

**Topic : Binomial Theorem**

Type of Questions	M.M., Min.	
Single choice Objective (no negative marking) Q.1 to 9	(3 marks, 3 min.)	[27, 27]
Subjective Questions (no negative marking) Q.10,11,12,13,14,15	(4 marks, 5 min.)	[24, 30]

1. The term independent of  $x$  in the expansion of  $\left(x - \frac{1}{x}\right)^4 \left(x + \frac{1}{x}\right)^3$  is:  
 (A)  $-3$                       (B)  $0$                       (C)  $1$                       (D)  $3$
  
2. Let the co-efficients of  $x^n$  in  $(1 + x)^{2n}$  &  $(1 + x)^{2n-1}$  be  $P$  &  $Q$  respectively, then  $\left(\frac{P+Q}{Q}\right)^5 =$   
 (A)  $9$                       (B)  $27$                       (C)  $81$                       (D) none of these
  
3. The value of  $m$ , for which the coefficients of the  $(2m + 1)^{\text{th}}$  and  $(4m + 5)^{\text{th}}$  terms in the expansion of  $(1 + x)^{10}$  are equal, is  
 (A)  $3$                       (B)  $1$                       (C)  $5$                       (D)  $8$
  
4. If  $k \in \mathbb{R}$  and the middle term of  $\left(\frac{k}{2} + 2\right)^8$  is  $1120$ , then value of  $k$  is:  
 (A)  $3$                       (B)  $2$                       (C)  $-3$                       (D)  $-4$
  
5. The remainder when  $2^{2003}$  is divided by  $17$  is :  
 (A)  $1$                       (B)  $2$                       (C)  $8$                       (D) none of these
  
6. The last two digits of the number  $3^{400}$  are:  
 (A)  $81$                       (B)  $43$                       (C)  $29$                       (D)  $01$
  
7. The last three digits in  $10!$  are :  
 (A)  $800$                       (B)  $700$                       (C)  $500$                       (D)  $600$
  
8. The value of  $\sum_{r=1}^{10} r \cdot \frac{{}^n C_r}{{}^n C_{r-1}}$  is equal to  
 (A)  $5(2n - 9)$                       (B)  $10n$                       (C)  $9(n - 4)$                       (D) none of these
  
9.  $\sum_{r=0}^{n-1} \frac{{}^n C_r}{{}^n C_r + {}^n C_{r+1}} =$   
 (A)  $\frac{n}{2}$                       (B)  $\frac{n+1}{2}$                       (C)  $(n+1) \frac{n}{2}$                       (D)  $\frac{n(n-1)}{2(n+1)}$

10. Find the middle term(s) in the expansion of

(i)  $\left(\frac{x}{y} - \frac{y}{x}\right)^7$                       (ii)  $(1 - 2x + x^2)^n$

11. Prove that the co-efficient of the middle term in the expansion of  $(1 + x)^{2n}$  is equal to the sum of the co-efficients of middle terms in the expansion of  $(1 + x)^{2n-1}$ .

12. Show that the middle term in the expansion of  $(1 + x)^{2n}$  is,  $\frac{1 \cdot 3 \cdot 5 \cdot \dots \cdot (2n-1)}{n!} 2^n \cdot x^n$ .

13. (i) Find the remainder when  $7^{98}$  is divided by 5  
(ii) Using binomial theorem prove that  $6^n - 5n$  always leaves the remainder 1 when divided by 25.  
(iii) Find the last digit, last two digits and last three digits of the number  $(27)^{27}$ .

14. Which is larger :  $(99^{50} + 100^{50})$  or  $(101)^{50}$ .

15. Find numerically greatest term(s) in the expansion of  $(3 - 5x)^{15}$  when  $x = \frac{1}{5}$

## Answers Key

1. (B)      2. (D)      3. (B)      4. (B)

5. (C)      6. (D)      7. (A)      8. (A)

9. (A)      10. (i)  $-\frac{35x}{y}, \frac{35y}{x}$       (ii)  $(-1)^n \frac{(2n)!}{n! n!} x^n$

13. (i) 4      (iii) 3, 03, 803      14.  $101^{50}$

15.  $T_4 = -455 \times 3^{12}$  and  $T_5 = 455 \times 3^{12}$

