frac{px^q - qx^p}{x^q - x^p}$ is

(a) $\frac{p+q}{1-x}$ (b) $\frac{1}{1-x}$ (c) $\frac{1}{1+x}$ (d) $\frac{p+q}{1+x}$

**250.** The coefficient of $x^{20}$ in the expansion of $(1+x^2)^{40} \cdot \left(x^2+2+\frac{1}{x^2}\right)^{-5}$ is

(a) ${}^{30}C_{10}$ (b) ${}^{30}C_{25}$ (c) 1 (d) None of these

### *Problem regarding three/four Consecutive terms or Coefficients*

#### *Basic Level*

**251.** If in the expansion of $(1+x)^n$, $a$, $b$, $c$ are three consecutive coefficients, then $n$ =

(a) $\frac{ac+ab+bc}{b^2+ac}$ (b) $\frac{2ac+ab+bc}{b^2-ac}$ (c) $\frac{ab+ac}{b^2-ac}$ (d) None of these

**252.** If $n$ is a positive integer and three consecutive coefficients in the expansion of $(1+x)^n$ are in the ratio 6 : 33 : 110, then $n$ =

(a) 4 (b) 6 (c) 12 (d) 16

**253.** If the three consecutive coefficients in the expansion of $(1+x)^n$ are 28, 56 and 70, then the value of $n$ is **[MP PET 1985]**

(a) 6 (b) 4 (c) 8 (d) 10

**254.** The coefficients of three successive terms in the expansion of $(1+x)^n$ are 165, 330 and 462 respectively, then the value of $n$ will be

**[UPSEAT 1999]**

(a) 11 (b) 10 (c) 12 (d) 8

### *Multinomial theorem*

#### *Basic Level*

**255.** The coefficient of $x^3$ in the expansion of $(1-x+x^2)^5$ is

(a) 10 (b) – 20 (c) – 50 (d) – 30

**256.** The coefficient of $a^8b^6c^4$ in the expansion of $(a+b+c)^{18}$ is

(a) ${}^{18}C_{14} \cdot {}^{14}C_8$ (b) ${}^{18}C_{10} \cdot {}^{10}C_6$ (c) ${}^{18}C_6 \cdot {}^{12}C_8$ (d) ${}^{18}C_4 \cdot {}^{14}C_6$

**257.** The coefficient of $x^3.y^4.z$ in the expansion of $(1+x+y-z)^9$ is

(a) $2.{}^9C_7.{}^7C_4$ (b) $-2.{}^9C_2.{}^7C_3$ (c) ${}^9C_7.{}^7C_4$ (d) None of these

### *Terms free from radical signs in the expansion of $(a^{1/p} + b^{1/q})$*

#### *Basic Level*

**258.** The number of terms which are free from radical signs in the expansion of $(y^{1/5}+x^{1/10})^{55}$ is

(a) 5 (b) 6 (c) 7 (d) None of these

**259.** The number of integral terms in the expansion of $(5^{1/2}+7^{1/6})^{642}$ is **[Kurukshetra CEE 1996]**

(a) 106 (b) 108 (c) 103 (d) 109

**260.** In the expansion of $[7^{1/3}+11^{1/9}]^{6561}$, the number of terms free from radicals is

(a) 730 (b) 715 (c) 725 (d) 750

**261.** The number of rational terms in the expansion of $(1+\sqrt{2}+\sqrt[3]{3})^6$ is

(a) 6 (b) 7 (c) 5 (d) 8

**262.** The number of terms with integral coefficients in the expansion of $(7^{1/3}+5^{1/2}.x)^{600}$ is

(a) 100 (b) 50 (c) 101 (d) None of these

**263.** The sum of the rational terms in the expansion of $(\sqrt{2}+\sqrt[5]{3})^{10}$ is

(a) 32 (b) 9 (c) 41 (d) None of these

## *Miscellaneous*

### *Basic Level*

**264.** If $(8+3\sqrt{7})^n = P+F$, where $P$ is an integer and $F$ is a proper fraction then

(a) $P$ is an odd integer (b) $P$ is an even integer (c) $F(P+F)=1$ (d) $(1-F)(P+F)=1$

**265.** If [$x$] denotes the greatest integer less than or equal to $x$, then $[(6\sqrt{6}+14)^{2n+1}]$

(a) Is an even integer (b) Is an odd integer (c) Depends on $n$ (d) None of these

**266.** Which of the following expansion will have term containing $x^2$

(a) $(x^{-1/5}+2x^{3/5})^{25}$ (b) $(x^{3/5}+2x^{-1/5})^{24}$ (c) $(x^{3/5}-2x^{-1/5})^{23}$ (d) $(x^{3/5}+2x^{-1/5})^{22}$

**267.** If the second term in the expansion $\left(\sqrt[13]{a}+\frac{a}{\sqrt{a^{-1}}}\right)^n$ is $14a^{5/2}$, then the value of ${}^nC_3 / {}^nC_2$ is

(a) 4 (b) 3 (c) 12 (d) 6

***

# Assignment

## Mathematical Induction

### Basic Level

**1.** $10^n + 3.4^{n+2} + 5, \forall n \in N$ is divisible by

(a) 5 (b) 7 (c) 9 (d) 11

**2.** For every natural number $n$, $n(n-1)(2n-1)$ is divisible by

(a) 6 (b) 12 (c) 24 (d) 5

**3.** For every natural number $n$, $3^{2n+2} - 8n - 9$ is divisible by **[IIT 1977]**

(a) 16 (b) 128 (c) 256 (d) None of these

**4.** $49^n + 16n - 1$ is divisible by **[Kurukshetra CEE 2001]**

(a) 3 (b) 19 (c) 64 (d) 29

**5.** For all positive integral values of $n$, $2^{4n} - 1$ is divisible by

(a) 8 (b) 16 (c) 24 (d) None of these

**6.** For all positive integral values of $n$, $3^{2n} - 2n + 1$ is divisible by

(a) 2 (b) 4 (c) 8 (d) 12

**7.** If $n \in N$, then $x^{2n-1} + y^{2n-1}$ is divisible by

(a) $x + y$ (b) $x - y$ (c) $x^2 + y^2$ (d) $x^2 + xy$

**8.** For each $n \in N$, $2^{3n} - 7n - 1$ is divisible by

(a) 23 (b) 41 (c) 49 (d) 98

**9.** For each $n \in N$, $x^n - y^n$ is divisible by

(a) $x + y$ (b) $x - y$ (c) $x^2 + y^2$ (d) $x^2 - y^2$

**10.** If $n \in N$, then the greatest integer which divides $n(n - 1)(n - 2)$ is

(a) 2 (b) 3 (c) 6 (d) 8

**11.** If $n \in N$, then $7^{2n} + 2^{3n-3}.\ 3^{n-1}$ is always divisible by **[IIT 1982]**

(a) 25 (b) 35 (c) 45 (d) None of these

**12.** If $n \in N$, then $11^{n+2} + 12^{2n+1}$ is divisible by **[Roorkee 1982]**

(a) 113 (b) 123 (c) 133 (d) None of these

**13.** For every natural number $n$, $n(n^2 - 1)$ is divisible by **[Rajasthan PET 1991]**

(a) 4 (b) 6 (c) 10 (d) None of these

**14.** The difference between an integer and its cube is divisible by **[MP PET 1999]**

(a) 4 (b) 6 (c) 9 (d) None of these

**15.** For every natural number $n$

(a) $n > 2^n$ (b) $n < 2^n$ (c) $n \geq 2^n$ (d) $n \leq 2^n$

**16.** For each $n \in N$, the correct statement is

(a) $2^n < n$ (b) $n^2 > 2n$ (c) $n^4 < 10^n$ (d) $2^{3n} > 7n+1$

**17.** For natural number $n$, $2^n (n-1)! < n^n$, if

(a) $n < 2$ (b) $n > 2$ (c) $n \geq 2$ (d) Never

**18.** If $n$ is a natural number then $\left(\frac{n+1}{2}\right)^n \geq n!$ is true when

(a) $n > 1$ (b) $n \geq 1$ (c) $n > 2$ (d) $n \geq 2$

**19.** For positive integer $n$, $10^{n-2} > 81n$, if

(a) $n > 5$ (b) $n \geq 5$ (c) $n < 5$ (d) $n > 6$

**20.** For every positive integer $n$, $2^n < n!$ when

(a) $n < 4$ (b) $n \geq 4$ (c) $n < 3$ (d) None of these

**21.** For every positive integral value of $n$, $3^n > n^3$ when

(a) $n > 2$ (b) $n \geq 3$ (c) $n \geq 4$ (d) $n < 4$

**22.** For natural number $n$, $(n!)^2 > n^n$, if

(a) $n > 3$ (b) $n > 4$ (c) $n \geq 4$ (d) $n \geq 3$

**23.** The value of the $n$ natural numbers $n$ such that the inequality $2^n > 2n+1$ is valid is **[MNR 1994]**

(a) For $n \geq 3$ (b) For $n < 3$ (c) For $mn$ (d) For any $n$

**24.** Let $P(n)$ denote the statement that $n^2 + n$ is odd. It is seen that $P(n) \Rightarrow P(n+1)$, $P_n$ is true for all **[IIT JEE 1996]**

(a) $n > 1$ (b) $n$ (c) $n > 2$ (d) None of these

**25.** 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

**26.** If $p$ is a prime number, then $n^p - n$ is divisible by $p$ when $n$ is a

(a) Natural number greater than 1 (b) Irrational number

(c) Complex number (d) Odd number

**27.** $x(x^{n-1} - na^{n-1}) + a^n(n-1)$ is divisible by $(x-a)^2$ for

(a) $n > 1$ (b) $n > 2$ (c) All $n \in N$ (d) None of these

**28.** Let $P(n)$ be a statement and let $P(n) \Rightarrow p(n+1)$ for all natural numbers $n$, then $P(n)$ is true

(a) For all $n$ (b) For all $n > 1$

(c) For all $n > m$, $m$ being a fixed positive integer (d) Nothing can be said

**29.** If $P(n) = 2 + 4 + 6 + .... + 2n$, $n \in N$, then $P(k) = k(k+1) + 2 \Rightarrow P(k+1) = (k+1)(k+2) + 2$ for all $k \in N$. So we can conclude that $P(n) = n(n+1) + 2$ for

(a) All $n \in N$ (b) $n > 1$ (c) $n > 2$ (d) Nothing can be said

**30.** For every natural number $n$, $n(n + 1)$ is always

(a) Even (b) Odd (c) Multiple of 3 (d) Multiple of 4

**31.** The statement $P(n)$ "$1\times1!+2\times2!+3\times3!+.....+n\times n!=(n+1)!-1$" is

(a) True for all $n > 1$ (b) Not true for any $n$ (c) True for all $n \in N$ (d) None of these

**32.** If $A=\begin{pmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{pmatrix}$, then for any $n \in N$, $A^n$ equals

(a) $\begin{pmatrix}\cos^n\theta & \sin^n\theta\\ -\sin^n\theta & \cos^n\theta\end{pmatrix}$ (b) $\begin{pmatrix}\cos n\theta & \sin n\theta\\ -\sin n\theta & \cos n\theta\end{pmatrix}$ (c) $\begin{pmatrix}n\cos\theta & n\sin\theta\\ -n\sin\theta & n\cos\theta\end{pmatrix}$ (d) None of these

**33.** The least remainder when $17^{30}$ is divided by 5 is **[Karnataka CET 2003]**

(a) 1 (b) 2 (c) 3 (d) 4

**34.** The remainder when $5^{99}$ is divided by 13 is

(a) 6 (b) 8 (c) 9 (d) 10

**35.** $2^{60}$ when divided by 7 leaves the remainder

(a) 1 (b) 6 (c) 5 (d) 2

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# Answer Sheet

## Binomial — Assignment (Basic and Advance Level)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| a | c | c | c | c | a,b,d | b | b | b | d | c | b | b | a | c | b | c | b | c | b |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| a | a | c | c | a | b | c,d | a | a | a | b | c | b | d | c | a | d | b | a | d |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| b | a | a | c | b | a | d | d | a | b | c | b | b | c | d | a | c | c | a | c |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| b | c | c | c | a | c | a | c | b | a | c | d | b | d | c | d | b | c | b | a |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| d | a | c | a | a | b | d | b | b | a | c | b | d | c | c | c | a | c | a | a |
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 |
| b | c | a | d | a | b | d | c | c | b | c | b | d | c | b | a | d | b,c,d | a | b |
| 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 |
| c | a | b | c | b | a | b | c | c | d | c | d | b | a | b | c | b | b | a | b |
| 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 |
| b | a | b | c | b | a | b | c | a | a | a | b | c | b | d | d | c | c | b | b |
| 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 |
| d | b | c | a | a | d | c | b | a | c | b | c | b | a | d | c | c | c | a | d |
| 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 |
| c | a | a | a | a | a | b | c | c | b | b | d | b | a,b,c | c | c | d | b | c | b |
| 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 |
| b | b | a | c | c | d | d | d | c | b | a | c | a | a | c | b | b | c | b | c |
| 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 |
| d | b | b | d | d | c | c | c | a | a | d | c | b | c | a | a | c | a | c | c |
| 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 |
| b | a | c | b | b | b | b | b | b | b | b | c | c | a | d | a,b,d | b | b | b | a |
| 261 | 262 | 263 | 264 | 265 | 266 | 267 | | | | | | | | | | | | | |
| b | c | c | a | a | d | a | | | | | | | | | | | | | |

## Mathematical — Assignment (Basic and Advance Level)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| c | a | a | c | d | a | a | c | b | c | a | c | b | b | b | c | b | b | b | b |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | | | | | |
| c | d | a | d | c | a | c | d | d | a | c | b | d | b | a | | | | | |