Dear student following is an Easy level [● ○ ○] test paper. Score of 24 Marks in 15 Minutes would be a satisfactory performance. Questions 1-10(+3, –1) (Questions may have more than one option correct)

Q.1 The 8th term of $\left(3x+\frac{2}{3x^2}\right)^{12}$, when expanded in ascending power of x, is

(A) $\frac{228096}{x^3}$ (B) $\frac{228096}{x^9}$

(C) $\frac{328179}{x^9}$ (D) None of these

Q.2 The term independent of x in $\left[\sqrt{\left(\frac{x}{3}\right)}+\sqrt{\left(\frac{3}{2x^2}\right)}\right]^{10}$ is

(A) 1 (B) $^{10}C_1$

(C) $\frac{5}{12}$ (D) None of these

Q.3 The (n + 1)th term from the end in the expansion of $\left(2x-\frac{1}{x}\right)^{3n}$ is-

(A) $\frac{3n!}{2n!n!}2^n.x^{-n}$ (B) $\frac{3n!}{2n!n!}2^{2n}.x^{-2n}$

(C) $\frac{3n!}{2n!n!}2^n.x^n$ (D) None of these

Q.4 The term independent of x in $(1 + x)^m \left(1+\frac{1}{x}\right)^n$ is

(A) $^{m+n}C_m$ (B) $^{m+n}C_n$

(C) $^{m+n}C_{m-n}$ (D) None of these

Q.5 The first three terms in the expansion of $(1 + ax)^n$ $(n \neq 0)$ are 1, 6x and $16x^2$. Then the values of a and n are respectively

(A) 2 and 9 (B) 3 and 2

(C) $\frac{2}{3}$ and 9 (D) $\frac{3}{2}$ and 6

Q.6 If in the expansion of $(1 + x)^{20}$, then co-efficients of rth and (r + 4)th terms are equal, then r is

(A) 7 (B) 8 (C) 9 (D) 10

Q.7 The total number of terms in $(2x - y + 4z)^{12}$ is

(A) 13 (B) 19

(C) 12 (D) None of these

Q.8 The co-efficient of x^4 in the expansion of $\frac{(1-3x)^2}{(1-2x)}$ is

(A) 1 (B) 2 (C) 3 (D) 4

Q.9 If n is a positive integer, then the number of the terms in the expansion of $(x + a)^n$ is

(A) n (B) n + 1

(C) n – 1 (D) None of these

Q.10 If n is a rational number, which is not a whole number, then the number of terms in the expansion of $(1 + x)^n$, where $|x| < 1$ is

(A) n (B) n + 1

(C) infinitely many (D) None of these

MATHEMATICS IIT JEE (SEPT.4th WEEK CLASS TEST 2) (BINOMIAL THEOREM) ANSWER KEY

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

	A	B	C	D		A	B	C	D		A	B	C	D
1	○	○	○	○	4	○	○	○	○	7	○	○	○	○
2	○	○	○	○	5	○	○	○	○	8	○	○	○	○
3	○	○	○	○	6	○	○	○	○	9	○	○	○	○
										10	○	○	○	○

ANSWER KEY

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

SOLUTIONS

Sol.1 (A)

when $\left(3x+\frac{2}{3x^2}\right)^{12}$ is expanded, the power of x goes on decreasing as the term proceed. Hence, it is expanded in descending powers of x. So $\left(\frac{2}{3x^2}+3x\right)^{12}$, when expanded, will be in ascending powers of x.

Now t_8 in $\left(\frac{2}{3x^2}+3x\right)^{12}$

$$= {}^{12}C_7\left(\frac{2}{3x^2}\right)^{12-7}.(3x)^7$$

$$= \frac{12!}{7!5!}.\left(\frac{2}{3x^2}\right)^5.(3x)^7$$

$$= \frac{12\times11\times10\times9\times8}{5\times4\times3\times2}.\frac{2^5.3^2}{x^3} = \frac{228096}{x^3}$$

Sol.2 (A)

The genral term is

$$T_{r+1} = {}^{10}C_r\left(\sqrt{\frac{x}{3}}\right)^{10-r}\left(\sqrt{\frac{3}{2x^2}}\right)^r$$

$$= {}^{10}C_r\left(\frac{1}{3}\right)^{5-r/2}\left(\frac{3}{2}\right)^{r/2}.\ x^{5-3r/2}$$

For term independent of x,

$5-\frac{3r}{2} = 0 \Rightarrow r = \frac{10}{3}$, which is not a positive integer, Hence, there is no term independent of x.

Sol.3 (A)

(n + 1)th term from the end = [3n – (n + 1) + 2]th term from the beginning

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

$$= \frac{3n!}{2n!n!}.\ 2^n.x^n(-1)^{2n}.\ \frac{1}{x^{2n}}$$

$$= \frac{3n!}{2n!n!}\ 2^n.x^{-n}$$

Sol.4 (A,B)

We have,

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

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

$\therefore$ Required term independent of x = co-efficient of x^0 in $x^{-n}(1+x)^{m+n}$

= coefficient of x^n in $(1+x)^{m+n} = {}^{m+n}C_n$

Sol.5 (C)

First three terms of $(1+ax)^n$ are ${}^nC_0$, ${}^nC_1\,(ax)$, ${}^nC_2\,(ax)^2$

i.e.1, nax , $\frac{n(n-1)}{2}a^2x^2$

$\therefore$ na = 6 $\Rightarrow$ $n^2a^2 = 36$ ....(1)

and $\frac{n(n-1)}{2}a^2 = 16$ ....(2)

Divide (1) by (2), we get

$$\frac{2n}{n-1} = \frac{36}{16} = \frac{9}{4} \Rightarrow 8n = 9n-9$$

$\Rightarrow$ n = 9

$\therefore$ 9a = 6 $\Rightarrow$ a = $\frac{6}{9} = \frac{2}{3}$

Thus a = $\frac{2}{3}$, n = 9

Sol.6 (C)

$T_{r+1} = {}^{20}C_r x^r$

$\therefore$ Co-eff. of rth term = co.eff of (r + 4)th term

$\therefore$ ${}^{20}C_{r-1} = {}^{20}C_{r+3}$

$\Rightarrow$ r − 1 = r + 3 (Not possible)

or r − 1 + r + 3 = 20

i.e. 2r = i.e. r = 9

Sol.7 (B)

Total number of terms in

$(2x - y + 4z)^{12} = {}^{12+3-1}C_{3-1}$

[Here n = 12, r = 3]

$= {}^{14}C_2 = \frac{14 \times 13}{2} = 91$

[r = no. of variables x, y, z in expansion = 3]

Sol.8 (D)

$\frac{(1-3x)^2}{(1-2x)} = (1 - 6x + 9x^2)(1 - 2x)^{-1}$

$= (1 - 6x + 9x^2)[1 + 2x + (2x)^2 + (2x)^3 + (2x)^4 + ...]$

Co-eff of x^4 = 10 − 6.8 + 9.4

= 16 − 48 + 36 = 4

Sol.9 (B)

Number of terms = one more than the power of the binomial.

Sol.10 (C)

Binomial theorem for rational index (Number of terms = ∞)