

PYQSide

JEE MAIN BINOMIAL THEOREM — PYQS

Max. Marks: 132

Questions: 33

Section A (MCQ)

Q.1 If $26\left(\frac{2^3}{3}({}^{12}C_2) + \frac{2^5}{5}({}^{12}C_4) + \frac{2^7}{7}({}^{12}C_6) + \dots + \frac{2^{13}}{13}({}^{12}C_{12})\right) = 3^{13} - \alpha$, then α is equal to :

[JEE Main 2026 (Online) 8th April Evening Shift]

- (1) 45 (2) 48 (3) 51 (4) 54

Scan or tap for the full solution



Q.2 If the coefficients of the middle terms in the binomial expansions of $(1 + \alpha x)^{26}$ and $(1 - \alpha x)^{28}$, $\alpha \neq 0$, are equal, then the value of α is :

[JEE Main 2026 (Online) 6th April Morning Shift]

- (1) 1 (2) $\frac{14}{13}$ (3) $\frac{27}{7}$ (4) $\frac{7}{27}$

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Q.3 The coefficient of x^2 in the expansion of $\left(2x^2 + \frac{1}{x}\right)^{10}$, $x \neq 0$, is :

[JEE Main 2026 (Online) 5th April Evening Shift]

- (1) 3240 (2) 3360 (3) 3480 (4) 3600

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Q.4 Let the smallest value of $k \in \mathbb{N}$, for which the coefficient of x^3 in $(1 + x)^3 + (1 + x)^4 + (1 + x)^5 + \dots + (1 + x)^{99} + (1 + kx)^{100}$, $x \neq 0$, is

$\left(43n + \frac{101}{4}\right)({}^{100}C_3)$ for some $n \in \mathbb{N}$, be p . Then the value of $p + n$ is :

[JEE Main 2026 (Online) 4th April Morning Shift]

- (1) 10 (2) 11 (3) 12 (4) 13

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Q.5 In the expansion of $\left(9x - \frac{1}{3\sqrt{x}}\right)^{18}$, $x > 0$, if the term independent of x is $(221)k$, then k is equal to :

[JEE Main 2026 (Online) 4th April Evening Shift]

- (1) 84 (2) 78 (3) 168 (4) 198

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Q.6 The number of elements in the set $S = \left\{ (r, k) : k \in \mathbb{Z} \text{ and } {}^{36}C_{r+1} = \frac{6({}^{35}C_r)}{(k^2 - 3)} \right\}$, is :

[JEE Main 2026 (Online) 2nd April Morning Shift]

- (1) 2 (2) 4 (3) 8 (4) 16

Scan or tap for the full solution



Q.7 If for $3 \leq r \leq 30$, $({}^{30}C_{30-r}) + 3({}^{30}C_{31-r}) + 3({}^{30}C_{32-r}) + ({}^{30}C_{33-r}) = mC_r$, then m equals :

[JEE Main 2026 (Online) 2nd April Evening Shift]

- (1) 31 (2) 32 (3) 33 (4) 34

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Q.8 Given below are two statements :

Statement-I: $25^{13} + 20^{13} + 8^{13} + 3^{13}$ is divisible by 7.

Statement-II: The integral part of $(7 + 4\sqrt{3})^{25}$ is an odd number.

In the light of the above statements, choose the **correct answer** from the options given below :

[JEE Main 2026 (Online) 28th January Evening Shift]

- (1) Statement-I is false but Statement-II is true
(2) Both Statement-I and Statement-II are false
(3) Both Statement-I and Statement-II are true
(4) Statement-I is true but Statement-II is false

Scan or tap for the full solution



Q.9 The sum of the coefficients of x^{499} and x^{500} in $(1 + x)^{1000} + x(1 + x)^{999} + x^2(1 + x)^{998} + \dots + x^{1000}$ is :

[JEE Main 2026 (Online) 28th January Evening Shift]

- (1) ${}^{1002}C_{501}$ (2) ${}^{1001}C_{501}$ (3) ${}^{1000}C_{501}$ (4) ${}^{1002}C_{500}$

Scan or tap for the full solution



Q.10 Let $S = \frac{1}{25!} + \frac{1}{3!23!} + \frac{1}{5!21!} + \dots$ up to 13 terms. If $13S = \frac{2^k}{n!}$, $k \in \mathbb{N}$, then $n + k$ is equal to

[JEE Main 2026 (Online) 24th January Morning Shift]

- (1) 50 (2) 52 (3) 49 (4) 51

Scan or tap for the full solution



- Q.11** The sum of all possible values of $n \in \mathbb{N}$, so that the coefficients of x , x^2 and x^3 in the expansion of $(1+x^2)^2(1+x)^n$, are in arithmetic progression is :

[JEE Main 2026 (Online) 23rd January Morning Shift]

- (1) 12 (2) 9 (3) 3 (4) 7

Scan or tap for the full solution



- Q.12** The value of $\frac{{}^{100}C_{50}}{{51}} + \frac{{}^{100}C_{51}}{{52}} + \dots + \frac{{}^{100}C_{100}}{{101}}$ is:

[JEE Main 2026 (Online) 23rd January Morning Shift]

- (1) $\frac{2^{101}}{101}$ (2) $\frac{2^{100}}{101}$ (3) $\frac{2^{100}}{100}$ (4) $\frac{2^{101}}{100}$

Scan or tap for the full solution



- Q.13** The coefficient of x^{48} in $(1+x) + 2(1+x)^2 + 3(1+x)^3 + \dots + 100(1+x)^{100}$ is equal to

[JEE Main 2026 (Online) 22nd January Morning Shift]

- (1) $100 \cdot {}^{100}C_{49} - {}^{100}C_{48}$ (2) $100 \cdot {}^{101}C_{49} - {}^{101}C_{50}$
(3) ${}^{100}C_{50} + {}^{101}C_{49}$ (4) $100 \cdot {}^{100}C_{49} - {}^{100}C_{50}$

Scan or tap for the full solution



- Q.14** Let C_r denote the coefficient of x^r in the binomial expansion of $(1+x)^n$, $n \in \mathbb{N}$, $0 \leq r \leq n$. If

$$P_n = C_0 - C_1 + \frac{2^2}{3}C_2 - \frac{2^3}{4}C_3 + \dots + \frac{(-2)^n}{n+1}C_n, \text{ then the}$$

value of $\sum_{n=1}^{25} \frac{1}{P_{2n}}$ equals

[JEE Main 2026 (Online) 22nd January Evening Shift]

- (1) 675 (2) 580 (3) 525 (4) 650

Scan or tap for the full solution



- Q.15** If the coefficient of x in the expansion of $(ax^2 + bx + c)(1 - 2x)^{26}$ is -56 and the coefficients of x^2 and x^3 are both zero, then $a + b + c$ is equal to :

[JEE Main 2026 (Online) 21st January Morning Shift]

- (1) 1483 (2) 1300 (3) 1500 (4) 1403

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- Q.16** The number of integral terms in the expansion of $\left(\frac{1}{5^2} + 7^{\frac{1}{8}}\right)^{1016}$ is:

[JEE Main 2025 (Online) 8th April Evening Shift]

- (1) 127 (2) 128 (3) 130 (4) 129

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- Q.17** The remainder when $((64)^{(64)})^{(64)}$ is divided by 7 is equal to

[JEE Main 2025 (Online) 7th April Morning Shift]

- (1) 4 (2) 6 (3) 3 (4) 1

Scan or tap for the full solution



- Q.18** For an integer $n \geq 2$, if the arithmetic mean of all coefficients in the binomial expansion of $(x+y)^{2n-3}$ is 16, then the distance of the point

$P(2n-1, n^2-4n)$ from the line $x+y=8$ is

[JEE Main 2025 (Online) 4th April Morning Shift]

- (1) $\sqrt{2}$ (2) $2\sqrt{2}$ (3) $5\sqrt{2}$ (4) $3\sqrt{2}$

Scan or tap for the full solution



- Q.19** In the expansion of $\left(\sqrt[3]{2} + \frac{1}{\sqrt[3]{3}}\right)^n$, $n \in \mathbb{N}$, if the ratio of 15th term from the beginning to the 15th term from the end is $\frac{1}{6}$, then the value of ${}^nC_3$ is

[JEE Main 2025 (Online) 4th April Morning Shift]

- (1) 4960 (2) 2300 (3) 1040 (4) 4060

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- Q.20** If $1^2 \cdot ({}^{15}C_1) + 2^2 \cdot ({}^{15}C_2) + 3^2 \cdot ({}^{15}C_3) + \dots + 15^2 \cdot ({}^{15}C_{15}) = 2^m \cdot 3^n \cdot 5^k$, where $m, n, k \in \mathbb{N}$, then $m+n+k$ is equal to :

[JEE Main 2025 (Online) 4th April Evening Shift]

- (1) 20 (2) 19 (3) 18 (4) 21

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- Q.21** The sum of all rational terms in the expansion of $(2 + \sqrt{3})^8$ is :

[JEE Main 2025 (Online) 3rd April Morning Shift]

- (1) 16923 (2) 18817 (3) 3763 (4) 33845

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- Q.22** If $\sum_{r=1}^9 \left(\frac{r+3}{2^r}\right) \cdot {}^9C_r = \alpha \left(\frac{3}{2}\right)^9 - \beta$, $\alpha, \beta \in \mathbb{N}$, then $(\alpha + \beta)^2$ is equal to

[JEE Main 2025 (Online) 3rd April Morning Shift]

- (1) 27 (2) 81 (3) 18 (4) 9

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- Q.23** The term independent of x in the expansion of $\left(\frac{(x+1)}{(x^{2/3} + 1 - x^{1/3})} - \frac{(x-1)}{(x-x^{1/2})}\right)^{10}$, $x > 1$, is :

[JEE Main 2025 (Online) 2nd April Morning Shift]

- (1) 240 (2) 120 (3) 150 (4) 210

Scan or tap for the full solution



Q.24 If $\sum_{r=0}^{10} \left(\frac{10^{r+1} - 1}{10^r} \right) \cdot {}^{11}C_{r+1} = \frac{\alpha^{11} - 11^{11}}{10^{10}}$, then α is equal to :

[JEE Main 2025 (Online) 2nd April Evening Shift]

- (1) 11 (2) 20 (3) 24 (4) 15



Q.25 The least value of n for which the number of integral terms in the Binomial expansion of $(\sqrt[3]{7} + \sqrt[12]{11})^n$ is 183, is :

[JEE Main 2025 (Online) 29th January Morning Shift]

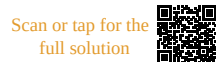
- (1) 2184 (2) 2172 (3) 2196 (4) 2148



Q.26 Let the coefficients of three consecutive terms T_r , T_{r+1} and T_{r+2} in the binomial expansion of $(a + b)^{12}$ be in a G.P. and let p be the number of all possible values of r . Let q be the sum of all rational terms in the binomial expansion of $(\sqrt[4]{3} + \sqrt[3]{4})^{12}$. Then $p + q$ is equal to:

[JEE Main 2025 (Online) 28th January Evening Shift]

- (1) 295 (2) 283 (3) 299 (4) 287



Section B (Numerical)

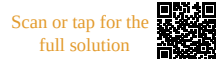
Q.27 If $(1 - x^3)^{10} = \sum_{r=0}^{10} a_r x^r (1 - x)^{30-2r}$, then $\frac{9a_9}{a_{10}}$ is equal to _____.

[JEE Main 2026 (Online) 6th April Evening Shift]



Q.28 If the sum of the coefficients of x^7 and x^{14} in the expansion of $\left(\frac{1}{x^3} - x^4 \right)^n$, $x \neq 0$, is zero, then the value of n is _____.

[JEE Main 2026 (Online) 5th April Morning Shift]



Q.29 If $\left(\frac{1}{{}^{15}C_0} + \frac{1}{{}^{15}C_1} \right) \left(\frac{1}{{}^{15}C_1} + \frac{1}{{}^{15}C_2} \right) \cdots \left(\frac{1}{{}^{15}C_{12}} + \frac{1}{{}^{15}C_{13}} \right) = \frac{\alpha^{13}}{{}^{14}C_0 {}^{14}C_1 \cdots {}^{14}C_{12}}$, then 30α is equal to _____.

[JEE Main 2026 (Online) 21st January Evening Shift]



Q.30 The product of the last two digits of $(1919)^{1919}$ is

[JEE Main 2025 (Online) 8th April Evening Shift]



Q.31 The sum of the series

$2 \times 1 \times {}^{20}C_4 - 3 \times 2 \times {}^{20}C_5 + 4 \times 3 \times {}^{20}C_6 - 5 \times 4 \times {}^{20}C_7 + \cdots + 18 \times 17 \times {}^{20}C_{20}$, is equal to _____.

[JEE Main 2025 (Online) 7th April Evening Shift]



Q.32 Let $(1 + x + x^2)^{10} = a_0 + a_1x + a_2x^2 + \cdots + a_{20}x^{20}$. If $(a_1 + a_3 + a_5 + \cdots + a_{19}) - 11a_2 = 121k$, then k is equal to _____.

[JEE Main 2025 (Online) 3rd April Evening Shift]



Q.33 If $\alpha = 1 + \sum_{r=1}^6 (-3)^{r-1} {}^{12}C_{2r-1}$, then the distance of the point $(12, \sqrt{3})$ from the line $\alpha x - \sqrt{3}y + 1 = 0$ is _____.

[JEE Main 2025 (Online) 28th January Morning Shift]



ANSWER KEY

Section A (MCQ)

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	3	4	2	2	1	2	3	3	4	3	2
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	2	2	1	4	2	4	4	2	2	2	2
Ques.	23	24	25	26							
Ans.	4	2	1	2							

Section B (Numerical)

Ques.	27	28	29	30	31	32	33
Ans.	30	21	32	63	34	239	5