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) (All questions have only one option correct)

Q.1 If the sum of the coefficients in the expansion of $(x + y)^n$ is 1024, then the value of the greatest coefficient in the expansion is

(A) 356 (B) 252

(C) 210 (D) 120

Q.2 To expand $(1 + 2x)^{-1/2}$ as an infinite series, the range of x should be

(A) $\left[\frac{-1}{2}, \frac{1}{2}\right]$ (B) $\left(\frac{-1}{2}, \frac{1}{2}\right)$

(C) [−2, 2] (D) (−2, 2)

Q.3 $49^n + 16n - 1$ is divisible by

(A) 3 (B) 19

(C) 64 (D) 29

Q.4 If $(1 + ax)^n = 1 + 8x + 24x^2 + ...$, then the value of a and n is

(A) 2, 4 (B) 2, 3

(C) 3, 6 (D) 1, 2

Q.5 The coefficient of x^5 in the expansion of $(1 + x^2)^5 (1 + x)^4$ is

(A) 30 (B) 60

(C) 40 (D) None of these

Q.6 In the polynomial $(x - 1)(x - 2)(x - 3)...(x - 100)$, the coefficient of x^{99} is

(A) 5050 (B) − 5050

(C) 100 (D) 99

Q.7 The coefficient of x^{100} in the expansion of $\sum_{j=0}^{200} (1 + x)^j$ is

(A) $\binom{200}{100}$ (B) $\binom{201}{102}$

(C) $\binom{200}{101}$ (D) $\binom{201}{100}$

Q.8 Middle term in the expansion of $(1 + 3x + 3x^2 + x^3)^6$ is

(A) 4th (B) 3rd

(C) 10th (D) None of these

Q.9 The term independent of x in $\left(\sqrt{x} - \frac{2}{x}\right)^{18}$ is

(A) $^{18}C_6 2^6$ (B) $^{18}C_6 2^{12}$

(C) $^{18}C_{18} 2^{18}$ (D) None of these

Q.10 In the expansion of $(1 + x)^n$ the sum of coeffecients of odd power of x is

(A) $2^n + 1$ (B) $2^n - 1$

(C) 2^n (D) 2^{n-1}

MATHEMATICS IIT JEE (SEPT.4th WEEK CLASS TEST 3) (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.	B	B	C	A	B	B	A	C	A	D

SOLUTIONS

Sol.1 (B)

Given $2^n = 1024$, $\therefore$ $n = 10$

$\therefore$ The greatest coefficient is ${}^{10}C_5 = 252$

Sol.2 (B)

$(1 + 2x)^{-1/2}$ can be expanded if $|2x| < 1$

i.e. if $|x| < \frac{1}{2}$, i.e. if $-\frac{1}{2} < x < \frac{1}{2}$

i.e. if $x \in \left(-\frac{1}{2}, \frac{1}{2}\right)$.

Sol.3 (C)

$49^n + 16n - 1 = (1 + 48)^n + 16n - 1$

$1 + {}^nC_1(48) + {}^nC_2(48)^2 + ... + {}^nC_n(48)^n + 16n - 1$

$= (48n + 16n) + {}^nC_2(48)^2 + {}^nC_3(48)^3 + ... + {}^nC_n(48)^n$

$= 64n + 8^2[{}^nC_2.6^2 + {}^nC_3.6^3.8 + {}^nC_4 6^4.8^2 + .. + {}^nC_n .6^n.8^{n-2}]$

Hence, $49^n + 16n - 1$ is divisible by 64.

Sol.4 (A)

As given $(1 + ax)^n = 1 + 8x + 24x^2 + ...$

$\Rightarrow 1 + \frac{n}{1}ax + \frac{n(n-1)}{1.2}a^2x^2 + ...$

$= 1 + 8x + 24x^2 + ...$

$\Rightarrow na = 8, \frac{n(n-1)}{1.2}a^2 = 24$

$\Rightarrow na(n - 1)a = 48$

$\Rightarrow 8(8 - a) = 48 \Rightarrow 8 - a = 6$

$\Rightarrow a = 2 \quad \Rightarrow n = 4$

Sol.5 (B)

We have $(1 + x^2)^5 (1 + x)^4$

$= ({}^5C_0 + {}^5C_1x^2 + {}^5C_2x^4 + ...)({}^4C_0 + {}^4C_1x + {}^4C_2x^2 + {}^4C_3x^3 + {}^4C_4x^4)$

So coefficient of x^5 in$[(1 + x^2)^5(1 + x)^4]$

$= {}^5C_2.{}^4C_1 + {}^4C_3.\ {}^5C_1 = 60$

Sol.6 (B)

$(x - 1)(x - 2)(x - 3)...(x - 100)$

Numbers of terms = 100;

$\therefore$ Coefficient of x^{99}

$= (x - 1)(x - 2)(x - 3) ...(x - 100)$

$= (-1 - 2 - 3 - ...... - 100)$

$= -(1 + 2 + ... + 100)$

$= -\frac{100 \times 101}{2} = -5050$

Sol.7 (A)

$T_{r+1} = {}^{200}C_r (1)^{200-r} (x)^r$

Hence coefficient of $x^{100} = {}^{200}C_{100} = \binom{200}{100}$

Sol.8 (C)

$(1 + 3x + 3x^2 + x^3)^6$

$= \{(1 + x)^3\}^6 = (1 + x)^{18}$

Hence the middle term is 10^{th}

Sol.9 (A)

$T_{r+1} = {}^{18}C_r (\sqrt{x})^{18-r}\left(-\frac{2}{x}\right)^r = {}^{18}C_r x^{9-r/2-r}(-2)^r$

If T_{r+1} is independent of x,

then $9 - \frac{r}{2} - r = 0 \Rightarrow r = 6$

So term independent of $x = T_7 = {}^{18}C_6\, 2^6$

Sol.10 (D)

Sum of coeffecient of odd powers of x

$= C_1 + C_3 + C_5 + ... = 2^{n-1}$