MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 68

Total Marks : 32

Max. Time : 34 min.

Topic : Binomial Theorem

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1 to 8	**(3 marks, 3 min.)**	**[24, 24]**
Subjective Questions (no negative marking) Q.9, 10	**(4 marks, 5 min.)**	**[8, 10]**

1. If in the expansion of $(1 + x)^m (1- x)^n$, the coefficients of x and x^2 are 3 and – 6 respectively, then m is

(A) 6 (B) 9 (C) 12 (D) 24.

2. For $2 \le r \le n$, $\binom{n}{r} + 2\binom{n}{r-1} + \binom{n}{r-2} =$

(A) $\binom{n+1}{r-1}$ (B) $2\binom{n+1}{r+1}$ (C) $2\binom{n+2}{r}$ (D) $\binom{n+2}{r}$

3. In the binomial expansion of $(a - b)^n$, $n \ge 5$, the sum of the 5th and 6th terms is zero. Then a/b equals:

(A) $\frac{n-5}{6}$ (B) $\frac{n-4}{5}$ (C) $\frac{5}{n-4}$ (D) $\frac{6}{n-5}$

4. The sum $\sum_{i=0}^{m}\binom{10}{i}\binom{20}{m-i}$, (where $\binom{p}{q} = 0$, if $p < q$) is maximum when 'm' is:

(A) 5 (B) 10 (C) 15 (D) 20

5. Coefficient of t^{24} in $(1 + t^2)^{12} (1 + t^{12}) (1 + t^{24})$ is:

(A) ${}^{12}C_6 + 3$ (B) ${}^{12}C_6 + 1$ (C) ${}^{12}C_6$ (D) ${}^{12}C_6 + 2$

6. If ${}^{(n-1)}C_r = (k^2 - 3)\, {}^{n}C_{r+1}$, then an interval in which k lies is

(A) $(2, \infty)$ (B) $(-\infty, -2)$ (C) $\left[-\sqrt{3}, \sqrt{3}\right]$ (D) $\left(\sqrt{3}, 2\right]$

7. The value of $\binom{30}{0}\binom{30}{10} - \binom{30}{1}\binom{30}{11} + \binom{30}{2}\binom{30}{12} - \ldots\ldots\ldots + \binom{30}{20}\binom{30}{30}$ is :

(A) $\binom{60}{20}$ (B) $\binom{30}{10}$ (C) $\binom{30}{15}$ (D) None of these

8. For $r = 0, 1, ..., 10$, let A_r, B_r and C_r denote, respectively, the coefficient of x^r in the expansions of $(1 + x)^{10}$, $(1 + x)^{20}$ and $(1 + x)^{30}$. Then $\sum_{r=1}^{10} A_r(B_{10}B_r - C_{10}A_r)$ is equal to

(A) $B_{10} - C_{10}$ (B) $A_{10}(B^2_{10} - C_{10}A_{10})$ (C) 0 (D) $C_{10} - B_{10}$

9. Prove that $2^k\binom{n}{0}\binom{n}{k} - 2^{k-1}\binom{n}{1}\binom{n-1}{k-1} + 2^{k-2}\binom{n}{2}\binom{n-2}{k-2} - ...... + (-1)^k\binom{n}{k}\binom{n-k}{0} = \binom{n}{k}$.

10. For any positive integer m, n (with $n \geq m$), let $\binom{n}{m} = {}^nC_m$. Prove that

$\binom{n}{m} + \binom{n-1}{m} + \binom{n-2}{m} + ... + \binom{m}{m} = \binom{n+1}{m+1}$. Hence or otherwise, prove that

$\binom{n}{m} + 2\binom{n-1}{m} + 3\binom{n-2}{m} + ... + (n - m + 1)\binom{m}{m} = \binom{n+2}{m+2}$.

Answers Key

1. (C)

2. (D)

3. (B)

4. (C)

5. (D)

6. (D)

7. (B)

8. (D)