

# Mathematical Aptitude

## Exponents and Powers

### Skill Based Questions

#### Q.1. Multiple choice questions:

**Directions:** Read the following questions and choose the answer that best answers the questions.

1.  $5^{\sqrt{x}} + 12^{\sqrt{x}} = 13^{\sqrt{x}}$ . Value of  $x$  in expression is  
(a) 4 (b) 3 (c) 2 (d) 1
2. The fourth root of  $28 + 16\sqrt{3}$  is  
(a)  $4 + 2\sqrt{3}$  (b)  $2\sqrt{2} + \sqrt{3}$  (c)  $\sqrt{3} + 1$  (d)  $\sqrt{3} - \sqrt{2}$
3. In which of the following is  $p > q$ ?  
I.  $(0.9)^p > (0.9)^q$  II.  $(1.8)^p < (1.8)^q$  III.  $(8.5)^p > (8.5)^q$  IV.  $\left(\frac{1}{2}\right)^p < \left(\frac{1}{2}\right)^q$   
(a) I and IV (b) II and III (c) III and IV (d) II and IV
4. In a cricket match, the number of runs scored by any team is equal to power of the number of batsmen playing in the team. Six batsmen played in team A and eleven batsmen played in team B. If team A won by 95 runs, then the runs scored by team A.  
(a) 216 (b) 220 (c) 210 (d) 230
5. The values of  $x$  and  $y$  that satisfy both the equations  $2^{0.7x} \cdot 3^{-1.25y} = 8\frac{\sqrt{6}}{27}$  and  $4^{0.3x} \cdot 9^{0.2y} = 8.(81)^{1/5}$  are  
(a)  $x = 2, y = 5$  (b)  $x = 2.5, y = 6$  (c)  $x = 3, y = 5$  (d)  $x = 5, y = 2$

6. If  $x, y, z$ , are positive real number and  $a, b, c$  are rational numbers, then the value of

$$\frac{1}{1+x^{b-a}+x^{c-a}} + \frac{1}{1+x^{a-b}+x^{c-b}} + \frac{1}{1+x^{b-c}+x^{a-c}}$$

- (a)  $-1$  (b)  $1$  (c)  $0$  (d) none of these

7.  $3 \times 10^3 + 2 \times 10^1 + 4 \times 10^x + 5 \times 10^y = 3024.05$ , where  $x$  and  $y$  are integers. The value of  $x$  and  $y$  are

- (a)  $x=0, y=0$  (b)  $x=-2, y=-2$  (c)  $x=-2, y=0$  (d)  $x=0, y=-2$

8. Simplest form of  $\left( \frac{q^{3-7q} \times q^{6-2q}}{q^{2q} \times q^{9-2q}} \right)^{1/9}$  is

- (a)  $\frac{1}{q^q}$  (b)  $\frac{1}{q}$  (c)  $q$  (d) None

## Q.2. Subjective questions:

1. If  $x$  is a rational number and  $a, b, c$  are all different integers, then prove that

(i)  $x^{a-b} \times x^{b-a} = 1$  (ii)  $x^{a-b} \times x^{b-c} \times x^{c-a} = 1$  (iii)  $\frac{x^a}{x^b} \times \frac{x^b}{x^c} \times \frac{x^c}{x^a} = 1$

**Ans.** .....  
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2. Is  $p^{2n+5}$  the simplest form of  $p^{n+1} \times p^{2n+1} \times p^{3-n}$ .

**Ans.** .....  
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3. (i) If  $5^{n+2} = 625$ , then find  $[(n+3)]^{1/3}$ .

(ii) If  $\left( \frac{32}{243} \right)^n = \frac{8}{27}$ , then find  $\left( \frac{n+0.4}{1024} \right)^{-n}$ .

**Ans.** .....  
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4. If  $21168 = x^4 \times x^3 \times z^2$ , find  $(x + y + z)^{\left(\frac{y+z}{x+y}\right)}$ , where  $x$ ,  $y$  and  $z$  are positive integers.

**Ans.** .....  
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5. If  $5^x = 3^y = 45^z$ , then prove that  $\frac{1}{z} = \frac{1}{x} + \frac{2}{y}$ .

**Ans.** .....  
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6. Prove that  $\frac{1}{1+p+q^{-1}} + \frac{1}{1+p+r^{-1}} + \frac{1}{1+r+p^{-1}} = 1$ , if  $pqr = 1$

**Ans.** .....  
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7. Find the value of  $\left[\left(\frac{a}{b}\right)^{\sqrt{p}+\sqrt{q}}\right]^{\sqrt{p}-\sqrt{q}} \times \left[\left(\frac{a}{b}\right)^{\sqrt{q}+\sqrt{r}}\right]^{\sqrt{q}-\sqrt{r}} \times \left[\left(\frac{a}{b}\right)^{\sqrt{r}+\sqrt{p}}\right]^{\sqrt{r}-\sqrt{p}}$

**Ans.** .....  
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8. Prove that  $\left(\frac{x^{-1}+y^{-1}}{x^{-1}}\right)^{-1} + \left(\frac{x^{-1}-y^{-1}}{x^{-1}}\right)^{-1} = \frac{2y^2}{y^2-x^2}$ .

**Ans.** .....  
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9. Find the value of  $\left[ \left( \sqrt[6]{7} \right)^2 + \left( \sqrt[6]{7} \right)^{-2} \right] \left[ \left( \sqrt[6]{7} \right)^4 - 1 + \left( \sqrt[6]{7} \right)^{-4} \right]$ .

**Ans.** .....  
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