I. *Combinations*

1. Find the value of *n*, if

   (a) $nC_{n-2} = 6$ (b) $nC_{n-2} = 28$ (c) $nC_7 = nC_2$ (d) $nC_{n-2} = 210$

   (e) $nC_{20} = nC_{23}$ (f) $nC_{12} = nC_{13}$

2. Find the value of *r*, if

   (a) $20C_{2r+3} = 20C_{r+7}$ (b) $25C_{2r+3} = 25C_{r+7}$ (c) $50C_{r+8} = 50C_{3r+2}$ (d) $20C_r = 20C_{r+2}$

II. *Binomial Series*

1. Expand binomially.

   (a) $(2x + 3y)^4$ (b) $\left(x^2 + \frac{1}{x^2}\right)^7$ (c) $\left(x + \frac{1}{\sqrt{x}}\right)^5$ (d) $\left(x^3 - \frac{1}{x^2}\right)^5$

   (e) $(3x + 2y)^5$ (f) $\left(x^2 - \frac{3}{x}\right)^5$

2. Find the 4th term in the expansion of $\left(x^2 - \frac{x}{y}\right)^9$.

3. Find the 10th term in the expansion of $\left(x^2 + \frac{1}{x^2}\right)^{20}$.

4. Find the middle term/terms in the expansion of:

   (a) $\left(2a + \frac{b}{y3}\right)^{10}$ (b) $\left(x^2 + \frac{1}{x}\right)^{12}$ (c) $\left(2x + \frac{3}{x}\right)^9$ (d) $\left(x^2 + \frac{2}{x}\right)^7$

   (e) $\left(2x + \frac{3}{x}\right)^{11}$

5. Find the constant term/term independent of *x* in the expansion of:

   (a) $\left(\sqrt{x} + \frac{2}{x^2}\right)^{10}$ (b) $\left(2x^2 + \frac{1}{x}\right)^{15}$ (c) $\left(x^3 + \frac{3}{x^2}\right)^{15}$ (d) $\left(\frac{4x^3}{3} - \frac{3}{2x}\right)^8$

6. Find the coefficient of x^4 in the expansion of $\left(x^4 - \frac{1}{x^3}\right)^{15}$.

7. Find the coefficient of x^{10} in the expansion of $\left(2x^2 - \frac{3}{x}\right)^{11}$.

8. Find the coefficient of x^{12} in the expansion of $\left(x^2 - \frac{1}{x^2}\right)^{10}$.

9. Find the coefficient of x^5 in the expansion of $\left(3x + \frac{4}{x}\right)^{11}$.

10. Find the coefficient of x^{11} in the expansion of $\left(x^4 - \frac{1}{x^3}\right)^{15}$.