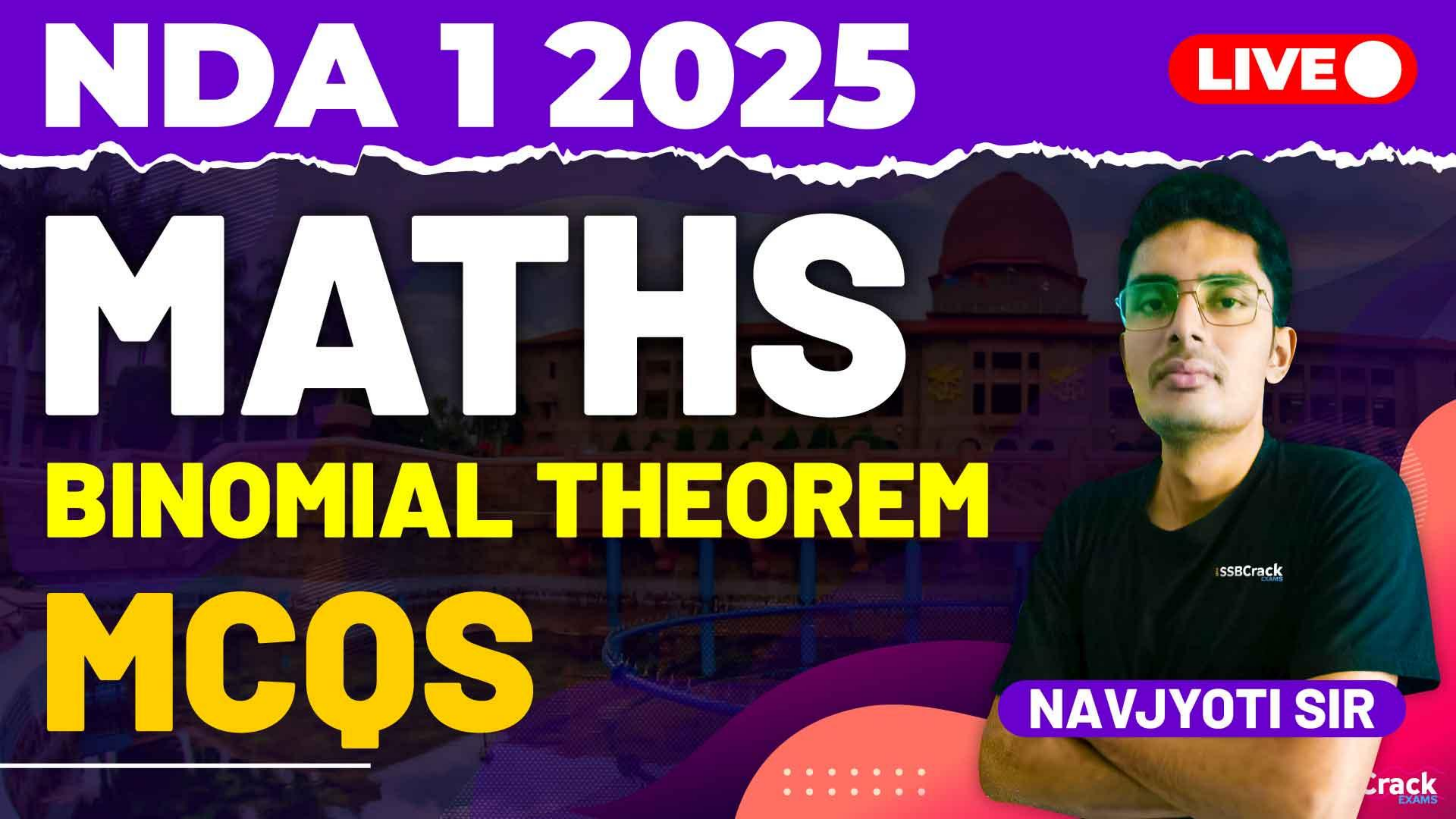

NDA 1 2025
LIVE
MATHS
BINOMIAL THEOREM
MCQS
SSBCrack EXAMS
NAVJYOTI SIR

# 05 Feb 2025 Live Classes Schedule

| | | |
|---|---|---|
| 9:00AM | 05 FEBRUARY 2025 DAILY DEFENCE UPDATES | DIVYANSHU SIR |

## SSB INTERVIEW LIVE CLASSES

| | | |
|---|---|---|
| 9:30AM | OVERVIEW OF GD & LECTURETTE | ANURADHA MA'AM |

## AFCAT 1 2025 LIVE CLASSES

| | | |
|---|---|---|
| 3:00PM | STATIC GK - RAMSAR & LAKES IN INDIA | DIVYANSHU SIR |
| 4:30PM | ENGLISH - IDIOMS & PHRASES - CLASS 2 | ANURADHA MA'AM |
| 5:30PM | MATHS - MENSURATION 2D - CLASS 1 | NAVJYOTI SIR |

## NDA 1 2025 LIVE CLASSES

| | | |
|---|---|---|
| 10:00AM | MATHS - BINOMIAL THEOREM | NAVJYOTI SIR |
| 1:00PM | PHYSICS - MAGNETIC EFFECTS OF ELECTRIC CURRENT | NAVJYOTI SIR |
| 4:30PM | ENGLISH - IDIOMS & PHRASES - CLASS 2 | ANURADHA MA'AM |

## CDS 1 2025 LIVE CLASSES

| | | |
|---|---|---|
| 1:00PM | PHYSICS - MAGNETIC EFFECTS OF ELECTRIC CURRENT | NAVJYOTI SIR |
| 4:30PM | ENGLISH - IDIOMS & PHRASES - CLASS 2 | ANURADHA MA'AM |
| 5:30PM | MATHS - MENSURATION 2D - CLASS 1 | NAVJYOTI SIR |



# QUESTION

In the expansion of $(1+x)^p(1+x)^q$, if the coefficient of $x^3$ is 35, then what is the value of $(p+q)$?

PYQ – 2024 - II

(a) 5

(b) 6

(c) 7

(d) 8

$(1+x)^{p+q}$

$= 1 + {}^{p+q}C_1 x + {}^{p+q}C_2 x^2 + {}^{p+q}C_3 x^3 + \dots x^{p+q}$

coefficient of $x^3 = {}^{p+q}C_3 = 35$

$$\frac{(p+q)!}{(p+q-3)!\,3!} = 35$$

$$\frac{(p+q)!}{(p+q-3)!\,3!} = 35$$

$$(p+q)(p+q-1)(p+q-2) = 35 \times 3!$$

Let $p+q = A$

$$A(A-1)(A-2) = 35 \times 6 = 210$$

5, 6, 7 ✓, 8 $\longrightarrow$ putting options and checking

Ans. (c)

# QUESTION

What is the remainder when $7^n - 6n$ is divided by 36 for $n = 100$?

PYQ – 2024 - II

(a) 0

(b) 1

(c) 2

(d) 6

$$7^n = (1+6)^n$$

$$= 1 + {}^nC_1 (6)^1 + {}^nC_2 (6)^2 + {}^nC_3 (6)^3 + \dots 6^n$$

$$= 1 + 6n + {}^nC_2 (36) + {}^nC_3 (36)(6) + {}^nC_4 (36)(6)^2 + \dots 36 \cdot 6^{n-2}$$

$$7^n - 6n = 1 + \underbrace{36\left({}^nC_2 + {}^nC_3 (6) + {}^nC_4 (6)^2 + \dots 6^{n-2}\right)}$$

Remainder = 1

# QUESTION

What is the coefficient of $x^{10}$ in the expansion of $(1-x^2)^{20}\left(\underline{2-x^2-\frac{1}{x^2}}\right)^{-5}$ ?

(a) $-1$

(b) $1$

(c) $10$

(d) Coefficient of $x^{10}$ does not exist

**PYQ – 2024 -I**

$$(1-x^2)^{20}\left[(-1)^{-5}\left(\underline{x^2+\frac{1}{x^2}-2}\right)^{-5}\right]$$

$$-(1-x^2)^{20}\left[\left(x-\frac{1}{x}\right)^2\right]^{-5}$$

$$\left(x-\frac{1}{x}\right)^2 = x^2+\frac{1}{x^2}-2$$

$$\frac{-(1-x^2)^{20}}{x^{-10}}\left(x^2-1\right)^{-10}$$

$$\frac{-(1-x^2)^{20}}{x^{-10}}\left(x^2-1\right)^{-10}$$

$$-x^{10}\,(1-x^2)^{20}\left[(1-x^2)^2\right]^{-5}$$

$$-x^{10}(1-x^2)^{20-10} = -x^{10}(1-x^2)^{10}$$

$$= -x^{10}\left[1-{}^{10}C_1(x^2)+{}^{10}C_2(x^2)^2-{}^{10}C_3(x^2)^3+\dots+{}^{10}C_{10}(x^2)^{10}\right]$$

$$= -x^{10}$$

coefficient $= -1$

SSBCrack EXAMS

# QUESTION

PYQ – 2024 - I

. If the 4th term in the expansion of $\left(mx+\frac{1}{x}\right)^n$ is $\frac{5}{2}$, then what is the value of $mn$?

(a) –3

(b) 3

(c) 6

(d) 12

$$T_4 = {}^nC_3 (mx)^{n-3}\left(\frac{1}{x}\right)^3$$

$$\frac{5}{2} = {}^nC_3\, m^{n-3}\left(x^{n-3} \times \frac{1}{x^3}\right)$$

$$\frac{5}{2} = {}^nC_3\, m^{n-3}\left(x^{n-3-3}\right)$$

$$\frac{5}{2} \times x^0 = {}^nC_3\, m^{n-3}\left(x^{n-6}\right)$$

$$\Rightarrow n-6 = 0$$

$$(n = 6)$$

$${}^nC_3\, m^{n-3} = \frac{5}{2}$$

$${}^6C_3 (m)^3 = \frac{5}{2}$$

$$m^3 = \frac{5}{2 \times 20} = \frac{1}{8}$$

$$m = \frac{1}{2}$$

$$mn = 6 \times \frac{1}{2} = 3$$

# What is the coefficient of $\underline{x^3y^4}$ in $(2x + 3y^2)^5$ ?

A. 240

B. 360

C. 720

D. 1080

$$T_{r+1} = {}^5C_r (2x)^{5-r} (3y^2)^r$$

$$3 = 5 - r \Rightarrow \boxed{r = 2}$$

$$T_3 = {}^5C_3 (2x)^3 (3y^2)^2$$

$$\text{coefficient} = {}^5C_3 \times 2^3 \times 3^2 = 10 \times 8 \times 9$$

$$= \boxed{720}$$

SSBCrack EXAMS

# What is the coefficient of $x^3y^4$ in $(2x + 3y^2)^5$ ?

A. 240

B. 360

**C. 720**

D. 1080

***What is the middle term in the expansion of*** $\left(\frac{x\sqrt{y}}{3} - \frac{3}{y\sqrt{x}}\right)^{12}$?

A. $C(12,7)\ x^3y^{-3}$

B. $C(12,6)\ x^{-3}y^{-3}$

C. $C(12,7)\ x^{-3}y^{-3}$

D. $C(12,6)\ x^3y^{-3}$

number of terms = $12 + 1 = \underline{13}$ (odd)

middle term $= \left(\frac{13+1}{2}\right)^{th}$ term $= 7^{th}$ term,

$$T_7 = {}^{12}C_6 \left(\frac{x\sqrt{y}}{3}\right)^6 \left(-\frac{3}{y\sqrt{x}}\right)^6$$

$$= {}^{12}C_6\ x^3 y^{-3}$$

$$= \underline{C(12,6)\ x^3 y^{-3}}$$

***What is the middle term in the expansion of*** $\left(\frac{x\sqrt{y}}{3} - \frac{3}{y\sqrt{x}}\right)^{12}$ ?

A. C(12,7) $x^3y^{-3}$

B. C(12,6) $x^{-3}y^{-3}$

C. C(12,7) $x^{-3}y^{-3}$

**D. C(12,6) $x^3y^{-3}$**

**The coefficients of $x^m$ and $x^n$ , where m and n are positive integers, in the expansion of $(1 + x)^{m+n}$ are**

A. equal

B. equal in magnitude but opposite in sign

C. reciprocal to each other

D. in the ratio m : n

$$(1+x)^{m+n} = 1 + {}^{m+n}C_1 x^1 + {}^{m+n}C_2 x^2 + \dots {}^{m+n}C_{m+n} x^{m+n}$$

coefficient of $x^m = {}^{m+n}C_m$

" " $x^n = {}^{m+n}C_n$

${}^nC_r = {}^nC_{n-r}$

equal

**The coefficients of $x^m$ and $x^n$, where m and n are positive integers, in the expansion of $(1 + x)^{m+n}$ are**

A. equal

B. equal in magnitude but opposite in sign

C. reciprocal to each other

D. in the ratio m : n

SSBCrack EXAMS

# The natural number $6^{10} – 51$ is

A. a prime number

B. an even number

C. divisible by 5

D. a power of 3

$$(1+5)^{10} - 51$$

$$= \underline{1 + {}^{10}C_1(5)} + {}^{10}C_2(5)^2 + {}^{10}C_3(5)^3 + \dots {}^{10}C_{10}(5)^{10} - 51$$

$$= 51 + 5^2\left({}^{10}C_2 + {}^{10}C_3(5) + \dots {}^{10}C_{10}(5)^8\right) - 51$$

$$= 5^2\left(\_\_\_\_\_\_\_\_\right)$$

divisible by 25 $\Rightarrow$ also divisible by 5.

# The natural number $6^{10} - 51$ is

A. a prime number

B. an even number

**C. divisible by 5**

D. a power of 3

# What is the coefficient of $x^3$ in $( 3 – 2x ) / ( 1 + 3x )^3$ ?

A. –272

B. – 540

C. – 870

D. – 918

$$\frac{3-2x}{(1+3x)^3} = \underline{(3-2x)}\,\underline{(1+3x)}^{-3}$$

$$= (3-2x)\left({}^{-3}C_0 (3x)^0 + {}^{-3}C_1 (3x)^1 + {}^{-3}C_2 (3x)^2 + {}^{-3}C_3 (3x)^3 + \dots\right)$$

$$= (3-2x)\left(1 + (-3)(3x) + \frac{(-3)(-4)}{2}(9x^2) + \frac{(-3)(-4)(-5)}{3 \times 2}(27x^3) + \dots\right)$$

$$= -270(3) - 108 = -810 - 108$$

$$= \underline{-918}$$

# What is the coefficient of $x^3$ in $(3 - 2x) / (1 + 3x)^3$ ?

A. $-272$

B. $-540$

C. $-870$

**D. $-918$**

**If n is even, then the middle term in the expansion of $\left(x^2 + \frac{1}{x}\right)^n$ is $924x^6$, then n is equal to**

A. 10

B. 12

C. 14

D. None of these

$\left(x^2 + \frac{1}{x}\right)^n$

number of terms = $n+1$ = odd

middle term = $\frac{(n+1)+1}{2} = \frac{n+2}{2}$

$= \frac{n}{2} + 1$

$T_{\frac{n}{2}+1} = {}^nC_{\frac{n}{2}} (x^2)^{n-\frac{n}{2}} \left(\frac{1}{x}\right)^{n/2}$

$924x^6 = \frac{n!}{(n-\frac{n}{2})!(\frac{n}{2})!} x^n \times \frac{1}{x^{n/2}}$

comparing powers of $x$,

$6 = \frac{n}{2} \Rightarrow n = 12$

**If n is even, then the middle term in the expansion of $\left(x^2 + \frac{1}{x}\right)^n$ is $924x^6$, then n is equal to**

A. 10

**B. 12**

C. 14

D. None of these

**If the $4^{th}$ term in expansion of $\left(\frac{2}{3}x - \frac{3}{2x}\right)^n$ is independent of x, then n is equal to**

A. 5

B. 6

C. 9

D. None of these

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

$T_4 = \underbrace{{}^nC_3 \left(\frac{2}{3}\right)^{n-3} \left(\frac{-3}{2}\right)^3}\ \underbrace{x^{n-3} \times \frac{1}{x^3}}$

independent of x

$x^{n-3-3} = x^0$

$n - 6 = 0$

$n = 6$

**If the 4th term in expansion of $\left(\frac{2}{3}x - \frac{3}{2x}\right)^n$ is independent of x, then n is equal to**

A. 5

**B. 6**

C. 9

D. None of these

# If in the expansion of $(1 + x)^n$, the coefficient of $r^{th}$ and $(r + 2)^{th}$ term be equal, then r is equal to

A. 2n

B. (2n + 1) / 2

C. n / 2

D. 2n – 1 / 2

$$T_r = {}^nC_{r-1}\,(x)^{r-1} \qquad T_{r+2} = {}^nC_{r+1}\,(x)^{r+1}$$

$${}^nC_{r-1} = {}^nC_{r+1}$$

$$\frac{n!}{(n-r+1)!\,(r-1)!} = \frac{n!}{(n-r-1)!\,(r+1)!} \Rightarrow (r+1)(r) = (n-r+1)(n-r)$$

$$(r+1)(r) = (n-r+1)(n-r)$$

$$\cancel{r^2} + r = n^2 - nr - rn + \cancel{r^2} + n - r$$

$$n^2 - 2rn + n - 2r = 0$$

$$r = \frac{n}{2}$$

✓

$2n$ $\quad$ $\frac{n}{2}$ ✓

$\frac{2n+1}{2}$ $\quad$ $\frac{2n-1}{2}$

**If in the expansion of $(1 + x)^n$, the coefficient of $r^{th}$ and $(r + 2)^{th}$ term be equal, then r is equal to**

A. $2n$

B. $(2n + 1) / 2$

C. **$n / 2$**

D. $2n - 1 / 2$

# In the expansion of $\left(x^3 + \frac{1}{x^2}\right)^8$ then the term containing $x^4$ is

A. $70x^4$

B. $60x^4$

C. $56x^4$

D. None of these

$$T_{r+1} = {}^8C_r \,(x^3)^{8-r}\left(\frac{1}{x^2}\right)^r$$

$$= {}^8C_r \, x^{24-3r-2r}$$

$$24 - 5r = 4$$

$$5r = 20 \Rightarrow \underline{r = 4}$$

$${}^8C_4 \,(x)^4$$

$$\frac{\cancel{8}\times 7\times \cancel{6}^{2}\times 5}{\cancel{4}\times\cancel{3}\times\cancel{2}\times 1}x^4 = \underline{70x^4}$$

SSBCrack EXAMS

**In the expansion of $\left(x^3 + \frac{1}{x^2}\right)^8$ then the term containing $x^4$ is**

A. $70x^4$

B. $60x^4$

C. $56x^4$

D. None of these

SSBCrack EXAMS

**The total number of terms in the expansion of $(x + a)^{100} + (x - a)^{100}$ after simplification will be**

A. 202

B. 51

C. 50

D. None of these

$$\overbrace{(x+a)^n = x^n + \cancel{n x^{n-1}(a)} + {}^nC_2\, x^{n-2}(a) + \ldots + {}^nC_n\, a^n}^{101}$$

$$(x-a)^n = x^n - \cancel{n x^{n-1}(a)} + {}^nC_2\, x^{n-2}(a) + \ldots + {}^nC_n\, a^n$$

+

(all even terms will be cancelled)

51

**The total number of terms in the expansion of $(x + a)^{100} + (x - a)^{100}$ after simplification will be**

A. 202

**B. 51**

C. 50

D. None of these

# What is the coefficient of $x^4$ in the expansion of $\left(\frac{1-x}{1+x}\right)^2$ ?

A. $-16$

B. $16$

C. $8$

D. $-8$

$(1-x)^2(1+x)^{-2}$

HW

SSBCrack EXAMS

**What is the coefficient of $x^4$ in the expansion of $\left(\frac{1-x}{1+x}\right)^2$ ?**

A. $-16$

**B. 16**

C. 8

D. $-8$

SSBCrack EXAMS

**What is the term independent of x in the expansion of $(1 + x + 2x^3)\left(\frac{3x^{-2}}{2} - \frac{1}{3x}\right)^9$?**

A. 1 / 3

B. 19 / 54

C. 1 / 4

D. No such term exists in the expansion

$$ {}^9C_r \left(\frac{3x^{-2}}{2}\right)^{9-r}\left(-\frac{1}{3x}\right)^r $$

$$ {}^9C_r \left(\frac{3}{2}\right)^{9-r}\left(\frac{-1}{3}\right)^r x^{-18+2r} \cdot x^{-r} $$

$$ -18 + 2r - r = 0 \Rightarrow r = 18 $$

not possible

$\boxed{r \le n}$

**What is the term independent of x in the expansion of $(1+x+2x^3)\left(\frac{3x^{-2}}{2}-\frac{1}{3x}\right)^9$ ?**

A. 1 / 3

B. 19 / 54

C. 1 / 4

**D. No such term exists in the expansion**

# For all n ∈ N , $2^{4n} - 15n - 1$ is divisible by

A. 125

B. 225

C. 450

D. None of these

$16^n - 15n - 1$

$\underline{(1+15)^n} - 15n - 1$

$= {}^nC_2\,(15)^2 + {}^nC_3\,(15)^3 + \dots {}^nC_n\,(15)^n$

$= 15^2(\text{------})$

divisible by $\underline{225}$

SSBCrack EXAMS

# For all $n \in N$, $2^{4n} - 15n - 1$ is divisible by

A. 125

**B. 225**

C. 450

D. None of these

# What is the number of terms in the expansion of $(a + b + c)^n$, $n \in N$ ?

A. $n + 1$

B. $n + 2$

C. $n(n + 1)$

D. $(n + 1)(n + 2)/2$

$$(a + (b+c))^n$$

$$(A + B)^n$$

$$= \underline{{}^nC_0\, a^n} + \underline{{}^nC_1\, a^{n-1}(b+c)} + \underline{{}^nC_2\, a^{n-2}(b+c)^2} + {}^nC_3\, a^{n-3}(b+c)^3 + \dots {}^nC_n \underline{(b+c)}^n$$

$$= 1 + 2 + 3 + 4 + \dots (n+1) = \left[\frac{(n+1)(n+2)}{2}\right]$$

SSBCrack EXAMS

# What is the number of terms in the expansion of $(a + b + c)^n$ , $n \in N$ ?

A. $n + 1$

B. $n + 2$

C. $n(n + 1)$

**D. $(n + 1)(n + 2)/2$**

**If $(1 - x + x^2)^n = a_0 + a_1x + a_2x^2 + \ldots + a_{2n}x^{2n}$, then $a_0 + a_2 + a_4 + \ldots + a_{2n}$ is equal to**

A. $(3^n + 1) / 2$

B. $(3^n - 1) / 2$

C. $(1 - 3^n) / 2$

D. $3^n + 1/2$

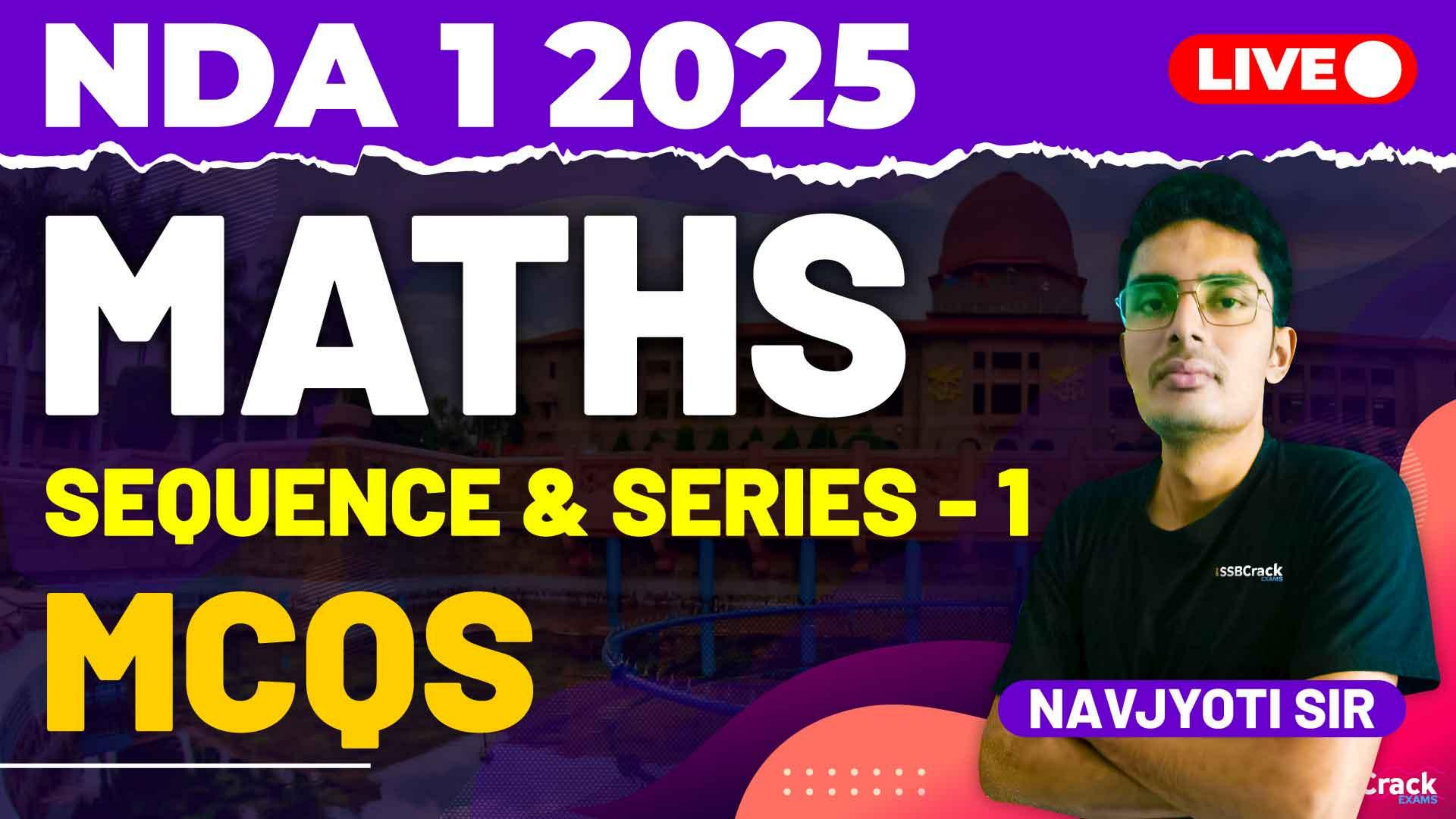
**If $(1 - x + x^2)^n = a_0 + a_1x + a_2x^2 + \ldots + a_{2n}x^{2n}$, then $a_0 + a_2 + a_4 + \ldots + a_{2n}$ is equal to**

A. $(3^n + 1) / 2$

B. $(3^n - 1) / 2$

C. $(1 - 3^n) / 2$

D. $3^n + 1/2$


NDA 1 2025
LIVE
MATHS
SEQUENCE & SERIES - 1
MCQS
SSBCrack EXAMS
NAVJYOTI SIR
Crack EXAMS