CHAPTER-8
BINOMIAL THEOREMS
02 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	Write the general term $(x^2 - y)^6$.	2
2.	When n is a positive integer, the no. of terms is the expansion of $(x + a)^n$is?	2
3.	In the expansion of $\left(x + \frac{1}{x}\right)^6$. Find the 3rd term from the end.	2
4.	Find the coefficient of x^5 in $(x + 3)^9$.	2
5.	Find the no. of terms in the expansion of $(1 - 2x + x^2)^7$	2
6.	Compute $(96)^4$ using binomial theorem	2
7.	If x is the number of terms in $(m^2 + 2mn + n^2)^8$, then find the sum of prime factors of x	2
8.	The 3rd term in the expansion of $\left(\frac{x}{3} + \frac{1}{x}\right)^5$ is $\frac{a}{b}$x, then find a+b	2
9.	Find the ratio of the first and last term of the expansion $\left(\sqrt[3]{2} + \frac{1}{\sqrt[3]{3}}\right)^{3n}$	2
10.	The number of terms in the expansion of $(x + 2y + 3z)^5$ is 7k, find k	2
11.	In the expansion of $(1 + a)^{15}$,prove that coefficient a^6,a^9 are equal.	2
12.	Find a positive value of m for which the coefficient of x^3 in the expansion of $(1 + x)^m$ is 35.	2
13.	Using binomial theorem, find 11^5 .	2
14.	Expanding $(x - \frac{1}{x})^6$,find the term which lies exactly at the middle of the expansion.	2
15.	Using binomial theorem indicate which number is larger $(1.1)^{10000}$ or 1000 ?	2
16.	Expand $(x^2 + 2a)^5$ using binomial theorem	2
17.	Expand using binomial theorem $\left(x^2 + \frac{2}{x}\right)^4$ $x \neq 0$	2
18.	Find the number of terms in the expansion of $(\sqrt{x} + \sqrt{y})^{10} + (\sqrt{x} - \sqrt{y})^{10}$	2
19.	Prove that $\sum_{r=0}^{n} {}^{n}C_{r} 3^r = 4^r$	2
20.	The first three terms in the expansion of $(1 + ax)^n$ are $1 + 12x + 64x^2$. Find n and a	2

21.	Compute $(102)^4$	2
22.	Using binomial theorem, prove that $6^n - 5n$ always leaves remainder 1 when divided by 25.	2
23.	Find $(\alpha + \beta)^4 - (\alpha - \beta)^4$.	2
24.	Expand the following $(1 - x + x^2)^4$	2
25.	Find the greatest term in the expansion of $\sqrt{3}\left(1 + \frac{1}{\sqrt{3}}\right)^{20}$.	2
26.	Expand the expression $(1-3x)^5$ using binomial theorem.	2
27.	Demonstrate how the expression $(x^2 + 1)^5$ can be expanded by the help of binomial theorem.	2
28.	Evaluate using Binomial theorem : $(95)^3$	2
29.	Evaluate : $(\sqrt{2} + 1)^5 + (\sqrt{2} - 1)^5$	2

ANSWERS:

Q. NO	ANSWER	MARKS
1.	$T^{r+1} = {}^6C_r(x^2)^{6-r}(-y)^r$ $= {}^6C_r(x)^{12-2r}(-1)^r \cdot y^r.$	2
2.	The no. of terms in the expansion of $(x+a)^n$ is one more than the index n i.e $(n+1)$	2
3.	3rd term form end = $(6-3+2)^{\text{th}}$ term from beginning $T_5 = {}^6C_4 x^{6-4}\left(\frac{1}{x}\right)^4$ $= {}^6C_4 x^2 x^{-4}$ $= 15x^{-2} = 15/x^2.$	2
4.	$T_{r+1} = {}^9C_{\text{r}}(x)^{9-\text{r}}3^{\text{r}}$ Put $9-r=5$ $r=4$ $T_5 = {}^9C_4x^5 3^4$ coifficient of x^5 is ${}^9\text{C}_4 3^4$	2
5.	$(1-2x+x^2)^7$ $= (x^2-2x+1)^7$ $= ((x-1)^2)^7$ $= (x-1)^{14}$ No. of term is 15.	
6.	$(96)^4 = (100-4)^4$ $= 4_{C_0}100^4 4^0 - 4_{C_1}100^3 4^1 + 4_{C_2}100^2 4^2 - 4_{C_3}100^1 4^3 + 4_{C_4}100^0 4^4$ $= 100000000 - 16000000 + 960000 - 25600 + 256$ $= 84934656$	2
7.	$(m^2+2mn+n^2)^8 = [(m+n)^2]^8 = (m+n)^{16}$ Thus, number of terms = 16+1=17=x Prime factors of 17 is 17 only Sum=17	2
8.	$T_3 = 5_{C_2}\left(\frac{x}{3}\right)^3\left(\frac{1}{x}\right)^2 = \frac{10}{27}x$ Thus, a+b=37	2
9.	Ratio = $\frac{3n_{C_0}\left(\sqrt[3]{2}\right)^{3n}}{3n_{C_{3n}}\left(\frac{1}{\sqrt[3]{3}}\right)^{3n}} = \frac{6^n}{1}$ Ratio = $6^n : 1$	2
10.	The number of terms in the expansion of $(x+2y+3z)^5$ $= \frac{(5+1)(5+2)}{2}$	2

	$= 21$ $7k = 21$ K=3	
11.	The coefficient of $a^6 = C(15,6)$ The coefficient of $a^9 = C(15,9)$ And $C(15,6)$= $C(15,9)$ as C(n,r)=C(n,n-r)	2
12.	C(m,3)=35 So,m(m-1)(m-2)=210 And m(m-1)(m-2)=7.6.5 Hence,m=7	2
13.	$(10+1)^5 = 10^5 + 5.10^4 + 10.10^3 + 10.10^2 + 5.10^1 + 1$=161051	2
14.	$(x - \frac{1}{x})^6 = x^6 - 6x^4 + 15x^2 - 20 + 15\frac{1}{x^2} - 6\frac{1}{x^4} + \frac{1}{x^6}$ So,the middle term is -20	2
15.	$(1.1)^{10000}$=$(1+0.1)^{10000}$=1+C(10000,1)(.01)+ positive numbers=1001+positive numbers >1000	2
16.	$x^{10} + 10x^8a + 40x^6a^2 + 80x^4a^3 + 80x^2a^4 + 32a^5$	2
17.	$x^8 + 8x^5 + 24x^2 + \frac{32}{x} + \frac{16}{x^4}$	2
18.	6terms	2
19.	$(1+3)^n = \sum_{r=0}^{n} {}^nC_r 3^r \text{ or } 4^n = \sum_{r=0}^{n} {}^nC_r 3^r$	2
20.	n = 9 , a= $\frac{4}{3}$	2
21.	108243216	2
22.	YES	2
23.	$\alpha\beta(\alpha^2 + \beta^2)$	2
24.	$1 - 4x + 10x^2 - 16x^3 + 19x^4 - 16x^5 + 10x^6 - 4x^7 + x^8$	2
25.	$T_8 = 25840/9$	2
26.	**We know that** **Considering the following elements, x = 1, y = -3x and n = 5** **$(1-3x)^5 = {}^5C_0 1^5 + {}^5C_1 1^4(-3x)^1 + {}^5C_2 1^3(-3x)^2 + {}^5C_3 1^2(-3x)^3 + {}^5C_4 1^1(-3x)^4 + {}^5C_0 1^0(-3x)^5$** **⇒ $1 - 5(3x) + 10(9x^2) - 10(27x^3) + 5(81x^4) - (243x^5)$** **⇒ $1 - 15x + 90x - 270x^3 + 405x^4 - 243x^5$** **Therefore, the expanded form of $(1-3x)^5$ is $1 - 15x + 90x - 270x^3 + 405x^4 - 243x^5$**	2
27.	**The binomial theorem formula states that:** **$(x+y)^n = nC_0x^n + nC_1x^{n-1}y + nC_2x^{n-2}y^2 + nC_3x^{n-3}y3 + …….. + nC_rx^{n-r}yr + ….. + nC_0x^0y^n$** **Here, $x = x^2$, y = 1 and n = 5**	2

	Substituting the following values of x, y and n in the above equation we get, **$\Rightarrow 5C_0(x^2)^5 + 5C1(x^2)^4 + 5C2(x^2)^3 + 5C3(x^2)^2 + 5C4(x^2)^1 + 5C5$** **$\Rightarrow x^{10} + 5.x^8 + 10.x^6 + 10.x^4 + 5.x^2 + 1$** **Therefore, the binomial expansion of $(x^2 + 1)^5$ is $x^{10} + 5x^8 + 10x^6 + 10x^4 + 5x^2 + 1$**	
28.	**Given, $(95)^3$** **95 can be expressed as the sum or difference of two numbers, and then the binomial theorem can be applied.** **The given question can be written as 95 = 100 – 5** **$(95)^3 = (100 – 5)^3$** **$= 3C0\ (100)^3 – 3C1\ (100)^2\ (5) – 3C2\ (100)\ (5)^2 – 3C3\ (5)^3$** **$= (100)^3 – 3\ (100)^2\ (5) + 3\ (100)\ (5)^2 – (5)^3$** **= 1000000 – 150000 + 7500 – 125** **= 857375**	2
29.	**Here, we can see** **$(x + y)^5 + (x – y)^5 = 2[5C_0\ x^5 + 5C_2\ x^3 y^2 + 5C_4\ xy^4]$** **= 2(x5 + 10 x3 y2 + 5xy4)** **Thus, (√2 + 1)5 + (√2 − 1)5 = $2[(\sqrt{2})^5 + 10(\sqrt{2})^3(1)^2 + 5(\sqrt{2})(1)^4]$** **= $58\sqrt{2}$**	2