

## Binomial Theorem

### Multiple Choice Questions

1. If in the expansion of  $(1 + x)^{20}$ , the coefficients of  $r$ th and  $(r + 4)$ th terms are equal, then  $r$  is equal to :  
(a) 7                      (b) 8                      (c) 9                      (d) 10
2. Constant term in the expansion of  $\left(x + \frac{1}{x}\right)^{10}$  is  
(a) 152                      (b) -152                      (c) -252                      (d) 252
3. Number of terms in the expansion of  $\left(2x - \frac{2}{x}\right)^{11}$  are  
(a) 11                      (b) 12                      (c) 10                      (d) 22
4. Middle term(s) in the expansion of  $\left(\frac{3}{x} - 7x\right)^{10}$  is  
(a) 5<sup>th</sup> and 6<sup>th</sup> terms      (b) 6<sup>th</sup> and 7<sup>th</sup> terms      (c) 5<sup>th</sup> term                      (d) 6<sup>th</sup> term
5. If in the expansion of  $\left(x^4 - \frac{1}{x^3}\right)^{15}$ ,  $x^{-17}$  occurs in  $r$ th term then value of  $r$  is  
(a) 10                      (b) 11                      (c) 12                      (d) 13
6. Middle term(s) in the expansion of  $\left(\frac{9}{x} - 4x\right)^{11}$  is  
(a) 5<sup>th</sup> and 6<sup>th</sup> terms      (b) 6<sup>th</sup> and 7<sup>th</sup> terms      (c) 5<sup>th</sup> term                      (d) 6<sup>th</sup> term
7. Coefficient of  $x^n$  in the expansion of  $(1 + x)(1 - x)^n$  is  
(a)  $(-1)^n(1 - n)$       (b)  $(1 - n)$                       (c)  $(n - 1)$                       (d)  $(-1)^n(n - 1)$
8. If in the expansion of  $(x + y)^n$  the coefficients of 5<sup>th</sup> and 12<sup>th</sup> terms are equal then value of  $n$  is  
(a) 18                      (b) 16                      (c) 17                      (d) 15
9. If in the expansion of  $\left(x - \frac{1}{x}\right)^{12}$ ,  $(r + 1)$ th term is independent of  $x$  then  $r$  is  
(a) 7                      (b) 6                      (c) 8                      (d) 5
10. If  $n$  is any natural number then  $9^{n+1} - 8n - 9$  is always divisible by  
(a) 64                      (b) 81                      (c) 72                      (d) 90

### 2 & 4 Marks Questions

1. Expand the following by binomial theorem :      (i)  $\left(\frac{2}{x} - \frac{x}{2}\right)^7$                       (ii)  $\left(3x^2 - \frac{1}{4y}\right)^{10}$
2. Find  $(x + 1)^6 + (x - 1)^6$  and hence evaluate  $(\sqrt{2} + 1)^6 + (\sqrt{2} - 1)^6$ .

3. Using binomial theorem show that  $9^{n+1} - 8n - 9$  is divisible by 64 .
4. Using binomial theorem, show that  $6^n - 5n - 1$  is divisible by 25.
5. Using binomial theorem, show that  $(1.01)^{1000000} > 10000$  .
6. Show that middle term in the expansion of  $(1+x)^{2n}$  is  $\frac{1.3.5.7.....(2n-1)}{n!} 2^n x^n$  .
7. Find the coefficient of  $x^{10}$  in the expansion of  $\left(x^2 - \frac{2}{x}\right)^{11}$  .
8. Find the coefficient of  $x^8$  in the expansion of  $\left(x^2 - \frac{1}{x}\right)^{10}$  .
9. Find the middle terms in the expansion of : (i)  $\left(3 - \frac{x^3}{6}\right)^{10}$  (ii)  $\left(4x - \frac{6}{x^2}\right)^{11}$  (iii)  $(5x + 2y^3)^{13}$   
(iv)  $\left(3x + \frac{7y}{x^2}\right)^{12}$  .
10. The coefficient of  $(r-1)^{th}$ ,  $r^{th}$  and  $(r+1)^{th}$  terms in the expansion of  $(1+x)^n$  are in the ratio 1:3:5. Find  $n$  and  $r$ .
11. The second , third and fourth terms in the binomial expansion  $(x+a)^n$  are 240, 720 and 1080 respectively. Find  $x$ ,  $a$  and .
12. If the coefficients of  $(r-5)^{th}$  and  $(2r-1)^{th}$  terms in the expansion of  $(1+x)^{34}$  are equal then find .

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