

Followings are of 2 Marks each (Q01-05).

Q01. Using binomial theorem, expand $\left(x - \frac{2}{x}\right)^4$.

Q02. If the coefficients of $(2r+4)^{\text{th}}$ and $(r-2)^{\text{th}}$ terms in the expansion of $(1+x)^{18}$ are equal then, find the value of r .

Q03. Find ninth term from end in the binomial expansion of $(3x+y)^{17}$.

Q04. What is the sum of all the binomial coefficients in the expansion of $(x+y)^{10}$?

Q05. Write the coefficient of y^{-2} in $(y+m^3y^{-2})^{10}$.

OR

Prove that : $\sum_{r=0}^n 8^r {}^nC_r = 3^{2n}$.

[2×5 = 10]

Followings are of 3 Marks each (Q06-07).

Q06. If n is any positive integer, prove that $2^{3n+3} - 7n - 7$ always leaves remainder 1 when divided by 49.

Q07. Find the coefficient of x^4 in the product $(2-x)^5 \cdot (1+2x)^4$.

OR

Find $(x+y)^4 - (x-y)^4$. Hence, evaluate $(\sqrt{2} + \sqrt{3})^4 - (\sqrt{2} - \sqrt{3})^4$.

[3×2 = 6]

Following is of 4 Marks (Q08).

Q08. **PASSAGE BASED QUESTION :** For a binomial $(a+b)^n$, the expansion is given by

$$(a+b)^n = {}^nC_0 a^n + {}^nC_1 a^{n-1}b + {}^nC_2 a^{n-2}b^2 + \dots + {}^nC_n b^n = \sum_{r=0}^n {}^nC_r a^{n-r} b^r;$$

where ${}^nC_r a^{n-r} b^r$ is the general term i.e., $(r+1)^{\text{th}}$ term in the expansion.

Based on the above information, answer the following questions.

(a) Find the binomial coefficient of 16^{th} term in the binomial $(24x+35y)^{63}$.

(b) In the binomial $(a+b)^6$, find the fourth term.

(c) In the binomial expansion of $(a+b)^7$, which term is $35a^4b^3$?

(d) Find the coefficient of x^{40} in the expansion of $(1+2x+x^2)^{27}$.

[1×4 = 4]

Followings are of 5 Marks each (Q09-10).

Q09. Find n , if the ratio of seventh term from the beginning to the seventh term from the end in the binomial expansion of $\left(\sqrt[3]{2} + \frac{1}{\sqrt[3]{3}}\right)^n$ is 1:6.

Q10. If the first three terms in the expansion of $(1+ax)^n$ are 1, $12x$, $64x^2$, find n and a .

OR

Suppose the coefficients of a^{r-1} , a^r and a^{r+1} in the binomial expansion of $(1+a)^n$ are in arithmetic progression. Then prove that $n^2 - n(4r+1) + 4r^2 - 2 = 0$. [5 × 2 = 10]

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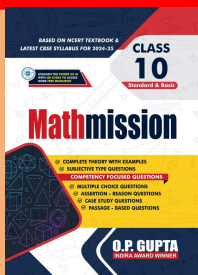
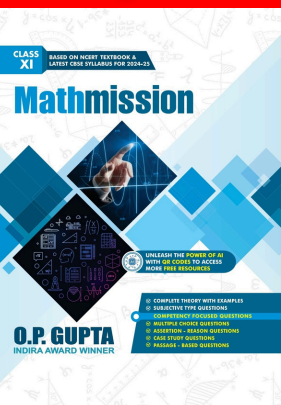
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