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$$\left(x^2+\frac{1}{x^2}+2\right)^n=\left(\left(x+\frac{1}{x}\right)^2\right)^n=\left(x+\frac{1}{x}\right)^{2n} \text{ का MT.}$$

$$= T_{n+1} = {}^{2n}C_n = \frac{\lfloor 2n}{(\lfloor n)^2}$$

(66)

Error.

$$\left(\frac{2}{5^{\log_5\sqrt{4^x+44}}}+\frac{1}{5^{-\log_5\sqrt[3]{2^{x-1}+7}}}\right)^8$$

$$\left(5^{\frac{2}{\log_5\sqrt{4^x+44}}}\right)$$

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Q 9 $\left(x^3+3\cdot 2^{-\log_{\sqrt{2}}\sqrt{x^3}}\right)^{11}$

$\left(x^3+3\cdot 2^{-\log_{2^{1/2}} x^{3/2}}\right)$

$x^3+3\cdot 2^{-2\log_2 x^{3/2}}$

$x^3+3\cdot \cancel{2}^{\cancel{\log_2}(x^{3/2})^{-2}}$

$x^3+3\cdot x^{-3}$

$\left(x^3+\frac{3}{x^3}\right)^{11}$

Note:

(14) Middle term in Exp of $\left(x+\frac{1}{2x}\right)^{2n}$ is

Mid T $= T_{\frac{2n+2}{2}} = T_{n+1} = {}^{2n}C_n\,(x)^{\cancel{n}}\left(\frac{1}{2\cancel{x}}\right)^n$

$= \boxed{{}^{2n}C_n}\,\frac{1}{2^n}$

$= \frac{1\cdot 3\cdot 5\ldots(2n-1)}{\lfloor n}\cdot \cancel{2^n}\times\frac{1}{\cancel{2^n}}$

Q 15. $(1+\alpha x)^4$, $(1-\alpha x)^6$

$T_{\frac{4+2}{2}}$ $T_{\frac{6+2}{2}}$

T_3 T_4

${}^4C_2(\alpha x)^2$ | ${}^6C_3(-\alpha x)^3$

$10\cdot\alpha^2=-20\alpha^3$

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Q4 $\left(2^{1/4}+3^{-1/4}\right)^{n}$

$$\text{Ratio}=\left(\frac{2^{1/4}}{3^{-1/4}}\right)^{n-8}=\frac{\sqrt{6}}{1}$$

$$(6)^{\frac{n-8}{4}}=(6)^{1/2}$$

$$\frac{n-8}{2\cancel{4}}=\frac{1}{\cancel{2}}$$

$$n-8=2$$

$$n=0$$

$\left(ax^2+\frac{1}{bx}\right)^{11}$ $\quad$ $\left(ax-\frac{1}{bx^2}\right)^{11}$

Coff of x^7 $\quad$ Coff of x^{-7}

$\alpha=2, \beta=-1, n=11$ $\quad$ $\alpha=1, \beta=2, n=11$

$m=7$ $\quad$ $m=-7$

$r=\frac{22-7}{3}$ $\quad$ $r=\frac{11\times1+7}{3}$

$=5$ $\quad$ $r=6$

$$T_{r+1}=\cancel{{}^{11}C_5}\frac{\cancel{(a)^6}}{\cancel{(b)^5}}=\cancel{{}^{11}C_6}\frac{\cancel{(a)^5}}{\cancel{(-1)^6}\,b^6}$$

$ab=1$

Q8 $\alpha=\frac{2}{3}, \beta=\frac{1}{2}$

$n=30, m=13.$

$$r=\frac{20-13}{\frac{2}{3}+\frac{1}{2}}$$

$$=\frac{7}{\frac{\cancel{4+3}}{6}}=6$$

$\text{Coff}={}^{30}C_6(-1)^6$

$\div$ B, $\underline{1}$, D

Q1. Coff of x^7 & x^8 in $\left(2+\frac{x}{3}\right)^n$.

$$T_{r+1} = {}^nC_r\,(2)^{n-r}\left(\frac{x}{3}\right)^r$$

$$= {}^nC_r \cdot (2)^{n-r} \cdot 3^{-r} \cdot (x)^r \quad \begin{matrix} r=7 \\ r=8 \end{matrix}$$

Coff x^7 Coff of x^8

$$\frac{{}^nC_7 \cdot \overset{2}{\cancel{(2)^{n-7}}}}{\cancel{3^7}} = \frac{{}^nC_8 \cdot \cancel{(2)^{n-8}}}{\cancel{3^8}\,3}$$

$$\frac{{}^nC_7}{{}^nC_8} = \frac{1}{6}.$$

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B.T.

Q Sum of real values of x for which

Mains

middle term in $\left(\frac{x^3}{3}+\frac{3}{x}\right)^8$ equals 5670?

$n = 8$ Even.

$M.T. = T_{\frac{8+2}{2}} = T_5 = {}^8C_4\left(\frac{x^3}{3}\right)^4\left(\frac{3}{x}\right)^4$

$= {}^8C_4 \cdot x^{12-4}$

$= \frac{\cancel{8}\cdot 7\cdot \cancel{6}^{2}\cdot 5}{1\cdot \cancel{2}\cdot \cancel{3}\cdot \cancel{4}} \quad x^8 = 5670$

$\cancel{70}x^8 = \cancel{5670}^{81}$

$x^4 = 9 \Rightarrow x^2 = 3 \rightarrow x = \pm\sqrt{3}$.

Sum of root $= \sqrt{3} + -\sqrt{3} = 0$

Q Ratio of 5th term form Beginning & end in

Bin. Exp. of $\left(2^{\frac{1}{3}}+\frac{1}{2\cdot 3^{1/3}}\right)^{10}$ is?

$r = 4$

Ratio $= \left(\frac{x}{a}\right)^{n-2r}$

$= \left(\frac{2^{1/3}}{\frac{1}{2\cdot 3^{1/3}}}\right)^{10-8} = \left(2\cdot 6^{1/3}\right)^2 = 4\cdot 6^{2/3}$

$= 4\cdot(36)^{1/3} : 1$ Ans

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N G T. ≡ Numerically Greatest term. → $\pm$ हटाकर

let T_{r+1}'th term is NGT

$$\underbrace{|T_r| \le |T_{r+1}|} \ge |T_{r+2}|$$

$|T_{r+1}| \ge |T_r|$

$$\left|\frac{T_{r+1}}{T_r}\right| \ge 1$$

$$\left|\frac{{}^nC_r \cdot \cancel{(x)^{n-r}} \cdot \cancel{a^r}\, a}{{}^nC_{r-1}\, \cancel{(x)^{n-r+1}}\, x \cdot \cancel{a^{r-1}}}\right| \ge 1$$

$$\frac{{}^nC_r}{{}^nC_{r-1}} \cdot \frac{1}{\left|\frac{x}{a}\right|} \ge 1$$

$$\frac{n-r+1}{r} \ge \left|\frac{x}{a}\right|$$

$$n-r+1 \ge r\left|\frac{x}{a}\right|$$

$$n+1 \ge r\left(1+\left|\frac{x}{a}\right|\right)$$

$$r \le \frac{n+1}{1+\left|\frac{x}{a}\right|}$$

$|T_{r+2}| \ge |T_{r+1}|$

$$\left|\frac{T_{r+2}}{T_{r+1}}\right| \ge 1$$

$$\downarrow$$

$$r \ge \frac{n+1}{1+\left|\frac{x}{a}\right|} - 1$$

$$\boxed{\frac{n+1}{1+\left|\frac{x}{a}\right|} - 1 \le r \le \frac{n+1}{1+\left|\frac{x}{a}\right|}}$$

Q Find N.G.T. in $(1+4x)^8$ when $x = \frac{1}{3}$?

$(x+a)^n$

$x = 1$

$a = 4x$

let T_{r+1} is N.G.T.

$$r \le \frac{n+1}{1+\left|\frac{x}{a}\right|} \Rightarrow r \le \frac{8+1}{1+\left|\frac{1}{4/3}\right|}$$

$$r \le \frac{9}{1+\frac{3}{4}} \Rightarrow r \le \frac{9\times 4}{7}$$

$$r \le \frac{36}{7}$$

$$r \le 5.1$$

$\boxed{r = 5}$ T_6 is NGT

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$$\frac{1}{\sqrt{4x+1}}\left[\left(\frac{1}{2}+\frac{\sqrt{4x+1}}{2}\right)^7-\left(\frac{1}{2}-\frac{\sqrt{4x+1}}{2}\right)^7\right]$$

$(A+B)^7 \quad (A-B)^7$

$T_2 \quad T_4 \quad T_6 \quad T_7 \quad T_8$

$$(A+B)^7 = {}^7C_0\cdot A^7 + {}^7C_1\cdot A^6B^1 + {}^7C_2A^5B^2 + {}^7C_3A^4B^3 + {}^7C_4A^3B^4 - - \quad -$$

$$(A-B)^7 = {}^7C_0\cdot A^7 - {}^7C_1A^6B^1 + {}^7C_2A^5B^2 - {}^7C_3\cdot A^4B^3 + {}^7C_4A^3B^4 - - \quad -$$

$- \quad - \quad + \quad - \quad + \quad -$

$$(A+B)^7-(A-B)^7 = 2\left[T_2+T_4+T_6+T_8\right]$$

$$2\times {}^7C_7\cdot\left(\tfrac{1}{2}\right)^0\left(\frac{\sqrt{4x+1}}{2}\right)^7$$

$$+\ 2\times\frac{(4x+1)^3\cdot\sqrt{4x+1}}{8}$$

top

Deg of N $= \underline{\underline{3}}$

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$(3-2)^9$

Q Find NGT. in $(3-2x)^9$ When $x=1$.

$$r \le \frac{9+1}{1+\left|\frac{3}{-2\times 1}\right|}$$

$$r \le \frac{10}{1+3/2}$$

$$r \le \frac{20}{5}$$

$$r \le 4$$

$r=4$ & $r=3$

T_5 & T_4 both are NGT

Explaination of NGT.

Ex.

$$(2+3)^5 = {}^5C_0 2^5 + {}^5C_1 \cdot 2^4 \cdot 3 + {}^5C_2 \cdot 2^3 \cdot 3^2 + {}^5C_3 \cdot 2^2 \cdot 3^3 + {}^5C_4 \cdot 2 \cdot 3^4 + {}^5C_5 \cdot 3^5$$

$$= 32 + 240 + \boxed{720} \boxed{+\boxed{1080}} + 810 + 243.$$

2MT $\rightarrow T_{\frac{5+1}{2}}, T_{\frac{5+3}{2}}$

T_3, T_4

$$(4-2)^6 = {}^6C_0 \cdot 4^6 - {}^6C_1 4^5 \cdot 2 + {}^6C_2 4^4 2^2 - {}^6C_3 4^3 \cdot 2^3 + {}^6C_4 (4)^2 (2)^4 - {}^6C_5 4 \cdot 2^5 + {}^6C_6 2^6$$

$$= 4096 - 12288 + \boxed{15360} - \boxed{10240} + 3840 - 768 + 64$$

NGT. MT

$MT = T_{\frac{6+2}{2}} = T_4$

2 Qs Bnte hain
- → Greatest Bin. Coff: M.T. of Bi Coff
- → Greatest Term: NGT.

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$(a+x)^n = {}^nC_0 a^n + {}^nC_1 a^{n-1} x + {}^nC_2 a^{n-2} x^2 + {}^nC_3 a^{n-3} x^3 + \dots = \underbrace{(T_1+T_3+T_5 \dots)}_{P}^{\text{odd}} + \underbrace{(T_2+T_4+T_6 \dots)}_{Q}^{\text{Even}}$

(T_1, T_2, T_3, T_4)

Q Find value of n for which 6th term is N.G.T. in $\left(\frac{3}{2}+\frac{x}{3}\right)^n$ when $x=\frac{1}{2}$.

$r=5$

$$\frac{n+1}{1+\left|\frac{x}{a}\right|}-1 \le r \le \frac{n+1}{1+\left|\frac{x}{a}\right|}$$

$$\frac{n+1}{1+\left|\frac{3/2}{1/6 \cdot 3}\right|}-1 \le 5 \le \frac{n+1}{1+\left|\frac{3/2}{1/6 \cdot 3}\right|}$$

$$\frac{n+1}{10}-1 \le 5 \le \frac{n+1}{10}$$

$\frac{n+1}{10} \le 6$, $n \le 59$ | $n+1 \ge 50$, $n \ge 49$

$49 \le n \le 59 \Rightarrow \{49, 50, 51, 52, \dots 58, 59\}$

** $(a+x)^n \pm (a-x)^n$ type Qs. ($P+Q$, $P-Q$)

$$(a+x)^n = {}^nC_0 a^n + {}^nC_1 a^{n-1} x + {}^nC_2 a^{n-2} x^2 + {}^nC_3 a^{n-3} x^3 + \dots$$

$$(a-x)^n = {}^nC_0 a^n - {}^nC_1 a^{n-1} x + {}^nC_2 a^{n-2} x^2 - {}^nC_3 a^{n-3} x^3 + \dots$$

A) $(a+x)^n + (a-x)^n = 2[T_1+T_3+T_5 \dots] = 2P$

B) $(a+x)^n - (a-x)^n = 2[T_2+T_4+T_6 \dots] = 2Q$

Q In Exp of $(a+x)^n$ if sum of odd terms is P & Sum of Even term in Q then select following correct

~~A)~~ $P^2-Q^2 = (a^2-x^2)^n = (a+x)^n (a-x)^n = (P+Q)(P-Q)$ (RHS)

~~B)~~ $4PQ = (a+x)^{2n} - (a-x)^{2n} = ((a+x)^n)^2 - ((a-x)^n)^2 = (P+Q)^2 - (P-Q)^2$

~~C)~~ $2(P^2+Q^2) = (a+x)^{2n} + (a-x)^{2n} = ((a+x)^n)^2 + ((a-x)^n)^2 = (P+Q)^2 + (P-Q)^2 = 2(P^2+Q^2)$

~~D)~~ $2PQ = (a+x)^{2n} - (a-x)^{2n}$