PART 5

PAST EXAMINATION QUESTIONS: BINOMIAL THEOREM

1. Write down the first three terms in the binomial expansion of $\left(2-\frac{1}{2x^2}\right)^{10}$ in ascending powers of $\frac{1}{x^2}$. Hence find the value of $(1{\cdot}995)^{10}$ correct to three significant figures. (J78/P2/5)

2. Evaluate the term which is independent of x in the expansion of $\left(x^2-\frac{1}{2x^6}\right)^{16}$. (N78/P1/5)

3. Find the coefficient of x^{-12} in the expansion of $\left(x^3-\frac{1}{x}\right)^{24}$. (J79/P1/7)

4. In the binomial expansion of $\left(1-\frac{1}{10}\right)^n$ the sum of the second and third terms is zero. Calculate the value of n and hence evaluate the fourth term. (N79/P2/1)

5. Find, in ascending powers of x, the first three terms in the expansions of (i) $(2-x)^6$, (ii) $(2+x)(2-x)^6$. (J80/P1/6)

6. Obtain the first 4 terms of the expansion of $(1+p)^6$ in ascending powers of p. By writing $p=x+x^2$, obtain the expansion of $\left(1+x+x^2\right)^6$ as far as the term in x^2. Hence find the value of $(1{\cdot}0101)^6$ to three decimal places. (N80/P2/7)

7. Find, in ascending powers of x, the first three terms in the expansion of $(2-3x)^8$. Use the expansion to find the value of $(1{\cdot}997)^8$ correct to the nearest whole number. (J81/P1/7)

8. Find, in ascending powers of t, the first three terms in the expansions of (i) $(1+\alpha t)^5$, (ii) $(1-\beta t)^8$. Hence find, in terms of α and β, the coefficient of t^2 in the expansion of $(1+\alpha t)^5(1-\beta t)^8$. (N81/P1/5)

9. Expand $\left(2-\frac{x}{2}\right)^5$ in ascending powers of x. Use the first four terms of the expansion to find an approximate value of $(1{\cdot}99)^5$. (J82/P2/6)

10. Obtain the first four terms on the expansion $\left(2+\frac{x}{4}\right)^8$ in ascending powers of x. By substituting an appropriate value of x into this expansion, find the value of $(2{\cdot}0025)^8$ correct to three decimal places. (N82/P1/6)

1. $1024 - 2560\frac{1}{x^2} + 2880(\frac{1}{x^2})^2$, 999

2. $113\frac{3}{4}$

3. -2024

4. $n = 21, -1{\cdot}33$

5. (i) $64 - 192x + 240x^2$
   (ii) $128 - 320x + 288x^2$

6. $1 + 6p + 15p^2 + 20p^3$;
   $1 + 6x + 21x^2$, 1·062

7. $256 - 3072x + 16128x^2$; 253

8. (i) $1 + 5\alpha t + 10\alpha^2 t^2$
   (ii) $1 - 8\beta t + 28\beta^2 t^2$;
   $10\alpha^2 - 40\alpha\beta + 28\beta^2$

9. $32 - 40x + 20x^2 - 5x^3 + \frac{5}{8}x^4 - \frac{x^5}{32}$;
   31·20796

10. $256 + 256x + 112x^2 + 28^3$; 258·571