

Binomial Theorem - Class XI

Past Year JEE Questions

Questions

Question: 01

The sum of the series ${}^{20}C_0 - {}^{20}C_1 + {}^{20}C_2 - {}^{20}C_3 + \dots - \dots + {}^{20}C_{10}$ is

- A. 0
- B. ${}^{20}C_{10}$
- C. $-{}^{20}C_{10}$
- D. $\frac{1}{2}{}^{20}C_{10}$

Solutions

Solution: 01

Explanation

We know

$${}^{20}C_0 - {}^{20}C_1 + {}^{20}C_2 - {}^{20}C_3 + \dots + {}^{20}C_{10} - {}^{20}C_{11} + \dots + {}^{20}C_{20} = 0$$

$$\Rightarrow ({}^{20}C_0 - {}^{20}C_1 + {}^{20}C_2 - {}^{20}C_3 + \dots - {}^{20}C_9) + {}^{20}C_{10}(-{}^{20}C_9 + {}^{20}C_8 + \dots + {}^{20}C_0)$$

$$(\text{As } {}^{20}C_{11} = {}^{20}C_9)$$

$$\Rightarrow 2({}^{20}C_0 - {}^{20}C_1 + {}^{20}C_2 - {}^{20}C_3 + \dots - {}^{20}C_9) + {}^{20}C_{10} = 0$$

$$\Rightarrow {}^{20}C_0 - {}^{20}C_1 + {}^{20}C_2 - {}^{20}C_3 + \dots - {}^{20}C_9 = -\frac{1}{2}{}^{20}C_{10}$$

Adding ${}^{20}C_{10}$ both sides,

$$\Rightarrow {}^{20}C_0 - {}^{20}C_1 + {}^{20}C_2 - {}^{20}C_3 + \dots - {}^{20}C_9 + {}^{20}C_{10} = -\frac{1}{2}{}^{20}C_{10} + {}^{20}C_{10}$$

$$\Rightarrow {}^{20}C_0 - {}^{20}C_1 + {}^{20}C_2 - {}^{20}C_3 + \dots - {}^{20}C_9 + {}^{20}C_{10} = \frac{1}{2}{}^{20}C_{10}$$