CHAPTER-8

BINOMIAL THEOREMS

04 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	Expand $(x+1/x)^6$	4
2.	Find the coefficient of a^5b^7 in $(a-2b)^{12}$	4
3.	Expand using binomial theorem: $\left(1+\frac{x}{3}-\frac{3}{x}\right)^4, x \neq 0$	4
4.	The coefficient of $(r-1)^{\text{th}}$ and $(2r-5)^{\text{th}}$ terms in the expansion of $\left(\frac{x}{y}+\frac{z}{t}\right)^{10}$ are equal find r and the value of $(r+2)$th term.	4
5.	If the coefficients of 2^{nd},3^{rd},4^{th} terms in the expansion of $(1+x)^n, n\epsilon N$,are in A.P.then find the value of n.	4
6.	Write first three terms in the expansion of $(3+ax)^9$ .Find a, if the coefficients of x^2, x^3 in the expansion of $(3+ax)^9$ are equal	4
7.	Find the coefficients of x^4 *and* x^5 in $(1+2x)^6(1-x)^7$	4
8.	If P be the sum of odd terms and Q that of even terms in the expansion of $(x+y)^n$ then prove that $(x^2-y^2)=P^2-Q^2$	4
9.	In the expansion of (x + a) n if the sum of odd terms is denoted by O and the sum of even term by E. Then prove that (i) $O^2 - E^2 = (x^2 - a^2)^n$ (ii) $4OE = (x + a)^{2n} - (x - a)^{2n}$	4
10.	If p is a real number and if the middle term in the expansion of $\left(2+\frac{p}{2}\right)^8$ is 1120, find p	4

ANSWERS:

Q. NO	ANSWER	MARKS
1.	$\left(x+\frac{1}{x}\right)^6 = ({}^6C_0x^6)+\left({}^6C_1x^5\cdot\frac{1}{x}\right)+\left({}^6C_2x^4\cdot\frac{1}{x^2}\right)+$ $\left({}^6C_3x^3\cdot\frac{1}{x^3}\right)+\left({}^6C_4x^2\cdot\frac{1}{x^4}\right)+\left({}^6C_5x^1\cdot\frac{1}{x^5}\right)$ $+\left({}^6C_6\cdot\frac{1}{x^6}\right)$ $= x^6+6\cdot x^5\cdot\frac{1}{x}+15x^4\cdot\frac{1}{x^2}+20x^3\cdot\frac{1}{x^3}+15x^2\cdot\frac{1}{x^4}$ $+6x\cdot\frac{1}{x^5}+\frac{1}{x^6}$ $= x^6+6x^4+15x^2+20+\frac{15}{x^2}+\frac{6}{x^4}+\frac{1}{x^6}$	4
2.	$T_{r+1} = {}^{12}C_r(a)^{12-r}\cdot(-2\mathrm{b})^r$ Put 12-r = 5 = $r = 7$ $T_8 = {}^{12}C_7(a)^5\cdot(-2b)^7$ $= {}^{12}C_7a^5\cdot(-2)^7\cdot b^7$ $= {}^{12}c_7(-2)^7a^5b^7$ coefficient of a^5b^7 is ${}^{12}C_7(-2)^7$	4
3.	$\left(1+\frac{x}{3}-\frac{3}{x}\right)^4=\left[\left(1+\frac{x}{3}\right)-\frac{3}{x}\right]^4$ $=4_{C_0}\left(1+\frac{x}{3}\right)^4\left(\frac{3}{x}\right)^0-4_{C_1}\left(1+\frac{x}{3}\right)^3\left(\frac{3}{x}\right)^1+4_{C_2}\left(1+\frac{x}{3}\right)^2\left(\frac{3}{x}\right)^2-$ $4_{C_3}\left(1+\frac{x}{3}\right)^1\left(\frac{3}{x}\right)^3+4_{C_4}\left(1+\frac{x}{3}\right)^0\left(\frac{3}{x}\right)^4$ $=\left(1+\frac{x}{3}\right)^4-4\left(1+\frac{x}{3}\right)^3\left(\frac{3}{x}\right)^1+6\left(1+\frac{x}{3}\right)^2\left(\frac{3}{x}\right)^2-4\left(1+\frac{x}{3}\right)^1\left(\frac{3}{x}\right)^3+$ $\left(\frac{3}{x}\right)^4$ $=\left(\frac{x}{3}\right)^0+4\left(\frac{x}{3}\right)^1+6\left(\frac{x}{3}\right)^2+4\left(\frac{x}{3}\right)^3+\left(\frac{x}{3}\right)^4-4\left(\frac{3}{x}\right)\left[\left(\frac{x}{3}\right)^0+3\left(\frac{x}{3}\right)^1+\right.$ $\left.3\left(\frac{x}{3}\right)^2+\left(\frac{x}{3}\right)^3\right]+6\left(\frac{9}{x^2}\right)\left[\left(\frac{x}{3}\right)^0+2\left(\frac{x}{3}\right)^1+\left(\frac{x}{3}\right)^2\right]-4\left(\frac{27}{x^3}\right)\left(1+\frac{x}{3}\right)+\frac{81}{x^4}$ $=1+\frac{4x}{3}+\frac{2x^2}{3}+\frac{4x^3}{27}+\frac{x^4}{81}-\frac{12}{x}-12-4x-\frac{4x^2}{9}+\frac{54}{x^2}+\frac{36}{x}+6-\frac{108}{x^3}-$ $\frac{36}{x^2}+\frac{81}{x^4}$ $=-5-\frac{8x}{3}+\frac{2x^2}{3}+\frac{4x^3}{27}+\frac{x^4}{81}+\frac{24}{x}+\frac{18}{x^2}-\frac{108}{x^3}+\frac{81}{x^4}$	4
4.	Coefficient of $T_{r-4}=10_{C_{r-5}}$ Coefficient of $T_{2r-8}=10_{C_{2r-9}}$	4

	As coefficient are equal $10_{C_{r-5}} = 10_{C_{2r-9}}$ Thus, $r-2=2r-6 \Longrightarrow r=4$ $(r+2)$th term = 6^{th} term $T_6 = 10_{C_5}\left(\frac{x}{y}\right)^5\left(\frac{z}{t}\right)^5$	
5.	Given,C(n,1),C(n,2),C(n,3) are in A.P. So,2C(n,2)=C(n,1)+C(n,3) And, n(n-1)= n+n(n-1)(n-2)/6 Solving,n=7	4
6.	$(3+ax)^9 = 3^9 + C(9,1)3^8(ax) + C(n,2)3^7(ax)^2 + \cdots \ldots\ldots + (ax)^9$ A/Q $C(n,2)3^7(ax)^2 = C(n,3)3^6(ax)^3$ And $a=\frac{9}{7}$	4
7.	Coefficient of x^4 is -5 , coefficient of x^5 is 171	4
8.	proof	4
9.	i) $(x^2-a^2)^n$ ii) $[(x+a)^{2n}-(x-a)^{2n}]$	4
10.	± 2	4