

JEE MAIN BINOMIAL THEOREM — PYQS

Max. Marks: 248

Questions: 62

Section A (MCQ) — 40 questions

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

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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

Scan or tap for the full solution 

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)
- ${}^{1002}C_{500}$

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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) $\frac{2^{101}}{100}$

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- 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

Scan or tap for the full solution



- 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

Scan or tap for the full solution



- 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

Scan or tap for the full solution



- 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

Scan or tap for the full solution



- 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

Scan or tap for the full solution



- 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

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- Q.24** The remainder, when 7^{103} is divided by 23, is equal to:

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

- (1) 9 (2) 6 (3) 14 (4) 17

Scan or tap for the full solution



Q.25 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

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Q.26 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

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Q.27 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

Scan or tap for the full solution



Q.28 For some $n \neq 10$, let the coefficients of the 5th, 6th and 7th terms in the binomial expansion of $(1 + x)^{n+4}$ be in A.P. Then the largest coefficient in the expansion of $(1 + x)^{n+4}$ is:

[JEE Main 2025 (Online) 24th January Morning Shift]

- (1) 10 (2) 35 (3) 70 (4) 20

Scan or tap for the full solution



Q.29 Suppose A and B are the coefficients of 30th and 12th terms respectively in the binomial expansion of $(1 + x)^{2n-1}$. If $2A = 5B$, then n is equal to:

[JEE Main 2025 (Online) 24th January Evening Shift]

- (1) 20 (2) 19 (3) 22 (4) 21

Scan or tap for the full solution



Q.30 If in the expansion of $(1 + x)^p(1 - x)^q$, the coefficients of x and x^2 are 1 and -2 , respectively, then $p^2 + q^2$ is equal to :

[JEE Main 2025 (Online) 23rd January Evening Shift]

- (1) 8 (2) 20 (3) 13 (4) 18

Scan or tap for the full solution



Q.31 Let α , β , γ and δ be the coefficients of x^7, x^5, x^3 and x respectively in the expansion of

$$\left(x + \sqrt{x^3 - 1} \right)^5 + \left(x - \sqrt{x^3 - 1} \right)^5, \quad x > 1.$$

If u and v satisfy the equations

$$\alpha u + \beta v = 18,$$

$$\gamma u + \delta v = 20,$$

then $u + v$ equals :

[JEE Main 2025 (Online) 22nd January Evening Shift]

- (1) 4 (2) 3 (3) 5 (4) 8

Scan or tap for the full solution



Q.32 The coefficient of x^{70} in $x^2(1 + x)^{98} + x^3(1 + x)^{97} + x^4(1 + x)^{96} + \dots + x^{54}(1 + x)^{46}$ is ${}^{99}C_p - {}^{46}C_q$. Then a possible value of $p + q$ is :

[JEE Main 2024 (Online) 9th April Morning Shift]

- (1) 61 (2) 83 (3) 55 (4) 68

Scan or tap for the full solution



Q.33 The sum of the coefficients of $x^{2/3}$ and $x^{-2/5}$ in the binomial expansion of $\left(x^{2/3} + \frac{1}{2}x^{-2/5} \right)^9$ is

[JEE Main 2024 (Online) 9th April Evening Shift]

- (1) 19/4 (2) 69/16 (3) 63/16 (4) 21/4

Scan or tap for the full solution



Q.34 If the term independent of x in the expansion of $\left(\sqrt{a}x^2 + \frac{1}{2x^3} \right)^{10}$ is 105, then a^2 is equal to :

[JEE Main 2024 (Online) 8th April Evening Shift]

- (1) 6 (2) 4 (3) 2 (4) 9

Scan or tap for the full solution



Q.35 If the constant term in the expansion of $\left(\frac{\sqrt[5]{3}}{x} + \frac{2x}{\sqrt[3]{5}} \right)^{12}$, $x \neq 0$, is $\alpha \times 2^8 \times \sqrt[5]{3}$, then 25α is

equal to : [JEE Main 2024 (Online) 5th April Evening Shift]

- (1) 724 (2) 742 (3) 693 (4) 639

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Q.36 The sum of all rational terms in the expansion of $\left(\frac{1}{2^5} + 5^{\frac{1}{3}} \right)^{15}$ is equal to :

[JEE Main 2024 (Online) 4th April Morning Shift]

- (1) 633 (2) 6131 (3) 3133 (4) 931

Scan or tap for the full solution



Q.37 If the coefficients of x^4 , x^5 and x^6 in the expansion of $(1 + x)^n$ are in the arithmetic progression, then the maximum value of n is:

[JEE Main 2024 (Online) 4th April Evening Shift]

- (1) 28 (2) 21 (3) 7 (4) 14

Scan or tap for the full solution



Q.38 Let m and n be the coefficients of seventh and thirteenth terms respectively in the expansion of

$$\left(\frac{1}{3}x^{\frac{1}{3}} + \frac{1}{2x^3}\right)^{18}. \text{ Then } \left(\frac{n}{m}\right)^{\frac{1}{3}} \text{ is :}$$

[JEE Main 2024 (Online) 1st February Evening Shift]

- (1) $\frac{1}{9}$ (2) $\frac{1}{4}$ (3) $\frac{4}{9}$ (4) $\frac{9}{4}$

Scan or tap for the full solution



Q.39 Suppose $2 - p$, p , $2 - \alpha$, α are the coefficients of four consecutive terms in the expansion of $(1 + x)^n$. Then the value of $p^2 - \alpha^2 + 6\alpha + 2p$ equals

[JEE Main 2024 (Online) 30th January Evening Shift]

- (1) 8 (2) 4 (3) 6 (4) 10

Scan or tap for the full solution



Q.40 If A denotes the sum of all the coefficients in the expansion of $(1 - 3x + 10x^2)^n$ and B denotes the sum of all the coefficients in the expansion of $(1 + x^2)^n$, then :

[JEE Main 2024 (Online) 27th January Morning Shift]

- (1) $B = A^3$ (2) $3A = B$ (3) $A = 3B$ (4) $A = B^3$

Scan or tap for the full solution



Section B (Numerical) — 22 questions

Q.41 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]

Scan or tap for the full solution



Q.42 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]

Scan or tap for the full solution



Q.43 The product of the last two digits of $(1919)^{1919}$ is

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

Scan or tap for the full solution



Q.44 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]

Scan or tap for the full solution



Q.45 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]

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Q.46 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]

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Q.47 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]

Scan or tap for the full solution



Q.48 The sum of all rational terms in the expansion of $(1 + 2^{1/3} + 3^{1/2})^6$ is equal to _____.

[JEE Main 2025 (Online) 23rd January Morning Shift]

Scan or tap for the full solution



Q.49 If $\sum_{r=0}^5 \frac{{}^{11}C_{2r+1}}{2r+2} = \frac{m}{n}$, $\gcd(m, n) = 1$, then $m - n$ is equal to _____.

[JEE Main 2025 (Online) 22nd January Morning Shift]

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Q.50 If $\sum_{r=1}^{30} \frac{r^2 ({}^{30}C_r)^2}{{}^{30}C_{r-1}} = \alpha \times 2^{29}$, then α is equal to _____.

[JEE Main 2025 (Online) 22nd January Evening Shift]

Scan or tap for the full solution



Q.51 The remainder when 428^{2024} is divided by 21 is _____.

[JEE Main 2024 (Online) 9th April Morning Shift]

Scan or tap for the full solution



Q.52 Let $\alpha = \sum_{r=0}^n (4r^2 + 2r + 1)^n C_r$ and $\beta = \left(\sum_{r=0}^n \frac{n C_r}{r+1} \right) + \frac{1}{n+1}$. If $140 < \frac{2\alpha}{\beta} < 281$, then the value of n is _____.

[JEE Main 2024 (Online) 8th April Morning Shift]

Scan or tap for the full solution



Q.53 If the second, third and fourth terms in the expansion of $(x + y)^n$ are 135, 30 and $\frac{10}{3}$, respectively, then $6(n^3 + x^2 + y)$ is equal to _____.

[JEE Main 2024 (Online) 6th April Morning Shift]

Scan or tap for the full solution



Q.54 If the constant term in the expansion of $(1 + 2x - 3x^3) \left(\frac{3}{2}x^2 - \frac{1}{3x} \right)^9$ is p , then $108p$ is equal to _____.

[JEE Main 2024 (Online) 5th April Morning Shift]

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Q.55 If the coefficient of x^{30} in the expansion of $\left(1 + \frac{1}{x}\right)^6 (1 + x^2)^7 (1 - x^3)^8$; $x \neq 0$ is α , then $|\alpha|$ equals _____.

[JEE Main 2024 (Online) 1st February Morning Shift]

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Q.56 In the expansion of $(1+x)(1-x^2) \left(1 + \frac{3}{x} + \frac{3}{x^2} + \frac{1}{x^3}\right)^5$, $x \neq 0$, the sum of the coefficients of x^3 and x^{-13} is equal to _____.

[JEE Main 2024 (Online) 31st January Morning Shift]

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Q.57 Let the coefficient of x^r in the expansion of $(x+3)^{n-1} + (x+3)^{n-2}(x+2) + (x+3)^{n-3}(x+2)^2 + \dots + (x+2)^{n-1}$ be α_r . If $\sum_{r=0}^n \alpha_r = \beta^n - \gamma^n$, $\beta, \gamma \in \mathbb{N}$, then the value of $\beta^2 + \gamma^2$ equals _____.

[JEE Main 2024 (Online) 31st January Evening Shift]

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Q.58 Number of integral terms in the expansion of $\left\{ 7\left(\frac{1}{2}\right) + 11\left(\frac{1}{6}\right) \right\}^{824}$ is equal to _____.

[JEE Main 2024 (Online) 30th January Morning Shift]

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Q.59 Let $\alpha = \sum_{k=0}^n \left(\frac{{}^n C_k}{k+1} \right)$ and $\beta = \sum_{k=0}^{n-1} \left(\frac{{}^n C_k {}^n C_{k+1}}{k+2} \right)$. If $5\alpha = 6\beta$, then n equals _____.

[JEE Main 2024 (Online) 30th January Evening Shift]

Scan or tap for the full solution



Q.60 If $\frac{{}^{11}C_1}{2} + \frac{{}^{11}C_2}{3} + \dots + \frac{{}^{11}C_9}{10} = \frac{n}{m}$ with $\gcd(n, m) = 1$, then $n + m$ is equal to _____.

[JEE Main 2024 (Online) 29th January Morning Shift]

Scan or tap for the full solution



Q.61 Remainder when $64^{32^{32}}$ is divided by 9 is equal to _____.

[JEE Main 2024 (Online) 29th January Evening Shift]

Scan or tap for the full solution



Q.62 The coefficient of x^{2012} in the expansion of $(1-x)^{2008}(1+x+x^2)^{2007}$ is equal to _____.

[JEE Main 2024 (Online) 27th January Evening Shift]

Scan or tap for the full solution



ANSWER KEY

Section A (MCQ) — 40 questions

Ques.	1	2	3	4	5
Ans.	3	4	2	2	1
Ques.	6	7	8	9	10
Ans.	2	3	3	4	3
Ques.	11	12	13	14	15
Ans.	2	2	2	1	4
Ques.	16	17	18	19	20
Ans.	2	4	4	2	2
Ques.	21	22	23	24	25
Ans.	2	2	4	3	2
Ques.	26	27	28	29	30
Ans.	1	2	2	4	3
Ques.	31	32	33	34	35
Ans.	3	2	4	2	3
Ques.	36	37	38	39	40
Ans.	3	4	4	BONUS	4

Section B (Numerical) — 22 questions

Ques.	41	42	43	44	45	46	47
Ans.	30	21	63	32	34	239	5
Ques.	48	49	50	51	52	53	54
Ans.	612	2035	465	1	5	806	54
Ques.	55	56	57	58	59	60	61
Ans.	678	118	25	138	10	2041	1
Ques.	62						
Ans.	0						