

Dear student following is an Easy level [●○○] test paper. Score of 21 Marks in 15 Minutes would be a satisfactory performance. Questions 1-10 (+3, -1) (All questions have only one option correct)

- Q.1** The 10th term of the expansion of  $(x - 1)^{11}$  (in decreasing power of x) is-  
 (A)  $-x$  (B)  $-11x$   
 (C)  $-x^2$  (D)  $-{}^{11}C_2 x^2$
- Q.2** If  $\frac{1}{1-2x+x^2} = 1 + a_1x + a_2x^2 + \dots$ , then the value of  $a_r$  is :  
 (A)  $2r$  (B)  $r + 1$  (C)  $r$  (D)  $r - 1$
- Q.3** The two consecutive terms in the expansion of  $(3 + 2x)^{74}$  whose coefficients are equal, then the two terms are :  
 (A) 1 and 2 (B) 15 and 16  
 (C) 30th and 31st (D) 29th and 30th
- Q.4**  $(1.003)^4$  is approximately equal to :  
 (A) 1.012 (B) 1.014  
 (C) 0.988 (D) 1.988
- Q.5** The total number of terms in the expansion of  $(x + a)^{100} + (x - a)^{100}$  after simplification is :  
 (A) 202 (B) 51  
 (C) 50 (D) None of these
- Q.6** If the coefficient of  $x^7$  and  $x^8$  in  $(2 + 1/3)^n$  are equal then n is-  
 (A) 56 (B) 55 (C) 45 (D) 15
- Q.7** The coefficient of  $x^{-n}$  in  $(1 + x)^n \left(1 + \frac{1}{x}\right)^n$  is :  
 (A) 0 (B) 1 (C)  $2^n$  (D)  $2n$
- Q.8** If the coefficients of the rth term and  $(r + 1)$ th term in the expansion of  $(1 + x)^{20}$  are in the ratio 1 : 2, then r =  
 (A) 6 (B) 7 (C) 8 (D) 9
- Q.9** The term independent of x in the expansion of  $(1 + x)^n \left[1 + \left(\frac{1}{x}\right)\right]^n$  is :  
 (A)  $C_0^2 + 2C_1^2 + 3C_2^2 + \dots + (n + 1) C_n^2$   
 (B)  $C_1 + C_2 + C_3 + \dots + C_n$   
 (C)  $C_0^2 + C_1^2 + C_2^2 + \dots + C_n^2$   
 (D)  $C_1 + 2C_2 + 3C_3 + \dots + n C_n$
- Q.10** If x is very small then an approximate value of  $\frac{1+x}{1-x}$  is  
 (A)  $1 - x$  (B)  $1 + x$   
 (C)  $1 - 2x$  (D)  $1 + 2x$

MATHEMATICS IIT JEE ( SEPT. 5<sup>th</sup> WEEK CLASS TEST 3 ) (BINOMIAL THEOREM) ANSWER KEY

Name : ..... Roll No. : .....

	A	B	C	D		A	B	C	D		A	B	C	D
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
										10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	D	B	C	A	B	B	B	B	C	D

## SOLUTIONS

**Sol.1 (D)**

$$\begin{aligned} \text{Here, } T_{10} &= {}^{11}C_9 (x)^{11-9} \cdot (-1)^9 \\ &= - {}^{11}C_9 \cdot x^2 \\ &= - {}^{11}C_2 x^2 \end{aligned}$$

**Sol.2 (B)**

$$\begin{aligned} \text{Given, } \frac{1}{1-2x+x^2} &= 1 + a_1x + a_2x^2 + \dots \\ \Rightarrow (1-x)^{-2} &= 1 + a_1x + a_2x^2 + \dots \\ \Rightarrow 1 + 2x + 3x^2 + \dots + (r+1)x^r + \dots \\ &= 1 + a_1x + a_2x^2 + \dots + a_r x^r + \dots \\ \therefore a_r &= r + 1 \end{aligned}$$

**Sol.3 (C)**

$$\begin{aligned} (3 + 2x)^{74} &= 3^{74} \left(1 + \frac{2x}{3}\right)^{74} \\ \Rightarrow \frac{T_{r+1}}{T_r} &= \frac{n-r+1}{r} \left(\frac{2x}{3}\right) \\ \text{Given, } \frac{n-r+1}{r} \left(\frac{2}{3}\right) &= 1 \\ \Rightarrow 2(74 - r + 1) &= 3r \quad [\because n = 74] \\ \Rightarrow 5r &= 150 \Rightarrow r = 30 \\ \therefore 30\text{th and } 31\text{st terms} &\text{ will have their coefficients equal.} \end{aligned}$$

**Sol.4 (A)**

$$\begin{aligned} (1.003)^4 &= (1 + 0.003)^4 \\ &= 1 + 0.012 = 1.012 \text{ nearly} \\ [\because (1+x)^n &= 1 + nx \text{ nearly}] \end{aligned}$$

**Sol.5 (B)**

$$\begin{aligned} (x+a)^{100} + (x-a)^{100} \\ &= 2[x^{100} + {}^{100}C_2 x^{98} y^2 + {}^{100}C_4 x^{96} y^4 + \dots + {}^{100}C_{100} y^{100}] \\ \text{Clearly number of terms} &= 51. \end{aligned}$$

**Sol.6 (B)**

$$\text{Coeff. of } x^7 \text{ in } \left(2 + \frac{1}{3}\right)^n = {}^nC_7 \cdot 2^{n-7} \cdot \left(\frac{1}{3}\right)^7$$

$$\text{Coeff. of } x^8 \text{ in } \left(2 + \frac{1}{3}\right)^n = {}^nC_8 \cdot 2^{n-8} \cdot \left(\frac{1}{3}\right)^8$$

$$\text{Given, } {}^nC_7 \cdot 2^{n-7} \left(\frac{1}{3}\right)^7 = {}^nC_8 \cdot 2^{n-8} \left(\frac{1}{3}\right)^8$$

$$\Rightarrow \frac{n!}{7!(n-7)!} \cdot 2 = \frac{n!}{8!(n-8)!} \cdot \frac{1}{3}$$

$$\Rightarrow \frac{2}{n-7} = \frac{1}{8.3}$$

$$\Rightarrow n = 55$$

**Sol.7 (B)**

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

$$= {}^nC_0 (2+x)^n \frac{1}{x} + \dots + {}^nC_n \frac{1}{x^n}$$

$$\therefore \text{Coefficient of } x^{-n} = {}^nC_n = 1$$

**Sol.8 (B)**

$$\begin{aligned} T_r &= {}^{20}C_{r-1} x^{r-1} \\ T_{r+1} &= {}^{20}C_r x^r \end{aligned}$$

$$\text{Given, } \frac{{}^{20}C_{r-1}}{{}^{20}C_r} = \frac{1}{2}$$

$$\Rightarrow \frac{\frac{20!}{(r-1)!(21-r)!}}{\frac{20!}{r!(20-r)!}} = \frac{1}{2}$$

$$\Rightarrow \frac{(20-r)! r!}{(r-1)!(21-r)!} = \frac{1}{2}$$

$$\Rightarrow \frac{r}{21-r} = \frac{1}{2}$$

$$\Rightarrow 2r = 21 - r$$

$$\Rightarrow 3r = 21$$

$$\Rightarrow r = 7$$

**Sol.9 (C)**

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

$$= (C_0 + C_1x + C_2x^2 + \dots + C_n x^n) \times$$

$$\left(C_0 + C_1 \frac{1}{x} + C_2 \frac{1}{x^2} + \dots + C_n \frac{1}{x^n}\right)$$

$\therefore$  term independent of  $x$

$$C_0^2 + C_1^2 + C_2^2 + \dots + C_n^2$$

**Sol.10 (D)**

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

$$= (1+x)(1+x)$$

$$= 1 + 2x + x^2$$

$$= 1 + 2x \text{ approximately.}$$