

# SURDS AND INDICES

## घातांक और करणी

### PRACTICE SHEET

#### WITH SOLUTIONS

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 Rankers Gurukul

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# Surds & Indices/घातांक और करणी

## ( Practice Sheet With Solution)

### Level-01

1. The value of  $\sqrt{7\sqrt{7\sqrt{7\ldots\infty}}}$  is

$\sqrt{7\sqrt{7\sqrt{7\ldots\infty}}}$  का मान है

- (a) 5 (b) 6  
(c) 7 (d) None

2. The value of  $\sqrt{12 + \sqrt{12 + \sqrt{12 + \ldots\infty}}}$  is

$\sqrt{12 + \sqrt{12 + \sqrt{12 + \ldots\infty}}}$  का मान है

- (a) 4 (b) 3  
(c) 2 (d) 12

3. The value of  $\sqrt{30 - \sqrt{30 - \sqrt{30 - \ldots\infty}}}$  is:

$\sqrt{30 - \sqrt{30 - \sqrt{30 - \ldots\infty}}}$  का मान है

- (a) 5 (b) 6  
(c) 7 (d) 30

4. If  $\left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3}$  then the value of  $x$  is:

यदि  $\left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3}$  तब  $x$  का मान है:

- (a)  $\frac{3}{2}$  (b) 3  
(c) 2 (d)  $\frac{2}{3}$

5. The value of  $(256)^{0.16} \times (256)^{0.09}$  is:

$(256)^{0.16} \times (256)^{0.09}$  का मान क्या है?

- (a) 256.25 (b) 64  
(c) 4 (d) 16

6. Which one of the following is the least?

$\sqrt{3}, \sqrt[3]{2}, \sqrt{2}$  and  $\sqrt[3]{4}$  ?

निम्नलिखित में से कौन सा सबसे छोटा है?

$\sqrt{3}, \sqrt[3]{2}, \sqrt{2}$  और  $\sqrt[3]{4}$

- (a)  $\sqrt{2}$  (b)  $\sqrt[3]{2}$   
(c)  $\sqrt{3}$  (d)  $\sqrt[3]{4}$

7. Which one of the following is the biggest?

$\sqrt[3]{4}, \sqrt[4]{6}, \sqrt[6]{15}$  and  $\sqrt[12]{245}$

निम्नलिखित में से कौन सा सबसे बड़ा है?

$\sqrt[3]{4}, \sqrt[4]{6}, \sqrt[6]{15}$  and  $\sqrt[12]{245}$

- (a)  $\sqrt[3]{4}$  (b)  $\sqrt[4]{6}$   
(c)  $\sqrt[6]{15}$  (d)  $\sqrt[12]{245}$

8. If cube root of 175616 is 56, then the value of  $\sqrt[3]{175.616} + \sqrt[3]{0.175616} + \sqrt[3]{0.000175616}$  is equal to

यदि 175616 का घनमूल 56 है, तो  $\sqrt[3]{175.616}, \sqrt[3]{0.175616}, \sqrt[3]{0.000175616}$  का मान बराबर है

- (a) 0.168 (b) 62.16  
(c) 6.216 (d) 6.116

9. Which among  $2^{\frac{1}{2}}, 3^{\frac{1}{3}}, 4^{\frac{1}{4}}, 6^{\frac{1}{6}}$  and  $12^{\frac{1}{2}}$  is the largest?

$2^{\frac{1}{2}}, 3^{\frac{1}{3}}, 4^{\frac{1}{4}}, 6^{\frac{1}{6}}$  और  $12^{\frac{1}{2}}$  में से कौन सा सबसे बड़ा है?

- (a)  $2^{\frac{1}{2}}$  (b)  $3^{\frac{1}{3}}$   
(c)  $4^{\frac{1}{4}}$  (d)  $6^{\frac{1}{6}}$

10. The greatest of the numbers  $(2.89)^{0.5}, 2 - (0.5)^2,$

$\left(1 + \frac{0.5}{1 - \frac{1}{2}}\right), \sqrt{3}$  is

सबसे बड़ी संख्या  $(2.89)^{0.5}, 2 - (0.5)^2, \left(1 + \frac{0.5}{1 - \frac{1}{2}}\right), \sqrt{3}$  है

- (a)  $(2.89)^{0.5}$  (b)  $2 - (0.5)^2$   
(c) 2 (d)  $\sqrt{3}$

11. The greatest number among  $2^{60}, 3^{48}, 4^{36}$ , and  $5^{24}$  is :

इनमें सबसे बड़ी संख्या कौन सी है  $2^{60}, 3^{48}, 4^{36}, 5^{24}$  ?

- (a)  $2^{60}$  (b)  $3^{48}$   
(c)  $4^{36}$  (d)  $5^{24}$

12. The largest numbers among  $0.16, \sqrt{0.16}, (0.16)^2, 0.04$  is:

निम्न  $0.16, \sqrt{0.16}, (0.16)^2, 0.04$  में सबसे बड़ी संख्या कौन-सी है?

- (a)  $0.16$  (b)  $\sqrt{0.16}$   
(c)  $(0.16)^2$  (d)  $0.04$

13. Which is the greatest among  $(\sqrt{19} - \sqrt{17}), (\sqrt{13} - \sqrt{11}), (\sqrt{7} - \sqrt{5})$  and  $(\sqrt{5} - \sqrt{3})$ ?

$(\sqrt{19} - \sqrt{17}), (\sqrt{13} - \sqrt{11}), (\sqrt{7} - \sqrt{5}), (\sqrt{5} - \sqrt{3})$   
सबसे बड़ी संख्या कौन सी है?

- (a)  $\sqrt{19} - \sqrt{7}$  (b)  $\sqrt{13} - \sqrt{11}$   
(c)  $\sqrt{7} - \sqrt{5}$  (d)  $\sqrt{5} - \sqrt{3}$

14. If  $\frac{9^n \times 3^5 \times (27)^3}{3 \times (81)^4} = 27$ , then the value of  $n$  is:

यदि  $\frac{9^n \times 3^5 \times (27)^3}{3 \times (81)^4} = 27$ , तो  $n$  का मान है:

- (a) 0 (b) 2  
(c) 3 (d) 4

15. The value of  $5^x \times 25^{x-1} \div (5^{x-1} \times 25^{x-1})$

$5^x \times 25^{x-1} \div (5^{x-1} \times 25^{x-1})$  का मान है

- (a) 2 (b) 5  
(c) 7 (d) 9

16. If  $m$  and  $n$  are whole numbers such that  $m^n = 121$ , then  $(m-1)^{n+1} = ?$

यदि  $m$  और  $n$  पूर्ण संख्याएँ हैं जैसे कि  $m^n = 121$ , तो  $(m-1)^{n+1} = ?$

- (a) 100 (b) 1000  
(c) 10000 (d) 10

17. The value of/का मान है  $\sqrt{5 + \sqrt{35 - 26 + \sqrt{448 + 7}}}$

ICAR Mains, 10/07/2023 (Shift-1)

- (a) 4 (b) 7  
(c) 6 (d) 5

18. The value of/का मान कितना होगा  $\sqrt[3]{50 + \sqrt[3]{216 + \sqrt[3]{512}}}$

ICAR Mains, 10/07/2023 (Shift-2)

- (a) 8 (b) 6  
(c) 4 (d) 5

19. Which of the following is the smallest among

$(14)^{\frac{1}{3}}, (12)^{\frac{1}{2}}, (16)^{\frac{1}{6}}$  and  $(25)^{\frac{1}{12}}$  ?

निम्नलिखित में सबसे छोटा कौन है?

$(14)^{\frac{1}{3}}, (12)^{\frac{1}{2}}, (16)^{\frac{1}{6}}$  और  $(25)^{\frac{1}{12}}$  ?

SSC CHSL 10/03/2023 (Shift-03)

- (a)  $(14)^{\frac{1}{3}}$  (b)  $(25)^{\frac{1}{12}}$

- (c)  $(16)^{\frac{1}{6}}$  (d)  $(12)^{\frac{1}{2}}$

20. Which of the following is largest among निम्नलिखित में सबसे बड़ा कौन है?

$(125)^{\frac{1}{6}}, (11)^{\frac{1}{3}}, (12)^{\frac{1}{6}}, (5)^{\frac{1}{4}}$  ?

SSC CHSL 21/03/2023 (Shift-03)

- (a)  $(12)^{\frac{1}{6}}$  (b)  $(11)^{\frac{1}{3}}$

- (c)  $(125)^{\frac{1}{6}}$  (d)  $(5)^{\frac{1}{4}}$

21. The value of/का मान ज्ञात करें।

$$\frac{\sqrt[3]{-2744} \times \sqrt[3]{-216}}{\sqrt[3]{\frac{64}{729}}}$$

SSC CPO 09/11/2022 (Shift-01)

- (a) 164 (b) 512  
(c) 189 (d) 156

22. The value of  $\frac{1}{\sqrt{7-4\sqrt{3}}}$  is closest to:/का मान इनमें से किसके निकटतम है?

SSC CPO 09/12/2019 (Shift-02)

- (a) 4.1 (b) 4.2  
(c) 1.2 (d) 3.7

23. The value of  $\sqrt{11+2\sqrt{18}}$  is closest to/का मान किसके निकटतम है?

SSC CPO 11/12/2019 (Shift-02)

- (a) 4.8 (b) 4.4  
(c) 3.8 (d) 4.1

24. Find the value of/का मान ज्ञात करें।

$$\sqrt{3 + \sqrt{27 + \sqrt{73 + \sqrt{64}}}}$$

UP Constable 28/01/2019 (Shift-01)

- (a) 1 (b) 2  
(c) 3 (d) 4

25. Simplify/सरल कीजिए

$$\sqrt{694 - \sqrt{337 - \sqrt{191 - \sqrt{484}}}}$$

RPf Constable 04/02/2019 (Shift-01)

- (a) 29 (b) 25  
(c) 24 (d) 26

26. Evaluate/का मान ज्ञात करें।

$$\sqrt{93 + \sqrt{32 + \sqrt{274 + \sqrt{225}}}}$$

RRB ALP & TECH 31/08/2018 (Shift-03)

- (a) 9 (b) 11  
(c) 12 (d) 10

27. Solve the following/निम्नलिखित को हल कीजिए।

$$\sqrt{51 + \sqrt{134 + 5\sqrt{42 + \sqrt{16 + \sqrt{9}}}}}$$

NTPC CBT-01 11/01/2021 (Shift-02)

- (a) 197 (b) 520  
(c) 8 (d) 64

28. Find the value of X

X का मान ज्ञात करें।

$$X = \sqrt{587 - \sqrt{121}} + \sqrt{2316 - \sqrt{180 - \sqrt{1296}}}$$

UPSI 12/11/2021 (Shift-02)

- (a) 2 (b) 1  
(c) 0.5 (d) 4

29. What value should come in place of the following question mark?

निम्नलिखित प्रश्न चिह्न के स्थान पर क्या मान आना चाहिए?

$$\sqrt{12.96} \times \sqrt{7.84} + \sqrt{3.24} \times \sqrt{31.36} = ?$$

UPSI 12/11/2021 (Shift-02)

- (a) 56.58 (b) 26.35  
(c) 78.45 (d) 31.36

30. What value should come in place of the following question mark?

निम्नलिखित प्रश्न चिह्न के स्थान पर क्या मान आना चाहिए?

$$6 + (5\sqrt{5})^2 = ? - (\sqrt{5})^2 + 195$$

UPSI 15/11/2021 (Shift-02)

- (a) -57 (b) -63  
(c) -61 (d) -59

31. Find the value of X

X का मान ज्ञात करें।

$$\sqrt{(155 - X)} = \sqrt{(135 + \sqrt{81})}$$

UPSI 16/11/2021 (Shift-02)

- (a) 17 (b) 15  
(c) 11 (d) 12

32. Solve/हल कीजिए:

$$(\sqrt{19.36} + \sqrt{4.84} \times \sqrt{43.56} + \sqrt{4.84}) = ?$$

UPSI 16/11/2021 (Shift-03)

(a) 21.12

(b) 17.05

(c) 15.15

(d) 19.32

33. Solve/हल करें:

$$\sqrt{1031 - \sqrt{61 - \sqrt{138 + \sqrt{36}}}}$$

UPSI 30/11/2021 (Shift-01)

(a) 35

(b) 65

(c) 32

(d) 48

34. Solve/हल करें:

$$4 + (3\sqrt{5})^2 = x - (\sqrt{5})^2 + 191$$

UPSI 30/11/2021 (Shift-01)

(a) -127

(b) -110

(c) -117

(d) -137

35. Solve/हल करें:

$$(\sqrt{26.01} + \sqrt{2.89} \times \sqrt{46.24} + \sqrt{2.89}) + (\sqrt{26.01} + \sqrt{2.89} \times \sqrt{46.24} + \sqrt{2.89})$$

UPSI 2/12/2021 (Shift-03)

(a) 36

(b) 12

(c) 48

(d) 24

36. Find the value of x

x का मान ज्ञात करें।

$$\sqrt{(140 - x)} = \sqrt{13 + \sqrt{144}}$$

UPSI 24/11/2021 (Shift-03)

(a) 125

(b) 115

(c) 110

(d) 120

37. Solve/हल कीजिए:

$$(\sqrt{38.44} + \sqrt{9.61} \times \sqrt{86.49} + \sqrt{9.61})^2$$

UPSI 20/11/2021 (Shift-1)

(a) 24

(b) 36

(c) 48

(d) 42

38. Simplify/सरल कीजिए

$$\frac{(3\sqrt{5} + \sqrt{125})}{(\sqrt{80} + 6\sqrt{5})} = ?$$

NTPC CBT-01 13/01/2021 (Shift-01)

(a)  $\frac{5}{4}$

(b)  $\frac{4}{5}$

(c)  $\frac{7}{9}$

(d)  $\frac{9}{5}$

39. Find the value of/का मान ज्ञात करें?  $\left\{ \left( -\frac{1}{729} \right)^{\left( -\frac{2}{3} \right)} \right\}$

UPSI 15/12/2017 (Shift-03)

(a)  $\frac{1}{81}$  (b)  $-81$

(c)  $-\frac{1}{81}$  (d)  $81$

40. Simplify/सरल कीजिए:

$$\frac{(542 + 321)^2 - (542 - 321)^2}{542 \times 321}$$

NTPC CBT-01 09/01/2021 (Shift-02)

(a)  $\frac{642}{271}$  (b)  $1$

(c)  $4$  (d)  $\frac{1}{271}$

41. Simplify/सरल कीजिए:

$$\frac{5.5^3 - 4^3}{30.25 + 22 + 16}$$

NTPC CBT-02 16/06/2022 (Shift-02)

(a)  $9.5$  (b)  $0.75$   
(c)  $1.5$  (d)  $14.25$

42. Find the value of/का मान ज्ञात कीजिए।

$$\frac{\{(13)^3 - 4^3\}}{13 - 8 + 2} \div 8 - \{2 + 6 \times 9\}$$

NTPC CBT-01 21/01/2021 (Shift-01)

(a)  $-\frac{217}{8}$  (b)  $-\frac{211}{8}$

(c)  $\frac{685}{8}$  (d)  $-\frac{685}{8}$

### Level-02

43. The value of  $(x^{b+c})^{b-c} (x^{a+c})^{c-a} (x^{b+a})^{a-b} (x \neq 0)$  is

$(x^{b+c})^{b-c} (x^{a+c})^{c-a} (x^{b+a})^{a-b} (x \neq 0)$  का मान है

(a)  $1$  (b)  $2$   
(c)  $-1$  (d)  $0$

44. If  $6^x = 3^y = 2^z$ , then what is the value of

$$\frac{1}{y} + \frac{1}{z} - \frac{1}{x} ?$$

यदि  $6^x = 3^y = 2^z$  है, तो  $\frac{1}{y} + \frac{1}{z} - \frac{1}{x}$  का मान क्या है?

SSC CHSL 20/03/2023 (Shift-02)

(a)  $1$  (b)  $0$   
(c)  $3$  (d)  $6$

45. If  $a^x = b$ ,  $b^y = c$ ,  $c^z = a$  and  $b^2 = ac$ , then  $y$  equals:

यदि  $a^x = b$ ,  $b^y = c$ ,  $c^z = a$  और  $b^2 = ac$  है, तो  $y$  बराबर है:

(a)  $\frac{xy}{x+z}$  (b)  $\frac{xz}{2(x-z)}$

(c)  $\frac{xz}{2(z-x)}$  (d)  $\frac{2xz}{(x+z)}$

46. If  $x = 5 + 2\sqrt{6}$ , then  $\frac{(x-1)}{\sqrt{x}}$  is equal to:

यदि  $x = 5 + 2\sqrt{6}$  है, तो  $\frac{(x-1)}{\sqrt{x}}$  बराबर है:

(a)  $\sqrt{2}$  (b)  $2\sqrt{2}$

(c)  $\sqrt{3}$  (d)  $2\sqrt{3}$

47. The value of  $\frac{(243)^{0.13} \times (243)^{0.07}}{(7)^{0.25} \times (49)^{0.075} \times (343)^{0.2}}$

$\frac{(243)^{0.13} \times (243)^{0.07}}{(7)^{0.25} \times (49)^{0.075} \times (343)^{0.2}}$  का मान है।

(a)  $\frac{3}{7}$  (b)  $\frac{5}{7}$

(c)  $\frac{7}{3}$  (d)  $\frac{7}{5}$

48. Simplify/सरल करें :

$$\left\{ (6.25)^{\frac{1}{2}} \times (0.0144)^{\frac{1}{2}} + \{0.027\}^{\frac{1}{3}} \times (81)^{\frac{1}{4}} \right\}$$

(a)  $0.14$  (b)  $1.4$   
(c)  $1$  (d)  $1.2$

49. If  $3^{2x+3} - 244 \times 3^x = -9$ , then which of the following statements is true?

यदि  $3^{2x+3} - 244 \times 3^x = -9$ , तो निम्नलिखित में से कौन सा कथन सत्य है?

- (a) 'X' is a positive number  
(b) 'X' is a negative number  
(c) 'X' can be either a positive number or a negative number  
(d) None of the above

50. If  $x = -0.5$ , then which of the following has the smallest value?

यदि  $x = -0.5$  है, तो निम्नलिखित में से किसका मान सबसे छोटा है?

(a)  $2^{\frac{1}{x}}$  (b)  $\frac{1}{x}$

(c)  $\frac{1}{x^2}$  (d)  $2^x$

51. Given that  $10^{0.48} = x$ ,  $10^{0.70} = y$  and  $x^z = y^2$ , then the value of  $z$  is close to:

यह देखते हुए कि  $10^{0.48} = x$ ,  $10^{0.70} = y$  और  $x^z = y^2$ , तो  $z$  का मान किसके करीब है:

- (a) 45 (b) 88  
(c) 2.9 (d) 3.7

52. If  $\sqrt[3]{7^a \times (35)^{(b+1)} \times (20)^{(c+2)}}$  is a whole number then, which one of statements below is consistent with it?

यदि  $\sqrt[3]{7^a \times (35)^{(b+1)} \times (20)^{(c+2)}}$  एक पूर्ण संख्या है, तो नीचे दिए गए कथनों में से कौन सा इसके अनुरूप है?

- (a)  $a = 3, b = 2, c = 1$   
(b)  $a = 3, b = 1, c = 1$   
(c)  $a = 2, b = 1, c = 2$   
(d)  $a = 1, b = 2, c = 1$

53. If  $a, b, c$  are non-zero and  $14^a = 36^b = 84^c$ , then

$6b\left(\frac{1}{c} - \frac{1}{a}\right)$  is equal to

यदि  $a, b, c$  शून्येतर हैं और  $14^a = 36^b = 84^c$  है, तो

$6b\left(\frac{1}{c} - \frac{1}{a}\right)$  बराबर है

- (a) 3 (b) 2  
(c) 1 (d) 5

54. Simplify/को सरलीकृत कीजिए-

$$\left(\frac{2+\sqrt{3}}{2-\sqrt{3}} + \frac{2-\sqrt{3}}{2+\sqrt{3}} + \frac{\sqrt{3}-1}{\sqrt{3}+1}\right)$$

- (a)  $2 - \sqrt{3}$  (b)  $2 + \sqrt{3}$   
(c)  $16 - \sqrt{3}$  (d)  $4 - \sqrt{3}$

55. Let  $x = \sqrt{4 + \sqrt{4 - \sqrt{4 + \sqrt{4 - \dots}}}}$  then  $x$  equals

मान लीजिए  $x = \sqrt{4 + \sqrt{4 - \sqrt{4 + \sqrt{4 - \dots}}}}$  तो  $x$  बराबर है

- (a) 3 (b)  $\sqrt{13}$   
(c)  $\frac{\sqrt{3}-1}{2}$  (d)  $\frac{\sqrt{13}+1}{2}$

56. Let  $x = \sqrt{6 - \sqrt{6 + \sqrt{6 - \sqrt{6 + \dots}}}}$  then  $x$  equals

मान लीजिए  $x = \sqrt{6 - \sqrt{6 + \sqrt{6 - \sqrt{6 + \dots}}}}$  तो  $x$  बराबर है

- (a)  $\frac{\sqrt{21}-1}{2}$  (b)  $\frac{\sqrt{21}+1}{2}$   
(c) 2 (d) 12

57. The value of  $\sqrt{5\sqrt{5\sqrt{5\sqrt{5}}}}$  is

$\sqrt{5\sqrt{5\sqrt{5\sqrt{5}}}}$  का मान है

- (a) 5 (b)  $5^{\frac{15}{16}}$   
(c) 10 (d)  $5^{\frac{17}{16}}$

58. The value of/का मान क्या होगा?

$$\sqrt{\frac{(0.1)^2 + (0.01)^2 + (0.009)^2}{(0.01)^2 + (0.001)^2 + (0.0009)^2}}$$
 is:

- (a)  $10^2$  (b) 10  
(c) 0.1 (d) 0.01

59. The value of/का मान क्या होगा?

$$\sqrt{\frac{(0.03)^2 + (0.21)^2 + (0.065)^2}{(0.003)^2 + (0.021)^2 + (0.0065)^2}}$$
 is

- (a) 0.1 (b) 10  
(c)  $10^2$  (d)  $10^3$

60. If  $\sqrt{0.05 \times 0.5 \times a} = 0.5 \times 0.05 \times \sqrt{b}$ , then  $\frac{a}{b}$  is equal to

यदि  $\sqrt{0.05 \times 0.5 \times a} = 0.5 \times 0.05 \times \sqrt{b}$  तो  $\frac{a}{b}$  बराबर है

- (a) 0.0025 (b) 0.025  
(c) 0.25 (d) 0.00025

61. Simplify/सरल करें?

$$\sqrt{(12.1)^2 - (8.1)^2 + [(0.25)^2 + (0.25)(19.95)]}$$

- (a) 1 (b) 2  
(c) 3 (d) 4

62. The square root of/का वर्गमूल ज्ञात करें?

$$\frac{0.75^3}{1-0.75} + [0.75 + (0.75)^2 + 1]?$$

- (a) 4 (b) 3  
(c) 2 (d) 1

63. The value of /का मान ज्ञात कीजिए?

$$\frac{1}{\sqrt{3.25} + \sqrt{2.25}} + \frac{1}{\sqrt{4.25} + \sqrt{3.25}} +$$

$$\frac{1}{\sqrt{5.25} + \sqrt{4.25}} + \frac{1}{\sqrt{6.25} + \sqrt{5.25}}$$

- (a) 1.00 (b) 1.25  
(c) 1.50 (d) 2.25

64. The value of /का मान ज्ञात करें?

$$\frac{1}{\sqrt{(12 - \sqrt{140})}} - \frac{1}{\sqrt{(8 - \sqrt{60})}} - \frac{2}{\sqrt{(10 + \sqrt{84})}}$$

- (a) 0 (b) 1  
(c) 2 (d) 3

65. Given  $\sqrt{10} + \sqrt{24} + \sqrt{40} + \sqrt{60} = \sqrt{p} + \sqrt{q} + \sqrt{r}$   
then, find (p + q + r)

दिया गया  $\sqrt{10} + \sqrt{24} + \sqrt{40} + \sqrt{60} = \sqrt{p} + \sqrt{q} + \sqrt{r}$   
तब (p + q + r) का मान है।

- (a) 9 (b) 10  
(c) 8 (d) 11

66. The simplified value of/का सरलीकृत मान क्या होगा

$$\frac{1}{\sqrt{2} + \sqrt{3} - \sqrt{5}} + \frac{1}{\sqrt{2} - \sqrt{3} - \sqrt{5}} ?$$

- (a) 0 (b) 1  
(c)  $\sqrt{2}$  (d)  $\frac{1}{\sqrt{2}}$

67. If  $3^x = 9^y = 27^z$  and

$$\frac{1}{3x} + \frac{1}{6y} + \frac{1}{9z} = \frac{32}{3}, \text{ find } z.$$

यदि  $3^x = 9^y = 27^z$  और  $\frac{1}{3x} + \frac{1}{6y} + \frac{1}{9z} = \frac{32}{3}$  है, तो  
z ज्ञात कीजिए।

CRPF HCM 01/03/2023 (Shift - 01)

- (a)  $\frac{1}{5}$  (b)  $\frac{5}{8}$   
(c)  $\frac{1}{32}$  (d)  $\frac{8}{5}$

68. Solve the equation  $3^{2x+1} - 3^x = 3^{x+3} - 3^2$ .

समीकरण  $3^{2x+1} - 3^x = 3^{x+3} - 3^2$  को हल कीजिए।

CRPF HCM 01/03/2023 (Shift - 02)

- (a) 2, -2 (b) 2, 3  
(c) -1, 2 (d) -1, 1

69. The value of  $\sqrt{6 - \sqrt{17 - 2\sqrt{72}}}$  is closest to/का मान  
किसके निकटतम है?

SSC CPO 12/12/2019 (Shift-01)

- (a) 2.1 (b) 2.4  
(c) 2.7 (d) 1.7

70. The value of  $\sqrt{9 - 2\sqrt{11 - 6\sqrt{2}}}$  is closest to:/का मान  
किसके निकटतम है?

SSC CPO 13/12/2019 (Shift-01)

- (a) 2.7 (b) 2.9  
(c) 2.4 (d) 2.1

71. The value of  $\frac{1}{\sqrt{17 + 12\sqrt{2}}}$  is closest to/का मान  
किसके निकटतम है?

SSC CPO 13/12/2019 (Shift-02)

- (a) 1.2 (b) 0.14  
(c) 1.4 (d) 0.17

72. Simplify/सरल कीजिए

$$\frac{7 + 3\sqrt{5}}{3 + \sqrt{5}} + \frac{7 - 3\sqrt{5}}{3 - \sqrt{5}}$$

NTPC CBT-02 14/06/2022 (Shift-02)

- (a) 14 (b) 6  
(c) 3 (d) 4

73. Find the value of/का मान ज्ञात कीजिए।

$$\left( \frac{\sqrt{3}-1}{\sqrt{3}+1} + \frac{\sqrt{3}+1}{\sqrt{3}-1} + \frac{2-\sqrt{3}}{2+\sqrt{3}} + \frac{2+\sqrt{3}}{2-\sqrt{3}} \right)$$

NTPC CBT-01 13/01/2021 (Shift-02)

- (a) 18 (b) 14  
(c) 16 (d) 20

74. Find 'x'/ज्ञात करें।

$$(x)^2 + (146)^2 = (232)^2 - (52)^2 - 5468$$

UPSI 13/12/2017 (Shift-03)

- (a) 158 (b) 183  
(c) 156 (d) 162

75. Find the value of x in the following equation.

निम्न समीकरण में x का मान ज्ञात करें।

$$8^{2.3} \times 4^{0.8} \times 16^{0.4} = 2^x$$

UPSI 13/12/2017 (Shift-02)

- (a) 11.4 (b) 10.2  
(c) 7.7 (d) 10.1

76. If  $95^{2.4} \times 95^{1.3} \div 95^{9989} = 95^n$  find the value of  $n$ ?

यदि  $95^{2.4} \times 95^{1.3} \div 95^{9989} = 95^n$  तो  $n$  का मान ज्ञात करें?

UPSI 15/12/2017 (Shift-02)

- (a) 2.7011 (b) 0.027011  
(c) 0.27011 (d) 27.011

77. Find the value of/का मान ज्ञात करें?

$$\frac{(1024^{0.13} \times 1024^{0.07})}{(7^{0.25} \times 49^{0.075} \times 343^{0.2})}$$

UPSI 20/12/2017 (Shift-02)

- (a)  $\frac{3}{49}$  (b)  $\frac{3}{16}$   
(c)  $\frac{3}{52}$  (d)  $\frac{4}{7}$

78. Find the value of the following./निम्न का मान ज्ञात करें

$$\sqrt[8]{3(81^2)^3}$$

UPSI 20/12/2017 (Shift-02)

- (a) 5 (b) 9  
(c) 11 (d) 3

### Level-03

79. Given that  $x^{2018} y^{2017} = \frac{1}{2}$  and  $x^{2016} y^{2019} = 8$ , the value of  $x^2 + y^3$  is

यह देखते हुए कि  $x^{2018} y^{2017} = \frac{1}{2}$  और  $x^{2016} y^{2019} = 8$ ,  $x^2 + y^3$  का मान है।

- (a)  $\frac{37}{4}$  (b)  $\frac{31}{4}$   
(c)  $\frac{35}{4}$  (d)  $\frac{33}{4}$

80. Given  $A = 2^{65}$  and  $B = (2^{64} + 2^{63} + 2^{62} + \dots + 2^0)$ , which of the following is true?

$A = 2^{65}$  और  $B = (2^{64} + 2^{63} + 2^{62} + \dots + 2^0)$  दिया गया है, निम्नलिखित में से कौन सा सत्य है?

- (a) B is  $2^{64}$  larger than A  
(b) A and B are equal  
(c) B is larger than A by 1  
(d) A is larger than B by 1

81. If  $\left(\frac{p^{-1}q^2}{p^3q^{-2}}\right)^{\frac{1}{3}} \div \left(\frac{p^6q^{-3}}{p^{-2}q^3}\right)^{\frac{1}{3}} = p^a q^b$ , then the value of  $a + b$ , where P and q are different positive primes, is

यदि,  $\left(\frac{p^{-1}q^2}{p^3q^{-2}}\right)^{\frac{1}{3}} \div \left(\frac{p^6q^{-3}}{p^{-2}q^3}\right)^{\frac{1}{3}} = p^a q^b$  है तो  $a + b$  का मान है, जहाँ P और q अलग-अलग धनात्मक अभाज्य संख्याएँ हैं

- (a) -1 (b)  $-\frac{2}{3}$   
(c)  $\frac{4}{3}$  (d) 2

82. If  $x =$

$\sqrt{4 + \sqrt{10 + 2\sqrt{5}}} + \sqrt{4 - \sqrt{10 + 2\sqrt{5}}}$ , then the value of  $x$  lies between:

यदि  $x = \sqrt{4 + \sqrt{10 + 2\sqrt{5}}} + \sqrt{4 - \sqrt{10 + 2\sqrt{5}}}$ , तो  $x$  का मान इनके बीच स्थित है:

CRPF HCM 28/02/2023 (Shift - 03)

- (a) 3.8 and 4.2 (b) 3.4 and 4.8  
(c) 3 and 3.4 (d) 2.6 and 3

83. If  $(5.55)^x = (0.555)^y = 1000$ , then the value of

$$\frac{1}{x} - \frac{1}{y} \text{ is}$$

यदि  $(5.55)^x = (0.555)^y = 1000$ , तो  $\frac{1}{x} - \frac{1}{y}$  का मान है

- (a) 1 (b)  $\frac{1}{3}$   
(c)  $\frac{2}{3}$  (d) 3

84. If  $x = (4096)^{7+4\sqrt{3}}$ , then which of the following equals 64?

यदि  $x = (4096)^{7+4\sqrt{3}}$  है, तो निम्नलिखित में से कौन सा 64 के बराबर है?

- (a)  $\frac{x^{\frac{7}{2}}}{x^{4\sqrt{3}}}$  (b)  $\frac{x^7}{x^{4\sqrt{3}}}$   
(c)  $\frac{x^{\frac{7}{2}}}{x^{2\sqrt{3}}}$  (d)  $\frac{x^7}{x^{2\sqrt{3}}}$

85. If  $9^{x-\frac{1}{2}} - 2^{2x-2} = 4^x - 3^{2x-3}$ , then  $x$  is

यदि  $9^{x-\frac{1}{2}} - 2^{2x-2} = 4^x - 3^{2x-3}$ , तो  $x$  है

- (a)  $\frac{3}{2}$  (b)  $\frac{2}{5}$   
(c)  $\frac{3}{4}$  (d)  $\frac{4}{9}$

86. If  $2^{2x+4} - 17 \times 2^{x+1} = -4$ , then which of the following is true?

यदि  $2^{2x+4} - 17 \times 2^{x+1} = -4$ , तो निम्नलिखित में से कौन सा सत्य है?

- (a)  $x$  is a positive value  
 (b)  $x$  is a negative value  
 (c)  $x$  can be either a positive value or a negative value  
 (d) None of these

87. If  $4^{x_1} = 5, 5^{x_2} = 6, 6^{x_3} = 7, \dots, 127^{x_{124}} = 128$  then find  $x_1 x_2 x_3 \dots x_{124}$ ?

यदि  $4^{x_1} = 5, 5^{x_2} = 6, 6^{x_3} = 7, \dots, 127^{x_{124}} = 128$  है, तो  $x_1 x_2 x_3 \dots x_{124}$  ज्ञात कीजिये?

- (a) 2 (b)  $\frac{5}{2}$   
 (c) 3 (d)  $\frac{7}{2}$

88. Evaluate/का मूल्यांकन करें

$$\left( \frac{4}{(\sqrt{5}+1)(\sqrt[4]{5}+1)(\sqrt[8]{5}+1)(\sqrt[16]{5}+1)} + 1 \right)^{48} ?$$

- (a) 25 (b) 125  
 (c) 5 (d) 625

89. If  $\frac{3^{a+3} \times 4^{a+6} \times 25^{a+1}}{27^{a-1} \times 8^{a-2} \times 125^{a+4}} = \frac{4}{15^{26}}$  then the value of  $\sqrt{a+9}$  is:

यदि  $\frac{3^{a+3} \times 4^{a+6} \times 25^{a+1}}{27^{a-1} \times 8^{a-2} \times 125^{a+4}} = \frac{4}{15^{26}}$  है, तो  $\sqrt{a+9}$  का मान ज्ञात कीजिए।

- (a) 4 (b) 6  
 (c) 5 (d) 8

90. If  $\left[ \left\{ \left( \frac{2}{3} \right)^3 \right\}^{(2x+3)} \right]^{\frac{-3}{4}} = \left[ \left\{ \left( \frac{2}{3} \right)^{\frac{2}{3}} \right\}^{(3x+7)} \right]^{\frac{-6}{5}}$ , then the value of  $\sqrt{2-42x}$  is:

यदि  $\left[ \left\{ \left( \frac{2}{3} \right)^3 \right\}^{(2x+3)} \right]^{\frac{-3}{4}} = \left[ \left\{ \left( \frac{2}{3} \right)^{\frac{2}{3}} \right\}^{(3x+7)} \right]^{\frac{-6}{5}}$  है, तो

$\sqrt{2-42x}$  का मान ज्ञात कीजिए।

- (a) 5 (b) 6  
 (c) 3 (d) 4

91. If  $\frac{9^n \times 3^2 \times \left( 3 - \frac{n}{2} \right)^{-2} - (27)^n}{3^{3m} \times 2^3} = \frac{1}{729}$ , then  $m - n = ?$

यदि  $\frac{9^n \times 3^2 \times \left( 3 - \frac{n}{2} \right)^{-2} - (27)^n}{3^{3m} \times 2^3} = \frac{1}{729}$  तो  $m - n = ?$

- (a) 3 (b) 1  
 (c) 2 (d) -2

92. If  $2^{x+y-2z} = 8^{8z-5-y}$ ;  $5^{4y-6z} = 25^{y+z}$ ;  $3^{4x-3z} = 9^{x+z}$  then the value of  $2x + 3y + 5z$  is:

यदि  $2^{x+y-2z} = 8^{8z-5-y}$ ;  $5^{4y-6z} = 25^{y+z}$ ;  $3^{4x-3z} = 9^{x+z}$  है तो  $2x + 3y + 5z$  का मान बताइए।

- (a) 56 (b) 44  
 (c) 32 (d) 28

93. If  $a^x = \sqrt{b}$ ,  $b^y = \sqrt[3]{c}$ ,  $c^z = \sqrt{a}$  then  $xyz = ?$

यदि  $a^x = \sqrt{b}$ ,  $b^y = \sqrt[3]{c}$ ,  $c^z = \sqrt{a}$  तो  $xyz$

- (a)  $\frac{1}{6}$  (b)  $\frac{1}{9}$   
 (c)  $\frac{1}{24}$  (d)  $\frac{1}{12}$

94. If  $(x-2a)(x-5a)(x-8a)(x-11a) + ka^4$  is a perfect square then  $k = ?$

यदि  $(x-2a)(x-5a)(x-8a)(x-11a) + ka^4$  एक पूर्ण वर्ग है तो  $k = ?$

- (a) 49  
 (b) 81  
 (c) 64  
 (d) 72

95. If  $x(x-1)(x-2)(x-3) + 1 = k^2$ , then which one of the following is a possible expression for  $k$ ?

यदि  $x(x-1)(x-2)(x-3) + 1 = k^2$  तो निम्नलिखित  $k$  में से के लिए कौन सा संभव होगा?

- (a)  $x^2 - 3x + 1$   
 (b)  $x^2 - 3x - 1$   
 (c)  $x^2 + 3x - 1$   
 (d)  $x^2 - 2x - 1$

## ANSWER KEY

|        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1.(c)  | 2.(a)  | 3.(a)  | 4.(c)  | 5.(c)  | 6.(b)  | 7.(a)  | 8.(c)  | 9.(b)  | 10.(c) |
| 11.(b) | 12.(b) | 13.(d) | 14.(c) | 15.(b) | 16.(b) | 17.(a) | 18.(c) | 19.(b) | 20.(c) |
| 21.(c) | 22.(d) | 23.(b) | 24.(c) | 25.(d) | 26.(d) | 27.(c) | 28.(c) | 29.(d) | 30.(d) |
| 31.(c) | 32.(a) | 33.(c) | 34.(d) | 35.(d) | 36.(b) | 37.(b) | 38.(b) | 39.(d) | 40.(c) |
| 41.(c) | 42.(b) | 43.(a) | 44.(b) | 45.(d) | 46.(b) | 47.(a) | 48.(d) | 49.(c) | 50.(b) |
| 51.(c) | 52.(a) | 53.(a) | 54.(c) | 55.(d) | 56.(a) | 57.(b) | 58.(b) | 59.(b) | 60.(b) |
| 61.(d) | 62.(c) | 63.(a) | 64.(a) | 65.(d) | 66.(d) | 67.(c) | 68.(c) | 69.(b) | 70.(c) |
| 71.(d) | 72.(c) | 73.(a) | 74.(c) | 75.(d) | 76.(a) | 77.(d) | 78.(d) | 79.(d) | 80.(d) |
| 81.(b) | 82.(b) | 83.(b) | 84.(c) | 85.(a) | 86.(c) | 87.(d) | 88.(c) | 89.(c) | 90.(a) |
| 91.(c) | 92.(b) | 93.(d) | 94.(b) | 95.(a) |        |        |        |        |        |

## SOLUTIONS

1. (c)

Let,

$$x = \sqrt{7\sqrt{7}\dots\dots\infty}$$

Squaring both sides

$$x^2 = 7 \times \sqrt{7\sqrt{7}\dots\dots\infty}$$

$$x^2 = 7x$$

$$x = 7$$

2. (a)

In this type of series we divide the number in two factors whose HCF are 1

$$\sqrt{12 + \sqrt{12 + \sqrt{12 + \dots\dots\infty}}}$$

$$\begin{array}{c} 12 \\ \swarrow \searrow \\ 4 \quad 3 \end{array}$$

In positive series correct answer is always larger digit

So, answer is 4

3. (a)

In this type of series we divide the number in two factors whose HCF are 1

$$\sqrt{30 - \sqrt{30 - \sqrt{30}\dots\dots\infty}}$$

$$\begin{array}{c} 30 \\ \swarrow \searrow \\ 6 \quad 5 \end{array}$$

In negative series correct answer is always smaller digit

So, answer is 5

4. (c)

ATQ,

$$\left(\frac{a}{b}\right)^{x-1} = \left(\frac{a}{b}\right)^{3-x}$$

$$\Rightarrow x - 1 = 3 - x$$

$$\Rightarrow 2x = 4$$

$$x = 2$$

5. (c)

$$(256)^{0.16} \times (256)^{0.09}$$

$$\Rightarrow (256)^{0.25}$$

$$\Rightarrow (256)^{\frac{1}{4}} = 4$$

6. (b)

$$\Rightarrow (3)^{\frac{1}{2}}, (2)^{\frac{1}{3}}, (2)^{\frac{1}{2}}, (4)^{\frac{1}{3}}$$

LCM of 2, 3 = 6

$$(3)^{\frac{1}{2} \times 6}, (2)^{\frac{1}{3} \times 6}, (2)^{\frac{1}{2} \times 6}, (4)^{\frac{1}{3} \times 6}$$

$$\Rightarrow 3^3, 2^2, 2^3, 4^2$$

$$\Rightarrow 27, 4, 8, 16$$

$$\text{Least value} = 4 = \sqrt[3]{2}$$

7. (a)

$$\Rightarrow (4)^{\frac{1}{3}}, (6)^{\frac{1}{4}}, (15)^{\frac{1}{6}}, (245)^{\frac{1}{12}}$$

$$\text{LCM of } 3, 4, 6, 12 = 12$$

$$\Rightarrow (4)^{\frac{1}{3} \times 12}, (6)^{\frac{1}{4} \times 12}, (15)^{\frac{1}{6} \times 12}, (245)^{\frac{1}{12} \times 12}$$

$$= (4)^4, (6)^3, (15)^2, (245)^1$$

$$= 256, 216, 225, 245$$

$$\text{Largest value} = 256 = \sqrt[3]{4}$$

8. (c)

$$\sqrt[3]{175.615} + \sqrt[3]{0.175616} + \sqrt[3]{0.000175616}$$

$$\Rightarrow 5.6 + 0.56 + 0.056$$

$$\Rightarrow 6.216$$

9. (b)

$$2^{\frac{1}{2}}, 3^{\frac{1}{3}}, 4^{\frac{1}{4}}, 6^{\frac{1}{6}}, 12^{\frac{1}{12}}$$

$$\text{LCM of } 2, 3, 4, 6 = 12$$

$$2^6, 3^4, 4^3, 6^2, 12^1$$

$$\text{Largest} = 3^4 \Rightarrow 3^{\frac{1}{3}}$$

10. (c)

$$(2.89)^{\frac{1}{2}}, 2 - 0.25, \left(1 + \frac{0.5}{1 - \frac{1}{2}}\right), \sqrt{3}$$

$$\Rightarrow (1.7), 1.75, 2, 1.732$$

$$\Rightarrow \text{Largest value} = 2$$

11. (b)

$$2^{60}, 3^{48}, 4^{36}, 5^{24}$$

$$\text{HCF of } 60, 48, 36, 24 = 12$$

$$\text{So, } \Rightarrow 2^5, 3^4, 4^3, 5^2$$

$$\Rightarrow 32, 81, 64, 25$$

$$\text{Greatest} = 81 \Rightarrow 3^{48}$$

12. (b)

$$0.16, \sqrt{0.16}, (0.16)^2, 0.04$$

$$\Rightarrow 0.16, 0.4, 0.0256, 0.04$$

$$\text{Largest} = 0.4 = \sqrt{0.16}$$

13. (d)

$$(\sqrt{19} - \sqrt{17}), (\sqrt{13} - \sqrt{11}), (\sqrt{7} - \sqrt{5}), (\sqrt{5} - \sqrt{3})$$

$$\Rightarrow \frac{2}{\sqrt{19} + \sqrt{17}}, \frac{2}{\sqrt{13} + \sqrt{11}}, \frac{2}{\sqrt{7} + \sqrt{5}}, \frac{2}{\sqrt{5} + \sqrt{3}}$$

$$= \text{Largest} = \frac{2}{\sqrt{5} + \sqrt{3}}$$

$$= \sqrt{5} - \sqrt{3}$$

14. (c)

$$\frac{9^n \times 3^5 \times (27)^3}{3 \times (81)^4} = 27$$

$$\Rightarrow \frac{3^{2n+5+9}}{3^{17}} = (3)^3$$

$$= 3^{2n+14-17} = 3^3$$

$$= 2n - 3 = 3$$

$$2n = 6$$

$$n = 3$$

15. (b)

$$\frac{5^x \times 5^{2x-2}}{5^{x-1} \times 5^{2x-2}} = \frac{5^{3x-2}}{5^{3x-3}}$$

$$= \frac{5^{-2}}{5^{-3}} = 5$$

16. (b)

$$\Rightarrow m = 11, n = 2$$

$$\Rightarrow (m-1)^{n+1} = (11-1)^{2+1} = 1000$$

17. (a)

$$\sqrt{5} + \sqrt{35-26} + \sqrt{448 \div 7}$$

$$\Rightarrow \sqrt{5+3+8} = 4$$

18. (c)

$$\sqrt[3]{50} + \sqrt[3]{216} + \sqrt[3]{512}$$

$$\Rightarrow 3\sqrt[3]{50+6+8} = 4$$

19. (b)

$$(14)^{\frac{1}{3}} (12)^{\frac{1}{2}} (16)^{\frac{1}{6}} (25)^{\frac{1}{12}}$$

$$\text{LCM of } 3, 2, 6, 12, = 12$$

$$\Rightarrow 14^4, 12^6, 16^2, (25)^1$$

$$\Rightarrow \text{Smallest value} = (25)^1 = (25)^{\frac{1}{12}}$$

20. (c)

$$(125)^{\frac{1}{6}}, (11)^{\frac{1}{3}}, (12)^{\frac{1}{6}}, (5)^{\frac{1}{4}}, \text{largest} = ?$$

$$\therefore \text{LCM of } 6, 3, 6, 4 = 12$$

$$\Rightarrow (125)^{\frac{12}{6}}, (11)^{\frac{12}{3}}, (12)^{\frac{12}{6}}, (5)^{\frac{12}{4}}$$

$$\Rightarrow (125)^2, (11)^4, (12)^2, (5)^3$$

$$\Rightarrow 15625, 14641, 144, 125$$

$$\text{Largest} = (125)^{\frac{1}{6}}$$

21. (c)

Given,

$$= \frac{\sqrt[3]{-2744} \times \sqrt[3]{-216}}{\sqrt[3]{\frac{64}{729}}}$$

$$\sqrt[3]{-14 \times -14 \times -14}$$

$$\times \sqrt[3]{-6 \times -6 \times -6}$$

$$\frac{\sqrt[3]{4 \times 4 \times 4}}{\sqrt[3]{9 \times 9 \times 9}}$$

$$= \frac{-14 \times -6}{\frac{4}{9}}$$

$$= \frac{-14 \times -6 \times 9}{4} = 189$$

22. (d)

Given that,

$$\frac{1}{\sqrt{7-4\sqrt{3}}}$$

$$\Rightarrow \frac{1}{\sqrt{7-2\sqrt{12}}}$$

$$\Rightarrow \frac{1}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}}$$

$$\Rightarrow 2 + \sqrt{3} = 3.7$$

23. (b)

$$\sqrt{11+2\sqrt{18}} = \sqrt{9} + \sqrt{2}$$

$$= 3 + 1.4 = 4.4$$

24. (c)

$$\sqrt{3 + \left( \sqrt{27 + \left( \sqrt{73 + \sqrt{64}} \right)} \right)}$$

$$\sqrt{3 + \left( \sqrt{27 + \left( \sqrt{73 + 8} \right)} \right)}$$

$$\sqrt{3 + \left( \sqrt{27 + \left( \sqrt{81} \right)} \right)}$$

$$\sqrt{3 + \left( \sqrt{27 + 9} \right)}$$

$$\sqrt{3 + \left( \sqrt{36} \right)} = \sqrt{3+6}$$

$$\sqrt{9} = 3$$

25. (d)

$$\begin{aligned}
 & \sqrt{(694 - \sqrt{(337 - \sqrt{191 - \sqrt{484}}))})} \\
 &= \sqrt{(694 - \sqrt{(337 - \sqrt{191 - 22}})} \\
 &= \sqrt{(694 - \sqrt{(337 - \sqrt{169}})} \\
 &= \sqrt{(694 - \sqrt{(337 - 13)})} \\
 &= \sqrt{(694 - \sqrt{324})} \\
 &= \sqrt{(694 - 18)} = \sqrt{676} = 26
 \end{aligned}$$

26. (d)

$$\begin{aligned}
 &= \sqrt{93 + \sqrt{32 + \sqrt{274 + \sqrt{225}}}} \\
 &= \sqrt{93 + \sqrt{32 + \sqrt{274 + 15}}} \\
 &= \sqrt{93 + \sqrt{32 + \sqrt{289}}} \\
 &= \sqrt{93 + \sqrt{32 + 17}} = \sqrt{93 + 7} = 10
 \end{aligned}$$

27 (c)

$$\begin{aligned}
 & \sqrt{51 + \sqrt{134 + 5\sqrt{42 + \sqrt{16 + \sqrt{9}}}}} \\
 &= \sqrt{51 + \sqrt{134 + 5\sqrt{49}}} \\
 &= \sqrt{51 + \sqrt{134 + 35}} \\
 &= \sqrt{51 + \sqrt{169}} = \sqrt{51 + 13} = \sqrt{64} = 8
 \end{aligned}$$

28. (c)

$$\begin{aligned}
 X &= \sqrt{587 - \sqrt{121}} \div \sqrt{2316 - \sqrt{180} - \sqrt{1296}} \\
 X &= \sqrt{587 - 11} \div \sqrt{2316 - \sqrt{180} - 36} \\
 X &= \sqrt{576} \div \sqrt{2316 - 12} \\
 X &= 24 \div 48 \\
 X &= \frac{1}{2} = 0.5
 \end{aligned}$$

29. (d)

$$\begin{aligned}
 & \sqrt{12.96} \times \sqrt{7.84} \div \sqrt{3.24} \times \sqrt{31.36} \\
 &= \sqrt{\frac{1296}{100}} \times \sqrt{\frac{784}{100}} \div \sqrt{\frac{324}{100}} \times \sqrt{\frac{3136}{100}} \\
 &= 3.6 \times 2.8 \div 1.8 \times 5.6 \\
 &= \frac{3.6 \times 2.8}{1.8} \times 5.6 \\
 &= 5.6 \times 5.6 = 31.36
 \end{aligned}$$

30. (d)

$$\begin{aligned}
 6 + (5\sqrt{5})^2 &= ? - (\sqrt{5})^2 + 195 \\
 6 + 125 &= ? - 5 + 195 \\
 131 &= ? + 190 \\
 ? &= -59
 \end{aligned}$$

31. (c)

$$\begin{aligned}
 & \text{Squaring both sides} \\
 155 - X &= 135 + 9 \\
 X &= 155 - 144 = 11
 \end{aligned}$$

32. (a)

$$\begin{aligned}
 & \sqrt{19.36} + \sqrt{4.84} \times \sqrt{43.56} + \sqrt{4.84} \\
 &= (4.4 + 2.2 \times 6.6 + 2.2) = 21.12
 \end{aligned}$$

33. (c)

$$\begin{aligned}
 & \sqrt{1031 - \sqrt{61 - \sqrt{138 + \sqrt{36}}}} \\
 &= \sqrt{1031 - \sqrt{61 - \sqrt{138 + 6}}} \\
 &= \sqrt{1031 - \sqrt{61 - \sqrt{144}}} \\
 &= \sqrt{1031 - \sqrt{61 - 12}} \\
 &= \sqrt{1031 - \sqrt{49}} \\
 &= \sqrt{1031 - 7} \\
 &= \sqrt{1024} = 32
 \end{aligned}$$

34. (d)

$$\begin{aligned}
 4 + (3\sqrt{5})^2 &= x - (\sqrt{5})^2 + 191 \\
 \Rightarrow 4 + 45 &= x - 5 + 191 \\
 \Rightarrow 49 &= x + 186 \\
 \Rightarrow -x &= -49 + 186 \\
 \Rightarrow x &= -137
 \end{aligned}$$

35. (d)

$$\begin{aligned}
 5.1 \div 1.7 \times 6.8 \div 1.7 + 5.1 \div 1.7 \times 6.8 \div 1.7 \\
 12 + 12 &= 24
 \end{aligned}$$

36. (b)

$$\begin{aligned}
 \sqrt{140 - x} &= \sqrt{13 + \sqrt{144}} \\
 \Rightarrow \sqrt{140 - x} &= \sqrt{13 + 12}
 \end{aligned}$$

On squaring both the sides,

$$\begin{aligned}
 140 - x &= 25 \\
 \therefore x &= (140 - 25) = 115
 \end{aligned}$$

37. (b)

$$\begin{aligned}
 & (\sqrt{38.44} \div \sqrt{9.61} \times \sqrt{86.49} \div \sqrt{9.61})^2 \\
 &= (6.2 \div 3.1 \times 9.3 \div 3.1)^2 \\
 &= (2 \times 3)^2 = (6)^2 = 36
 \end{aligned}$$

38. (b)

$$\frac{3\sqrt{5} + \sqrt{125}}{\sqrt{80} + 6\sqrt{5}}$$

$$= \frac{3\sqrt{5} + 5\sqrt{5}}{4\sqrt{5} + 6\sqrt{5}} = \frac{8\sqrt{5}}{10\sqrt{5}} = \frac{4}{5}$$

39. (d)

$$\left(\frac{-1}{729}\right)^{-\frac{2}{3}} = (-729)^{\frac{2}{3}}$$

$$= (-9)^2 = 81$$

40. (c)

We know that,

$$\frac{(a+b)^2 - (a-b)^2}{ab} = 4$$

$$\frac{(542+321)^2 - (542-321)^2}{542 \times 321} = 4$$

41. (c)

We know that,

$$a^3 - b^3 = (a-b)(a^2 + b^2 + ab)$$

$$\frac{5.5^3 - 4^3}{30.25 + 22 + 16}$$

$$= (5.5 - 4) = 1.5$$

42. (b)

$$\frac{\{(13)^3 - 4^3\}}{13 - 8 + 2} \div 8 - \{2 + 6 \times 9\}$$

$$= \frac{13^3 - 4^3}{13 - 4} \div 8 - 56$$

$$= (13^2 + 4^2 + 13 \times 4) \div 8 - 56$$

$$= (185 + 52) \div 8 - 56$$

$$= 237 \div 8 - 56 = \frac{-211}{8}$$

43. (a)

$$x^{(b^2-c^2)} \times x^{(c^2-a^2)} \times x^{(a^2-b^2)}$$

$$\Rightarrow x^{b^2-c^2+c^2-a^2+a^2-b^2}$$

$$\Rightarrow x^0 = 1$$

44. (b)

$$\text{Let, } 6x = 2y = 3z = k$$

$$6 = k^{\frac{1}{x}}, 2 = k^{\frac{1}{y}}, 3 = k^{\frac{1}{z}}$$

$$k^{\frac{1}{y}} \times k^{\frac{1}{z}} = k^{\frac{1}{x}}$$

$$\frac{1}{y} + \frac{1}{z} = \frac{1}{x}$$

$$\frac{1}{y} + \frac{1}{z} - \frac{1}{x} = 0$$

45. (d)

ATQ,

$$a^x = b^y = c^z = k \text{ (Let)}$$

$$a = k^{\frac{1}{x}}, b = k^{\frac{1}{y}}, c = k^{\frac{1}{z}}$$

$$b^2 = ac$$

$$\Rightarrow \frac{2}{y} = \frac{1}{x} + \frac{1}{z}$$

$$\Rightarrow \frac{2}{y} = \frac{x+z}{xz}$$

$$\Rightarrow y = \frac{2xz}{x+z}$$

46. (b)

$$x = 5 + 2\sqrt{6}$$

$$\sqrt{x} = (\sqrt{3} + \sqrt{2})$$

$$\Rightarrow \frac{x-1}{\sqrt{x}} = \frac{4+2\sqrt{6}}{\sqrt{3}+\sqrt{2}} \Rightarrow 2\sqrt{2} \frac{(\sqrt{2}+\sqrt{3})}{(\sqrt{2}+\sqrt{3})} = 2\sqrt{2}$$

47. (a)

$$\frac{(243)^{0.13} \times (243)^{0.07}}{(7)^{0.25} \times (49)^{0.075} \times (343)^{0.2}}$$

$$\Rightarrow \frac{3^{5 \times 0.13} \times 3^{5 \times 0.07}}{(7)^{0.25} \times (7)^{2 \times 0.075} \times (7)^{0.6}}$$

$$\Rightarrow \frac{3^{0.65+0.35}}{7^{0.25+0.15+0.6}} = \frac{3}{7}$$

48. (d)

$$\left\{ (6.25)^{\frac{1}{2}} \times (0.0144)^{\frac{1}{2}} + (0.027)^{\frac{1}{3}} \times (81)^{\frac{1}{4}} \right\}$$

$$= 2.5 \times 0.12 + 0.3 \times 3$$

$$= 0.3 + 0.9 = 1.2$$

49. (c)

ATQ,

$$3^x (3^x \times 27 - 244) = -9$$

$$\text{Let, } 3^x = y$$

$$y (27y - 244) = -9$$

$$27y^2 - 244y + 9 = 0$$

$$y = 9, y = \frac{1}{27}$$

$$3^x = \frac{1}{27}$$

$$3^x = 3^{-3}$$

$$x = -3$$

$$3^x = 9$$

$$3^x = 3^2$$

$$x = 2$$

$x$  is either negative or positive

50. (b)

$$x = -0.5$$

$$2^{\frac{1}{x}} = 2^{-\frac{1}{0.5}} = 2^{-2} = \frac{1}{4}$$

$$\frac{1}{x^2} = \frac{1}{0.25} = 4$$

$$2^{-0.5} = \frac{1}{2^{0.5}} = \frac{1}{\sqrt{2}}$$

$$\frac{1}{x} = \frac{1}{-0.5} = -2$$

$$\text{So, smallest value} = \frac{1}{x}$$

51. (c)

$$x^z = y^2 \Rightarrow (10^{0.48})^z = (10^{0.70})^2$$

$$\Rightarrow 10^{(0.48)z} = 10^{1.40}$$

$$\Rightarrow 0.48z = 1.40$$

$$\Rightarrow z = \frac{140}{48} = 2.9$$

52. (a)

$$\sqrt[3]{7^a \times (35)^{b+1} \times (20)^{(c+2)}} \rightarrow \text{Whole no.}$$

By option A

$$\sqrt[3]{7^3 \times 35^3 \times 20^3}$$

$$\Rightarrow 7 \times 35 \times 20 = 4900 \text{ (Whole no)}$$

So option (a) is correct

53. (a)

$$14^a = 36^b = 84^c \Rightarrow 14^a = 6^{2b} = 84^c = k \text{ (Let)}$$

$$14 = k^{\frac{1}{a}}$$

$$6 = k^{\frac{1}{2b}}$$

$$84 = k^{\frac{1}{c}}$$

We know that  $14 \times 6 = 84$

$$\Rightarrow \frac{1}{a} + \frac{1}{2b} = \frac{1}{c}$$

$$\Rightarrow \left( \frac{1}{c} - \frac{1}{a} \right) = \frac{1}{2b}$$

$$\Rightarrow 6b \times \frac{1}{2b} = 3$$

54. (c)

$$\left[ \frac{2+\sqrt{3}}{2-\sqrt{3}} + \frac{2-\sqrt{3}}{2+\sqrt{3}} + \frac{\sqrt{3}-1}{\sqrt{3}+1} \right]$$

$$\Rightarrow \frac{2(4+3)}{1} + \frac{\sqrt{3}-1}{\sqrt{3}+1}$$

$$\Rightarrow 14 + \frac{\sqrt{3}-1}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1}$$

$$= 14 + \frac{4-2\sqrt{3}}{2} = 16 - \sqrt{3}$$

55. (d)

ATQ,

$$x = \sqrt{4 + \sqrt{4 - \sqrt{4 + \dots \infty}}}$$

$$\Rightarrow \frac{\sqrt{4 \times 4 - 3} + 1}{2}$$

$$= \frac{\sqrt{13} + 1}{2}$$

56. (a)

$$x = \sqrt{6 - \sqrt{6 + \sqrt{6 \dots \infty}}}$$

$$\Rightarrow \frac{\sqrt{4 \times 6 - 3} - 1}{2}$$

$$= \frac{\sqrt{21} - 1}{2}$$

57. (b)

$$\sqrt{5\sqrt{5\sqrt{5\sqrt{5}}}}$$

$$\Rightarrow \left( 5 \right)^{\frac{(2^4-1)}{2^4}} = 5^{\frac{15}{16}}$$

58. (b)

$$\sqrt{\frac{(0.1)^2 + (0.01)^2 + (0.009)^2}{(0.01)^2 + (0.001)^2 + (0.0009)^2}}$$

$$\Rightarrow \sqrt{\frac{0.01 + 0.0001 + 0.000081}{0.0001 + 0.000001 + 0.00000081}} = 10$$

59. (b)

$$\Rightarrow \sqrt{\frac{(0.03)^2 + (0.21)^2 + (0.065)^2}{(0.003)^2 + (0.021)^2 + (0.0065)^2}} = 10$$

60. (b)

$$\sqrt{0.05 \times 0.5 \times a} = 0.5 \times 0.05 \times \sqrt{b}$$

Squaring both sides

$$0.05 \times 0.5 \times a = 0.5 \times 0.5 \times 0.05 \times b$$

$$\frac{a}{b} = 0.025$$

61. (d)

$$\begin{aligned} & \sqrt{(12.1)^2 - (8.1)^2 \div [(0.25)^2 + (0.25)(19.95)]} \\ & \Rightarrow \sqrt{20.2 \times 4 \div [0.25(0.25 + 19.95)]} \\ & \Rightarrow \sqrt{\frac{20.2 \times 4}{(0.25) \times 20.2}} = 4 \end{aligned}$$

62. (c)

$$\begin{aligned} & \frac{0.75^3}{1 - 0.75} + [(0.75) + (0.75)^2 + 1] \\ & \Rightarrow \frac{27}{64} + \left[ \frac{3}{4} + \frac{9}{16} + 1 \right] \\ & \Rightarrow \frac{27}{16} + \frac{3}{4} + \frac{9}{16} + 1 \\ & \Rightarrow \sqrt{\frac{64}{16}} = 2 \end{aligned}$$

63. (a)

$$\begin{aligned} & \frac{1}{\sqrt{3.25} + \sqrt{2.25}} + \frac{1}{\sqrt{4.25} + \sqrt{3.25}} + \frac{1}{\sqrt{5.25} + \sqrt{4.25}} \\ & + \frac{1}{\sqrt{6.25} + \sqrt{5.25}} \\ & \Rightarrow \sqrt{3.25} - \sqrt{2.25} + \sqrt{4.25} - \sqrt{3.25} + \sqrt{5.25} \\ & - \sqrt{4.25} + \sqrt{6.25} - \sqrt{5.25} \\ & = \sqrt{6.25} - \sqrt{2.25} \\ & = (2.5 - 1.5) = 1.00 \end{aligned}$$

64. (a)

ATQ,

$$\begin{aligned} & \Rightarrow \frac{1}{\sqrt{7} - \sqrt{5}} - \frac{1}{\sqrt{5} - \sqrt{3}} - \frac{2}{\sqrt{7} + \sqrt{3}} \\ & \Rightarrow \frac{\sqrt{7} + \sqrt{5}}{2} - \frac{\sqrt{5} + \sqrt{3}}{2} - \frac{\sqrt{7} - \sqrt{3}}{2} \\ & \frac{\sqrt{7} + \sqrt{5} - \sqrt{5} - \sqrt{3} - \sqrt{7} + \sqrt{3}}{2} = 0 \end{aligned}$$

65. (d)

$$\begin{aligned} & \sqrt{10} + \sqrt{24} + \sqrt{40} + \sqrt{60} = \sqrt{p} + \sqrt{q} + \sqrt{r} \\ & \Rightarrow \sqrt{2} + \sqrt{3} + \sqrt{5} = \sqrt{p} + \sqrt{q} + \sqrt{r} \\ & \Rightarrow (p + q + r) = 10 \end{aligned}$$

66. (d)

$$\begin{aligned} & \frac{1}{(\sqrt{2} - \sqrt{5}) + \sqrt{3}} + \frac{1}{(\sqrt{2} - \sqrt{5}) - \sqrt{3}} \\ & \frac{(\sqrt{2} - \sqrt{5}) - \sqrt{3} + (\sqrt{2} - \sqrt{5}) + \sqrt{3}}{(\sqrt{2} - \sqrt{5})^2 - 3} \\ & \frac{2(\sqrt{2} - \sqrt{5})}{4 - 2\sqrt{10}} = \frac{2(\sqrt{2} - \sqrt{5})}{2\sqrt{2}(\sqrt{2} - \sqrt{5})} = \frac{1}{\sqrt{2}} \end{aligned}$$

67. (c)

$$\begin{aligned} & 3^x = 9^y = 27^z \Rightarrow 3^x = 3^{2y} = 3^{3z} \\ & \Rightarrow x = 2y = 3z \\ & \frac{1}{3x} + \frac{1}{6y} + \frac{1}{9z} = \frac{32}{3} \\ & = \frac{1}{9z} + \frac{1}{9z} + \frac{1}{9z} = \frac{32}{3} \\ & = \frac{1}{3z} = \frac{32}{3} \\ & z = \frac{1}{32} \end{aligned}$$

68. (c)

By option

Option (c) satisfy that equation

69. (b)

$$\begin{aligned} & \sqrt{6 - \sqrt{17 - 2\sqrt{72}}} \\ & = \sqrt{6 - (3 - 2\sqrt{2})} \\ & = \sqrt{3 + 2\sqrt{2}} = 2.4 \end{aligned}$$

70. (c)

$$\begin{aligned} & \sqrt{9 - 2\sqrt{11 - 6\sqrt{2}}} \\ & = \sqrt{9 - 2\sqrt{3^2 + (\sqrt{2})^2 - 2 \times 3 \times \sqrt{2}}} \\ & = \sqrt{9 - 2(3 - \sqrt{2})} \\ & = \sqrt{9 - 6 + 2\sqrt{2}} \\ & = \sqrt{3 + 2\sqrt{2}} \\ & = \sqrt{(\sqrt{2})^2 + 1^2 + 2\sqrt{2}} = \sqrt{2} + 1 \\ & = (1.4 + 1) = 2.4 \end{aligned}$$

71. (d)

$$\begin{aligned}\frac{1}{\sqrt{17+12\sqrt{2}}} &= \frac{1}{\sqrt{17+2\sqrt{72}}} \\&= \frac{1}{\sqrt{9+\sqrt{8}}} \\&= \frac{1}{\sqrt{9+\sqrt{8}}} \times \frac{\sqrt{9-\sqrt{8}}}{\sqrt{9-\sqrt{8}}} = \frac{3-2\sqrt{2}}{1} \\&= (3-2 \times 1.414) = 0.17\end{aligned}$$

72. (c)

$$\begin{aligned}\frac{7+3\sqrt{5}}{3+\sqrt{5}} + \frac{7-3\sqrt{5}}{3-\sqrt{5}} \\&= \frac{(7+3\sqrt{5})(3-\sqrt{5}) + (7-3\sqrt{5})(3+\sqrt{5})}{4} \\&= \frac{21+9\sqrt{5}-7\sqrt{5}-15+21-9\sqrt{5}+7\sqrt{5}-15}{4} \\&= \frac{12}{4} = 3\end{aligned}$$

73. (a)

$$\begin{aligned}\left( \frac{\sqrt{3}-1}{\sqrt{3}+1} + \frac{\sqrt{3}+1}{\sqrt{3}-1} + \frac{2-\sqrt{3}}{2+\sqrt{3}} + \frac{2+\sqrt{3}}{2-\sqrt{3}} \right) \\&= \frac{(\sqrt{3}-1)^2 + (\sqrt{3}+1)^2}{(3-1)} + \frac{(2-\sqrt{3})^2 + (2+\sqrt{3})^2}{(4-3)} \\&= \frac{(4-2\sqrt{3}+4+2\sqrt{3})}{2} + \frac{(7-4\sqrt{3}+7+4\sqrt{3})}{1} \\&= 4 + 14 = 18\end{aligned}$$

74. (c)

$$\begin{aligned}x^2 &= (232)^2 - (52)^2 - 5468 - (146)^2 \\&= 53824 - 2704 - 5468 - 21316 \\x^2 &= 24336 \\&\Rightarrow x = 156\end{aligned}$$

75. (d)

$$\begin{aligned}8^{2.3} \times 4^{0.8} \times 16^{0.4} &= 2^x \\&\Rightarrow (2^3)^{2.3} \times (2^2)^{0.8} \times (2^4)^{0.4} = 2^x \\&\Rightarrow 2^{6.9} \times 2^{1.6} \times 2^{1.6} = 2^x \\&\Rightarrow 2^{6.9+1.6+1.6} = 2^x \\&\Rightarrow 2^{10.1} = 2^x \\&\Rightarrow x = 10.1\end{aligned}$$

76. (a)

$$\begin{aligned}95^{2.4} \times 95^{1.3} \div 95^{0.9989} &= 95^n \\&\Rightarrow 95^{2.4+1.3-0.9989} = 95^n \\&\Rightarrow n = 2.7011\end{aligned}$$

77. (d)

$$\begin{aligned}\frac{1024^{0.13} \times 1024^{0.07}}{7^{0.25} \times 49^{0.075} \times 343^{0.2}} \\&= \frac{(1024)^{0.13+0.07}}{7^{0.25} \times 7^{2 \times 0.075} \times 7^{3 \times 0.2}} \\&= \frac{1024^{0.2}}{7^{0.25+0.15+0.6}} = \frac{(1024)^{\frac{2}{10}}}{7} \\&= \frac{(1024)^{\frac{1}{5}}}{7} = \frac{4}{7}\end{aligned}$$

78. (d)

$$\begin{aligned}\sqrt[8]{3\sqrt{(81^2)^3}} \\&= \left\{ \left[ (81^2)^3 \right]^{\frac{1}{3}} \right\}^{\frac{1}{8}} = (81^2)^{\frac{1}{8}} \\&= (81)^{\frac{1}{4}} = 3\end{aligned}$$

79. (d)

$$\begin{aligned}x^{2018} y^{2017} &= \frac{1}{2} \quad \dots\dots(i) \\x^{2016} y^{2019} &= 8 \quad \dots\dots(ii) \\&\quad (i) \div (ii) \\&\Rightarrow \frac{x^2}{y^2} = \frac{1}{16} \\&\Rightarrow y = 4x \text{ Put in (i)} \\x^{2018} \times 4^{2017} \times x^{2017} &= \frac{1}{2} \\x^{4035} &= \left( \frac{1}{2} \right)^{4035} \\x &= \frac{1}{2} \\y &= 2\end{aligned}$$

$$\Rightarrow x^2 + y^3 = \frac{1}{4} + 8 = \frac{33}{4}$$

80. (d)

$$\begin{aligned}A &= 2^{65} \\B &= 2^{64} + 2^{63} + 2^{62} + \dots\dots + 2^0 \\&\quad 2^0 + 2^1 + 2^2 + \dots\dots + 2^{64} \\&= \frac{1(2^{65}-1)}{(2-1)} \\&= (2^{65}-1)\end{aligned}$$

So, A is greater than B by 1

81. (b)

$$\left(\frac{p^{-1}q^2}{p^3q^{-2}}\right)^{\frac{1}{3}} \div \left(\frac{p^6q^{-3}}{p^{-2}q^3}\right)^{\frac{1}{3}} = p^a q^b$$

$$\Rightarrow \left(\frac{q^4}{p^4}\right)^{\frac{1}{3}} \div \left(\frac{p^8}{q^6}\right)^{\frac{1}{3}}$$

$$\Rightarrow \frac{q^{\frac{4}{3}}}{p^{\frac{4}{3}}} \div \frac{p^{\frac{8}{3}}}{q^{\frac{6}{3}}} = p^a q^b$$

$$\Rightarrow \frac{q^{\frac{4}{3}}}{p^{\frac{4}{3}}} \times \frac{q^{\frac{6}{3}}}{p^{\frac{8}{3}}} = p^a q^b$$

$$\Rightarrow a = -4 \quad b = \frac{10}{3}$$

$$a + b = -4 + \frac{10}{3} \Rightarrow -\frac{2}{3}$$

82. (b)

$$x = \sqrt{4 + \sqrt{10 + 2\sqrt{5}}} + \sqrt{4 - \sqrt{10 + 2\sqrt{5}}}$$

$$\sqrt{5} = 2.2$$

$$\Rightarrow x^2 = 4 + \sqrt{10 + 2\sqrt{5}} + 4 - \sqrt{10 + 2\sqrt{5}} + 2\sqrt{16 - 10 - 2\sqrt{5}}$$

$$x^2 = 8 + 2\sqrt{6 - 2\sqrt{5}}$$

$$x^2 = 8 + 2\sqrt{6 - 4.4}$$

$$x^2 = 8 + 2 \times 1.6 = 11.6$$

$$x = \text{more than } 3.4$$

83. (b)

Given that,

$$(5.55)^x = 10^3$$

$$(0.555)^y = 10^3$$

ATQ,

$$= 5.55 = 10^{\frac{3}{x}} \quad \dots\dots(1)$$

$$\& 0.555 = 10^{\frac{3}{y}} \quad \dots\dots(2)$$

By dividing (1) by (2)

$$\frac{10^{\frac{3}{x}}}{10^{\frac{3}{y}}} = \frac{5.55}{0.555}$$

$$10^{\left(\frac{3}{x} - \frac{3}{y}\right)} = 10$$

$$\frac{3}{x} - \frac{3}{y} = 1$$

$$\frac{1}{x} - \frac{1}{y} = \frac{1}{3}$$

84. (c)

$$x = (4096)^{7+4\sqrt{3}}$$

$$\Rightarrow (4096) = (x)^{7-4\sqrt{3}}$$

$$(64)^2 = (x)^{(7-4\sqrt{3})}$$

$$\Rightarrow 64 = x^{\frac{7-4\sqrt{3}}{2}}$$

$$64 = \frac{x^{\frac{7}{2}}}{x^{2\sqrt{3}}}$$

85. (a)

$$9^{x-\frac{1}{2}} - 2^{2x-2} = 4^x - 3^{2x-3}$$

$$\Rightarrow 3^{(2x-1)} - 2^{(2x-2)} = 2^{2x} - 3^{(2x-3)}$$

$$\Rightarrow 3^{(2x-1)} + 3^{(2x-3)} = 2^{2x} + 2^{(2x-2)}$$

$$= 3^{2x} \left[ \frac{1}{3} + \frac{1}{27} \right] = 2^{2x} \left[ 1 + \frac{1}{4} \right]$$

$$\Rightarrow 3^{2x} \left[ \frac{10}{27} \right] = \left[ \frac{5}{4} \right] 2^{2x}$$

$$= 3^{2x} \times 8 = 27 \times 2^{2x}$$

$$\Rightarrow \left(\frac{3}{2}\right)^{2x} = \left(\frac{3}{2}\right)^3 \Rightarrow x = \frac{3}{2}$$

86. (c)

$$2^{2x} \times 16 - 17 \times 2^x \times 2 = -4$$

$$\text{Let, } 2^x = y$$

$$16y^2 - 34y + 4 = 0$$

$$y = \frac{32}{16} = 2$$

$$2^x = 2^1$$

$$x = 1$$

$$2x = 2^{-3}$$

$$x = -3$$

So, x is either positive or negative

87. (d)

$$4^{x_1} = 5, 5^{x_2} = 6, 6^{x_3} = 7 \dots 127^{x_{124}} = 128(2^7)$$

$$4x_1 x_2 x_3 = 7$$

$$4x^1 x^2 x^2 \dots x^{124} = 2^7$$

$$2^7 = 4^{\frac{7}{2}}$$

$$2^7 = 2^7 = 4^{\frac{1}{2}} = \sqrt{4}$$

$$4^{\frac{7}{2}} = \frac{7}{2}$$

88. (c)

$$\left( \frac{4}{(\sqrt{5}+1)(\sqrt[4]{5}+1)(\sqrt[8]{5}+1)(\sqrt[16]{5}+1)} + 1 \right)^{48}$$

$$\left( \frac{4 \times (\sqrt[16]{5}-1)}{4} + 1 \right)^{48}$$

$$(\sqrt[16]{5})^{48} = 5^3 = 125$$

89. (c)

$$\frac{3^{a+3} \times 4^{a+6} \times 25^{a+1}}{27^{a-1} \times 8^{a-2} \times 125^{a+4}} = \frac{4}{15^{26}}$$

$$\frac{2^{2a+12}}{2^{3a-6}} = 2^2$$

$$2^{-a+18} = 2^2$$

$$a = 16$$

$$\sqrt{a+9} \Rightarrow \sqrt{16+9} = 5$$

90. (a)

$$\left[ \left[ \left( \frac{2}{3} \right)^3 \right]^{(2x+3)} \right]^{\frac{-3}{4}}$$

$$= \left[ \left[ \left( \frac{2}{3} \right)^{\frac{2}{3}} \right]^{(3x+7)} \right]^{\frac{-6}{5}}$$

$$3 \times (2x+3) \times \frac{-3}{4} = \frac{2}{3} \times (3x+7) \times \frac{-6}{5}$$

$$90x + 135 = 48x + 112$$

$$42x - 23$$

$$\sqrt{2-42x}$$

$$\sqrt{2+23} = 5$$

91. (c)

$$\frac{9^n \times 3^2 \times \left( 3 - \frac{n}{2} \right)^{-2} - (27)^n}{3^{3m} \times 2^3} = \frac{1}{729}$$

$$\frac{3^{3n} \times 3^2 - 3^{3n}}{3^{3m} \times 8}$$

$$\frac{3^{3n} \times (3^2 - 1)}{3^{3m} - 8} = \frac{1}{3^6}$$

$$\frac{1}{3^{3m-3n}} = \frac{1}{3^6} \Rightarrow m - n = 2r$$

92. (b)

$$2^{x+y-2z} = 8^{8z-5-y}; 5^{4y-6z} = 25^{y+z}; 3^{4x-3z} = 9^{x+z}$$

$$x + y - 2z = 24z - 15 - 3y, 5^{2y+2z}, 2x = 5z$$

$$x + 4y - 26z - 15, y = 4z$$

$$x = \frac{5z}{2}, y = 4 \times 2 = 8, z = \frac{5z}{2} - 10z = -15$$

$$x = \frac{5 \times 2}{2} = 5, z = \frac{-15z}{2} = -15 = 2$$

$$2x + 3y + 5z$$

$$20 + 24 + 10 = 44$$

93. (d)

$$a^x = b^{\frac{1}{2}} \dots \dots (i)$$

$$b^y = c^{\frac{1}{3}} \dots \dots (ii)$$

$$c^z = a^{\frac{1}{2}} \dots \dots (iii)$$

$$a^{2x} = b$$

Put value of b in eqn. (ii)

$$a^{6xy} = c$$

Put value of c in eqn. (iii)

$$a^{6xyz} = a^{\frac{1}{2}}$$

$$xyz = \frac{1}{12}$$

94. (b)

$$(x-2a)(x-11a)(x-5a)(x-8a) + ka^4 = 0$$

$$(x^2 - 11ax - 2ax + 22a^2)(x^2 - 8ax - 5ax + 40a^2) + ka^4$$

$$(x^2 - 13ax + 22a^2)(x^2 - 13ax + 40a^2) + ka^4$$

$$\text{Let } x^2 - 13ax = g$$

$$= (g + 22a^2)(g + 40a^2) + ka^4$$

$$= g^2 + 40a^2g + 22a^2g + 880a^4 + ka^4$$

$$= g^2 + 62a^2g + 880a^4 + ka^4 \quad [a^2 + b^2 + 2ab = (a+b)^2]$$

k = 81 will make it a perfect square

$$(g + 31a^2)^2 = 0$$

95. (a)

$$x(x-1)(x-2)(x-3) + 1 = k^2$$

Value putting method

Take value of x in negative

$$\text{Put } x = -1$$

$$-1(-1-1)(-1-2)(-1-3) + 1$$

$$-1(-2)(-3)(-4) + 1$$

$$24 + 1 = 25$$

$$25 = k^2 = k = 5$$

Now put the value of x in options to check whether the option satisfied the value of k

$$(a) x^2 - 3x + 1$$

$$(-1)^2 - 3(-1) + 1$$

$$1 + 3 + 1 = 5 = k$$

option A is correct