Q1

The $(n+1)^{th}$ term from the end in $\left(x-\frac{1}{x}\right)^{3n}$ is

1) ${}^{3n}C_n x^{-n}$ 2) $(-1)^n\ {}^{3n}C_n x^{-n}$ 3) ${}^{3n}C_n x^{n}$ 4) $(-1)^n\ {}^{3n}C_n x^{n}$

Q2

The coefficient of x^n in the expansion of $(1+x)^{2n}$ and $(1+x)^{2n-1}$ are in the ratio

1) 1: 2 2) 1: 3 3) 3: 1 4) 2: 1

Q3

The coefficient of $(2r+1)^{th}$ term is equal to the coefficient of $(4r+5)^{th}$ term then r =

1) 0 2) 1 3) 2 4) 3

Q4

In the expansion $\left(\sqrt{x}-\frac{2}{x}\right)^{18}$, the term independent of x is

1) ${}^{18}C_6 2^5$ 2) ${}^{18}C_6 2^6$ 3) ${}^{18}C_5 2^6$ 4) ${}^{18}C_4 2^5$

Q5

If the coefficient of x in $\left(x^2+\frac{k}{x}\right)^5$ is 270, then k =

1) 3 2) 4 3) 5 4) 6

Q6

In the expansion of $\left(2+\frac{x}{3}\right)^n$, coefficients of x^7 and x^8 are equal then n =

1) 49 2) 50 3) 55 4) 56

Q7

In the expansion of $(1+x)^n$, the 5th term is 4 times the 4th term and the 4th term is 6 times the 3rd term, then n =

1) 9 2) 10 3) 11 4) 15

Q8

The total number of terms in the expansion of $(x+a)^{51}-(x-a)^{51}$ after simplification

1) 102 2) 25 3) 26 4) 51

Q9

If $\frac{T_2}{T_1}$ in the expansion of $(a+b)^n$ and $\frac{T_3}{T_4}$ in the expansion of $(a+b)^{n+3}$ are equal, then n =

1) 3 2) 4 3) 5 4) 6

Q10

If the coefficients of 2^{nd}, 3^{rd} and 4^{th} terms in the expansion of $(1+x)^n$ are in AP then the value of n is

1) 2 2) 7 3) 11 4) 14

Q11

If $(1-x+x^2)^n = a_0 + a_1x + a_2x^2 + ... + a_{2n}x^{2n}$ then $a_0 + a_2 + a_4 + ... + a_{2n} =$

1) $\frac{3^n+1}{2}$ 2) $\frac{3^n-1}{2}$ 3) $\frac{1-3^n}{2}$ 4) $3^n + \frac{1}{2}$

Q12

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

1) 5 2) 6 3) 7 4) 8

Q13

If 21^{st} and 22^{nd} terms in the expansion $(1+x)^{44}$ are equal, then x =

1) $\frac{8}{7}$ 2) $\frac{21}{22}$ 3) $\frac{23}{24}$ 4) $\frac{7}{8}$

Q14

If the middle term of $\left(x+\frac{1}{x}\sin^{-1}x\right)^8$ is $\frac{35\pi^4}{8}$, then the value of x =

1) $\frac{1}{2}$ 2) $\frac{\sqrt{3}}{2}$ 3) $\frac{1}{\sqrt{2}}$ 4) 1

Q15

If $Z = \left(\frac{\sqrt{3}}{2}+\frac{i}{2}\right)^5 + \left(\frac{\sqrt{3}}{2}-\frac{i}{2}\right)^5$ then

1) Re (Z) = 0 2) Im(Z) = 0 3) Re(Z) > 0, Im(Z) >0 4) Re(Z) < 0, Im(Z) < 0

Q16

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

1) 12: 32 2) 1: 32 3) 32: 12 4) 32: 1

Q17

If the coefficient of 7th and 13th terms in the expansion of $(1+x)^n$ are equal, then n =

1) 10 2) 15 3) 18 4) 20

Q18

The sum of the coefficients in the expansion of $\left(1+2x+3x^2+.....+nx^n\right)^2$ is

1) $\sum 1$ 2) $\sum n$ 3) $\sum\left(n^2\right)$ 4) $\sum\left(n^3\right)$

Q19

If the sum of the coefficients in the expansion of $\left(a^2x^2-2ax+1\right)^{51}$ vanishes, then the value of a is

1) 2 2) – 1 3) 1 4) – 2

Q20

The coefficient of x^6 in the expansion of $(1+x)^6+(1+x)^7+(1+x)^8+........+(1+x)^{15}$ is

1) ${}^{16}C_5-{}^6C_5$ 2) ${}^{16}C_6-1$ 3) ${}^{16}C_9$ 4) ${}^{16}C_9-1$

Q21

The sum of the coefficients in the expansion of $(x+y)^n=4096$. The greatest coefficient in the expansion is

1) 924 2) 1024 3) 724 4) 824

Q22

.In the expansion of $(1+x)^{50}$, the sum of the coefficients of odd powers of x is

1) 0 2) 2^{49} 3) 2^{50} 4) 2^{51}

Q23

The number of terms in the expansion of $(2x+3y-z)^{16}$ is

1) 136 2) 135 3) 116 4) 153

Q24

The first three terms in the expansion of $(1+ax)^n$ $(n\neq 0)$ are 1, 6x and $16x^2$. Then the ordered pair (a, n) is

1) $\left(\frac{2}{3},9\right)$ 2) (2, 9) 3) (3, 2) 4) $\left(\frac{3}{2},6\right)$

Q25

If $C_0, C_1, C_2, \ldots\ldots C_n$ denote the binomial coefficients in the expansion of $(1+x)^n$ and $C_0 + 2C_1 + 3C_2 + \ldots\ldots\ldots + (n+1)C_n = 576$, then n =

1) 7 2) 8 3) 9 4) 10

Q26

The coefficient of x^{-n} is $(1+x)^n\left(1+\frac{1}{x}\right)^n$ is

1) 0 2) 1 3) 2n 4) $2nC_n$

Q27

The coefficient of middle term in the binomial expansion in powers of x is $(1+\propto x)^4$ and $(1-\propto x)^6$ is the same, then $\propto =$

1) $-\frac{5}{3}$ 2) $\frac{10}{3}$ 3) $-\frac{3}{10}$ 4) $\frac{3}{5}$

Q28

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

1) 2 2) $\frac{1}{2}$ 3) 3 4) 4

Q29

In the binomial expansion of $(a-b)^n, n \geq 5$, the sum of the 5th and 6th terms is zero then $\frac{a}{b} =$

1) $\frac{n-5}{6}$ 2) $\frac{n-4}{5}$ 3) $\frac{5}{n-4}$ 4) $\frac{6}{n-5}$

Q30

The coefficient of x^7 in the expansion of $\left(1-x-x^2+x^3\right)^6$ is

1) 132 2) 144 3) – 132 4) – 144

Q31

The sum of last eight coefficients in the expansion of $(1+x)^{15}$ is

1) 2^{16} 2) 2^{15} 3) 2^{14} 4) 2^7

Q32

The two successive terms in the expansion of $(1+x)^{24}$ whose coefficients are in the ratio $\frac{1}{4}$ are

1) 3rd and 4th 2) 4th and 5th 3) 5th and 6th 4) 6th and 7th

Q33

If the coefficient of 4th term in the expansion of $\left(x+\frac{\propto}{2x}\right)^n$ is 20 then the respective values of $\propto$ and n are

1) 2, 7 2) 5, 8 3) 3, 6 4) 2, 6

Q34

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

1) ${}^{20}C_{12}\frac{1}{2^{12}}x^2$ 2) $-\frac{1}{2^{13}}\ {}^{20}C_7x$ 3) ${}^{20}C_{14}\frac{1}{2^{14}}x$ 4) ${}^{20}C_{13}\frac{1}{2^{12}}x$

Q35

The 7th term in $\left(\frac{1}{y}+y^2\right)^{10}$ when expanded in descending powers of y is

1) $\frac{210}{y^2}$ 2) $\frac{y^2}{210}$ 3) $210y^2$ 4) $187y^2$

Q36

If the rth term in the expansion of $\left(\frac{x}{3}-\frac{2}{x^2}\right)^{10}$ contains x^4, then r =

1) 2 2) 3 3) 4 4) 5

Q37

The 11^{th} term in the expansion of $\left(x+\frac{1}{\sqrt{x}}\right)^{14}$ is

1) 1 2) $\frac{999}{x}$ 3) $\frac{x}{1001}$ 4) $\frac{1001}{x}$

Q38

The value of ${}^{10}C_1 + {}^{10}C_2 + {}^{10}C_3 + \ldots\ldots + {}^{10}C_9$ is

1) $2^{10}-1$ 2) 2^{10} 3) 2^{11} 4) $2^{10}-2$

Q39

The middle term of expansion of $\left(\frac{10}{x}+\frac{x}{10}\right)^{10}$

1) ${}^{9}C_5$ 2) ${}^{7}C_5$ 3) ${}^{10}C_5$ 4) ${}^{8}C_5$

Q40

In the binomial expansion of $(1+x)^{15}$, the coefficients of x^r and x^{r+3} are equal, then r =

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

Q41

If ${}^{n}C_1 + 2\,{}^{n}C_2 + \ldots\ldots\ldots + n\,{}^{n}C_n = 2n^2$ then n =

1) 4 2) 7 3) 3 4) 1

Q42

The 6^{th} term from the end of the expansion of $\left(3x-\frac{1}{x^2}\right)^{10}$ is

1) ${}^{10}C_5 3^5 \frac{1}{x^5}$ 2) $-{}^{10}C_5 3^5 \frac{1}{x^5}$ 3) ${}^{10}C_4 3^4 \frac{1}{x^6}$ 4) $-{}^{10}C_4 3^4 \frac{1}{x^6}$

Q43

The middle term of $\left(\frac{1}{x}+x\sin x\right)^{10}$ is equal to $7\frac{7}{8}$ then the value of x is

1) $2n\pi+\frac{\pi}{6}$ 2) $n\pi+\frac{\pi}{6}$ 3) $n\pi+(-1)^n\frac{\pi}{6}$ 4) $n\pi+(-1)^n\frac{\pi}{3}$

Q44

If the term independent of x in the expansion of $\left(\sqrt{x}-\frac{k}{x^2}\right)^{10}$ is 405, then k =

1) – 3 2) 3 3) 3 or – 3 4) 10

Q45

If the coefficients of $r^{th}, (r+1)^{th}$ and $(r+2)^{th}$ terms in the expansion of $(1+x)^{14}$ are in AP then r =

1) 5, 9 2) 6, 9 3) 7, 9 4) 8, 9

Q46

The number of terms in $(x+a)^{75}-(x-a)^{75}$ is

1) 36 2) 38 3) 37 4) 150

Q47

The median of the variables, x+4, x-$\frac{7}{2}$, x-$\frac{5}{2}$, x-3, x-2, x+$\frac{1}{2}$, x-$\frac{1}{2}$, x+5, (x>0) is,

1) x-3 2) x-2 3) x+$\frac{5}{4}$ 4) x-$\frac{5}{4}$

Q48

The mean of 100 observations is 50 and their standard deviation is 5. The sum of all squares of all the observations is

1) 50000 2) 250000 3) 252500 4) 255000

Q49

A class of 30 boys and 15 girls is given a test in mathematics. The average mark obtained by boys is 15 and by girls is 6. The average of whole class is,

1) 10.5 2) 12 3) 4.5 4) none of these

Q50

The median of a series is 10. Two additional observations 7 and 20 are added to series. The median of new series is,

1) 9 2) 20 3) 7 4) 10

Q51

The mean of ‘n’ items is $\bar{x}$. If first item is increased by 1, second item by 2 and so on, then the new mean is,

1) $\bar{x}+\frac{n+1}{2}$ 2) $\bar{x}+\frac{n}{2}$ 3) $\bar{x}$ +n 4) $\bar{x}+\frac{n-1}{2}$

Q52

The average weight of a class of 14 students is 42kg., if the teacher is included, the average weight increased by 400g. Then weight of teacher is,

1) 52 2) 48 3) 46 4) 54

Q53

Let x_1, x_2, x_3, x_4, x_5 be the observations with mean m and standard deviation s . The standard deviation of the observations $kx_1, kx_2, kx_3, kx_4, kx_5$ is

1) $k+s$ 2) $\frac{s}{k}$ 3) ks 4) s

Q54

The sum of square of deviation for 10 observations taken from mean 50 is 250. The co-efficient of variation is,

1) 50 2) 10 3) 30 4) 40

Q55

The standard deviation of the set of first ‘n’ natural number is,

1) $\frac{\sqrt{n^2-1}}{4n}$ 2) $\frac{\sqrt{n^2+1}}{4n}$ 3) $\frac{\sqrt{n^2+1}}{2n}$ 4) $\sqrt{\frac{\left(n^2-1\right)}{12}}$

Q56

The co-efficient of variation of two series are 70 and 90 and their standard deviations are 17.5 and 18 respectively. The mean of two series are,

1) 25, 20 2) 18, 22 3) 22, 18 4) 16, 24

Q57

In a series of 2n observations, half of them equal “a” and remains half equal to “-a”. If the standard deviation of the observation is 2 then |a| equals

1) $\frac{\sqrt{2}}{n}$ 2) $\sqrt{2}$ 3)2 4) $\frac{1}{n}$

Q58

Mode of the data 3,2,5,2,3,5,6,6,5,3,5,2,5 is

1) 6 2) 4 3) 3 4) 5

Q59

The range of the following set of observations 2,3,5,9,8,7,6,5,7,4,3 is

1) 7 2) 11 3) 5.5 4) 6

Q60

A set of n values $x_1, x_2, \ldots\ldots\ldots\ldots x_n$ has standard deviation σ. The standard deviation of n values, $x_1 + k, x_2 + k, \ldots\ldots\ldots\ldots x_n + k$

1. σ 2. $\sigma + k$ 3. $\sigma - k$ 4. $k\sigma$

1. Ans : (1)

The $(n+1)^{th}$ term from the end

$=\left[3n-(n+1)+2\right]^{th}$ term from the beginning

$=(2n+1)^{th}$ term the beginning $\quad\Big|\quad \therefore T_{2n+1}={}^{3n}C_{2n}(x)^{n}\left(-\frac{1}{x}\right)^{2n}={}^{3n}C_{n}x^{-n}$

2. Ans : (4) Required ratio $=\frac{{}^{2n}C_n}{{}^{2n-1}C_n}=\frac{(2n)!}{n!n!}\frac{(n-1)!n!}{(2n-1)!}=\frac{2}{1}$

3. Ans : (2)

Given ${}^{10}C_{2r}={}^{10}C_{4r+4} \qquad \Rightarrow 2r+4r+4=10\Rightarrow r=1$

4. Ans : (2)

If $(r+1)^{th}$ term is independent of x is $\left(ax^{p}+\frac{b}{x^{q}}\right)^{n}$ then $r=\frac{np}{p+q}$

$$\therefore r=\frac{18\times \frac{1}{2}}{\frac{1}{2}+1}=6$$

$$T_{r+1}=T_{6+1}={}^{18}C_{6}\left(\sqrt{x}\right)^{12}\left(-\frac{2}{x}\right)^{6}={}^{18}C_{6}2^{6}$$

5. Ans : (1)

If x^m is $(r+1)^{th}$ term in $\left(ax^p + \frac{b}{x^q}\right)^n$ then $r = \frac{np-m}{p+q}$

$$r = \frac{5(2)-1}{2+1} = 3$$

$$T_{3+1} = {}^5C_3\left(x^2\right)^2\left(\frac{k}{x}\right)^3 = {}^5C_3k^3x \qquad \Rightarrow {}^5C_3k^3 = 270 \Rightarrow k = 3$$

6. Ans : (3)

The coefficients of x^7 and x^8 are equal.

$$\therefore {}^nC_7 2^{n-7}\left(\frac{x}{3}\right)^7 = {}^nC_8 2^{n-8}\left(\frac{x}{3}\right)^8 \Rightarrow n = 55$$

7. Ans : (3)

By data $T_5 = 4T_4$ and $T_4 = 6T_3$

$$\frac{T_5}{T_4} = 4 \text{ and } \frac{T_4}{T_3} = 6 \qquad \frac{n-4+1}{4}x = 4 \text{ and } \frac{n-3+1}{3}x = 6 \qquad \frac{n-3}{n-2} = \frac{8}{9} \Rightarrow n = 11$$

8. Ans : (3)

The number of terms in the expansion of $(x+a)^n - (x-a)^n = \frac{n+1}{2}$ if n is odd

9. Ans : (3)

$$\frac{T_3}{T_2}=\frac{T_4}{T_3}\Rightarrow\frac{n-2+1}{2}\frac{b}{a}=\frac{(n+3)-3+1}{3}\frac{b}{a}\qquad\Rightarrow n=5$$

10. Ans : (2)

If $r^{th},(r+1)^{th}$ and $(r+2)^{th}$ term in the expansion of $(1+x)^n$ are in AP then $n^2-(4r+1)n+4r^2=2$. Take r = 2 and solve for n.

11. Ans : (1)

Take x = 1, $a_0+a_1+a_2+\ldots\ldots+a_{2n}=1$ ----------(1)

x = - 1, $a_0-a_1+a_2-\ldots\ldots+a_{2n}=3^n$ -----------(2)

adding (1) and (2), we have

$$2(a_0+a_2+a_4+\ldots\ldots+a_{2n})=3^n+1\qquad a_0+a_2+\ldots\ldots\ldots\ldots+a_{2n}=\frac{3^n+1}{2}$$

12. Ans : (3)

We know that $(x+y)^5+(x-y)^5$

$=2\left[{}^5C_0x^5+{}^5C_2x^3y^2+{}^5C_4xy^4\right]$

$=2\left[x^5+10x^3y^2+5xy^4\right]$

$\therefore GE=2\left[x^5+10x^3(x^3-1)+5x(x^6-2x^3+1)\right]$

It is a polynomial of degree 7.

13. Ans : (4)

$$T_{21} = T_{22} \Rightarrow {}^{44}C_{20}x^{20} = {}^{44}C_{21}x^{21}$$

$$\Rightarrow \frac{1}{x} = \frac{{}^{44}C_{21}}{{}^{44}C_{20}} = \frac{44-21+1}{21} = \frac{8}{7} \Rightarrow x = \frac{7}{8}$$

14. Ans : (4)

$$\text{Middle term} = T_5 = {}^{8}C_4 x^4\left(\frac{1}{x}\sin^{-1}x\right)^4 = \frac{35\pi^4}{8}$$

$$\Rightarrow \left(\sin^{-1}x\right)^4 = \left(\frac{\pi}{2}\right)^4 \Rightarrow x = 1$$

15. Ans : (2)

We know that $(a+b)^5 + (a-b)^5 = 2\left[a^5 + 10a^3b^2 + 5ab^4\right]$

$$Z = \left(\frac{\sqrt{3}}{2} + \frac{i}{2}\right)^5 + \left(\frac{\sqrt{3}}{2} - \frac{i}{2}\right)^5$$

$$= 2\left[\left(\frac{\sqrt{3}}{2}\right)^5 + 10\left(\frac{\sqrt{3}}{2}\right)^3\left(\frac{i}{2}\right)^2 + 5\left(\frac{\sqrt{3}}{2}\right)\left(\frac{i}{2}\right)^4\right]$$

= a real number.

16. Ans : (2)

Here n = 15, p = 2, q = 1, m = 15

$$r=\frac{np-m}{p+q}=\frac{30-15}{2+1}=5, T_6={}^{15}C_5\left(x^2\right)^{10}\left(\frac{2}{x}\right)^5$$

Now n = 15, p = 2, q = 1

$$r=\frac{np}{p+q}=\frac{30}{2+1}=10, T_{11}={}^{15}C_{10}\left(x^2\right)^5\left(\frac{2}{x}\right)^{10}$$

$$\text{Re}\,quired=\frac{coefficient\ of\ T_6}{coefficient\ of\ T_{11}}=\frac{{}^{15}C_5 2^5}{{}^{15}C_{10}2^{10}}=\frac{1}{32}$$

17. Ans : (3)

Coefficient of T_7 = coefficient of T_{13}

$${}^nC_6={}^nC_{12} \qquad \Rightarrow n=6+12=18$$

18. Ans : (4)

Take $x=1,\left(1+2+3+.....+n\right)^2 \quad =\left(\frac{n(n+1)}{2}\right)^2=\sum\left(n^3\right)$

19. Ans : (3)

Take $x=1,\left(a^2-2a+1\right)^{51}=0 \qquad \therefore\left(a-1\right)^2=0\Rightarrow a=1$

20. Ans : (3)

$$G.E=(1+x)^6\frac{\left[1-(1+x)^{10}\right]}{1-(1+x)}=\frac{(1+x)^{16}-(1+x)^6}{x}$$

The coefficient of x^6 in G.E is same as the coefficient of x^7 in $(1+x)^{16}-(1+x)^6$

That is ${}^{16}C_7={}^{16}C_9$

21. Ans : (1) Take $x=y=1,(1+1)^n=4096$ $2^n=2^{12}\Rightarrow n=12$

22. Ans : (2) Required sum = ${}^{50}C_1+{}^{50}C_3+\ldots\ldots+{}^{50}C_{49}=2^{50-1}=2^{49}$

23. Ans : (4)

The number of terms in the expansion $(a+b+c)^n$ is ${}^{n+2}C_2=\frac{(n+1)(n+2)}{2}$

24. Ans : (1)

$$(1+ax)^n=1+nax+\frac{n(n-1)}{2}a^2x^2+\ldots\ldots\ldots$$

$$=1+6x+16x^2+\ldots\ldots\ldots$$

$$\Rightarrow na=6\ and\ \frac{n(n-1)}{2}a^2=16$$

$$\Rightarrow a=\frac{2}{3},n=9$$

25. Ans : (1)

$$C_0+2C_1+3C_2+\dots\dots+(n+1)C_n=(n+2)2^{n-1}=576$$

By inspection method, we get n = 7

26. Ans : (1)

$$G.E=(1+x)^n\left[\frac{1}{x}(1+x)\right]^n=\frac{1}{x^n}(1+x)^{2n}$$

$$=\frac{1}{x^n}\left[1+{}^{2n}C_1x+{}^{2n}C_2x^2+\dots\dots+{}^{2n}C_{2n}x^{2n}\right] \qquad \therefore \text{coefficient of } x^{-n} \text{ is } 1$$

27. Ans : (3)

In $(1+\propto x)^4$, middle term $= {}^4C_2 \propto^2 x^2$

In $(1-\propto x)^6$, middle term $= -{}^6C_3 \propto^3 x^3$ $\quad \therefore {}^4C_2 \propto^2 = -{}^6C_3 \propto^3 \Rightarrow \propto = -\frac{3}{10}$

28. Ans : (2)

$$T_3={}^mC_2x^2=-\frac{1}{8}x^2 \Rightarrow {}^mC_2=-\frac{1}{8}\Rightarrow 4m^2-4m+1=0 \qquad \Rightarrow (2m-1)^2=0\Rightarrow m=\frac{1}{2}$$

29. Ans : (2)

$$T_5+T_6=0\Rightarrow {}^nC_4a^{n-4}b^4-{}^nC_5a^{n-5}b^5=0 \quad \Rightarrow \frac{a}{b}=\frac{{}^nC_5}{{}^nC_4}=\frac{n-4}{5}$$

30. Ans : (4)

$$G.E=\left[(1-x)-x^2(1-x)\right]^6=(1-x)^6\left(1-x^2\right)^6$$

$$=\left(1-6x+15x^2-20x^3+15x^4-6x^5+x^6\right)\left(1-6x^2+15x^4-20x^6....\right)$$

Coefficient of x^7 is $=(-6)(-20)+(-20)(15)+(-6)(-6)$

$$=120-300+36=-144$$

31. Ans : (3)

$$S=C_0+C_2+........+C_4=C_1+C_3+.........+C_{15}$$

$$2S=C_0+C_1+C_2+.........+C_n=2^n$$

$$S=C_0+C_1+.......+C_7=C_2+C_4+.........+C_{16}=2^{15-1}=2^{14}$$

32. Ans : (3)

$$\frac{\text{Coefficient of } T_{r+1}}{\text{Coefficient of } T_{r+2}}=\frac{^{24}C_r}{^{24}C_{r+1}}=\frac{1}{4}$$

$\therefore$ Required terms are 5th and 6th.

$$\Rightarrow \frac{r+1}{24-r}=\frac{1}{4}\Rightarrow r=4$$

33. Ans : (4)

$$T_4=T_{3+1}={}^nC_3x^{n-3}\left(\frac{\propto}{2x}\right)^3 \quad \Rightarrow {}^nC_3.\frac{\propto^3}{8}=20\Rightarrow {}^nC_3\propto^3=160$$

By inspection method $\propto=2, n=6$

34. Ans : (2)

Middle term $=T_r=T_{11}, r=11$ $\quad T_{r+3}=T_{14}={}^{20}C_{13}\left(x^2\right)^7\left(-\frac{1}{2x}\right)^{13}=-\frac{1}{2^{13}}\,{}^{20}C_7x$

35. Ans : (3)

If $\left(y^2+\frac{1}{y}\right)^{10}$ is expanded the powers of y goes on decreases.

$$\therefore T_7={}^{10}C_6\left(y^2\right)^4\left(\frac{1}{y}\right)^6={}^{10}C_6y^2={}^{10}C_4y^2=210y^2$$

36. Ans : (2)

If r^th term contains in $\left(\alpha x^p+\frac{b}{x^q}\right)^n$, then $\quad r-1=\frac{np-m}{p+q}=\frac{10(1)-4}{1+2}=2\Rightarrow r=3$

37. Ans : (4)

$$T_{11}=T_{10+1}={}^{14}C_{10}\left(x\right)^4\left(\frac{1}{\sqrt{x}}\right)^{10}=\frac{1001}{x}$$

38. Ans : (4)

$${}^{10}C_0+{}^{10}C_1+\ldots\ldots+{}^{10}C_{10}=2^{10}$$

$$\Rightarrow {}^{10}C_1+{}^{10}C_2+\ldots\ldots+{}^{10}C_9=2^{10}-\left({}^{10}C_0+{}^{10}C_{10}\right)$$

$$=2^{10}-2$$

39. Ans : (3)

Middle term = $T_6 = {}^{10}C_5\left(\frac{10}{x}\right)^5\left(\frac{x}{10}\right)^5 = {}^{10}C_5$

40. Ans : (2)

Coefficient of x^r = coefficient of x^{r+3}

$${}^{15}C_r = {}^{15}C_{r+3}$$

$$r + r + 3 = 15 \Rightarrow r = 6$$

41. Ans : (1)

$${}^nC_1 + 2\,{}^nC_2 + 3\,{}^nC_3 + \ldots\ldots n\,{}^nC_n = n2^{n-1} = 2n^2$$

$$\Rightarrow 2^{n-2} = n$$

By inspection method n = 4

42. Ans : (2)

6th term from the end = $(10-6+2)^{th}$ term from the beginning.

$$i.e., T_6 = {}^{10}C_5(3x)^5\left(-\frac{1}{x^2}\right)^5 = -{}^{10}C_5 3^5\frac{1}{x^5}$$

43. Ans : (3) The middle term = $T_6 = {}^{10}C_5\left(\frac{1}{x}\right)^5 (x\sin x)^5 = 7\frac{7}{8}$

$$\Rightarrow (\sin x)^5 = \frac{63}{8}\times\frac{1}{252} = \frac{1}{32}$$

$$\Rightarrow \sin x = \frac{1}{2} = \sin\frac{\pi}{6}$$

$$\Rightarrow x = n\pi + (-1)^n\frac{\pi}{6}$$

44. Ans : (3) $(r+1)^{th}$ term is independent of x.

$$\therefore r = \frac{np}{p+q} = \frac{10\times\frac{1}{2}}{\frac{1}{2}+2} = 2$$

$$T_3 = {}^{10}C_2\left(\sqrt{x}\right)^8\left(-\frac{K}{x^2}\right)^2 = 405$$

$$\Rightarrow K = \pm 3$$

45. Ans : (1)

Use $n^2 - (4r+1)n + 4r^2 - 2 = 0$

Take n = 14, $r^2 - 14r + 45 = 0 \Rightarrow r = 5, 9$

46. Ans : (2)

The number of terms in $(x+a)^n-(x-a)^n$ is $\frac{n+1}{2}$ if n is odd.

For $n=75, \frac{75+1}{2}=38$ terms.

47. Ans (4)

After arranging in ascending order, median$=\frac{4^{th}+5^{th}}{2}=\frac{(x-2)+\left(x-\frac{1}{2}\right)}{2}$

48. Ans(3)

$$\sigma^2=\frac{\sum x^2}{n}-(\bar{x})^2 \quad 25=\frac{\sum x^2}{100}-(50)^2$$

49. Ans: (2)

Total marks of 30 boys=30 x 15 =450

Total marks of 15 girls=6 x 15 =90

Total marks of 45 students=540

Average=12

50. Ans(4)

Median remains the same as one number is added to the left and another to the right.

51. Ans: (1)

$$\bar{x} = \frac{x_1 + x_2 + \cdots + x_n}{n} = \frac{(x_1 + 1) + (x_2 + 2) + \cdots + (x_n + n)}{n}$$

$$= \frac{x_1 + x_2 + \cdots + x_n}{n} + \frac{1 + 2 + \cdots + n}{n} = \bar{x} + \sum n$$

52. Ans: (2)

x-total number of students, y-teacher

$\frac{x}{14} = 42 \Rightarrow x = 588;$ $\quad \frac{588+y}{15} = 42 + 0.4 \Rightarrow y = 48$

53. Ans: (4)

54. Ans: (2)

$$C.V. = \frac{\sigma}{\mu} x\, 100$$

$$\sigma = \sqrt{\left(\frac{\sum x^2}{10}\right) + \mu^2 - \mu\left(\frac{\sum x}{10}\right)} = \sqrt{\frac{250}{10} + 2500 - 2500} = 5 \Rightarrow C.V. = \frac{5}{50} x\, 100$$

55. Ans: (4)

56. Ans: (1)

$$C.V = \frac{\sigma}{\bar{x}} \times 100 \Rightarrow 70 = \frac{17.5}{\bar{x}} \times 100 \text{ and } 90 = \frac{18}{\bar{x}} \times 100$$

57. Ans: (2)

a, a, …, n times and –a, -a, ….,n times, therefore mean=0

$$S.D. = \sqrt{\frac{n(a-0)^2+n(-a-0)^2}{2n}} \Rightarrow 2 = \sqrt{\frac{2na^2}{2n}}$$

58. Ans: (4)

59. Ans: (1) Range=highest-lowest

60. Ans: (1)