SECTION - I
Straight Objective Type

1. $\sqrt{14\sqrt{5}-30}$

$= 5^{1/4}\sqrt{14-6\sqrt{5}}$

$= 5^{1/4}\sqrt{14-2\sqrt{45}}$

$= 5^{1/4}\left(\sqrt{9}-\sqrt{5}\right)$

$= 5^{1/4}\left(3-\sqrt{5}\right)$

Hence, (b) is the correct option.

2. $\frac{1}{\sqrt{5-\sqrt{5-\sqrt{24}}}} + \frac{1}{\sqrt{5+\sqrt{5+\sqrt{24}}}}$

$\frac{1}{\sqrt{5-\sqrt{5-2\sqrt{6}}}} + \frac{1}{\sqrt{5}-\sqrt{5+2\sqrt{6}}}$

$\frac{1}{\sqrt{5-\left(\sqrt{3}-\sqrt{2}\right)}} + \frac{1}{\sqrt{5}-\left(\sqrt{3}++\sqrt{2}\right)}$

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

Hence, (b) is the correct option.

3. $\sqrt{a+2\sqrt{a-1}}+\sqrt{a-2\sqrt{a-1}}$

$= 2\sqrt{a-1}$

Hence, (d) is the correct option.

4. $\left(\sqrt{50}+\sqrt{48}\right)^{1/2} = k\left(\sqrt{3}+\sqrt{2}\right)$

$\left(5\sqrt{2}+4\sqrt{3}\right)^{1/2} = k\left(\sqrt{3}+\sqrt{2}\right)$

$\Rightarrow$ $2^{1/4}\left(\sqrt{3}+\sqrt{2}\right)=k\left(\sqrt{3}+\sqrt{2}\right)$

$2^{1/4}\left(\sqrt{3}+\sqrt{2}\right)=k\left(\sqrt{3}+\sqrt{2}\right)$

$\Rightarrow$ $k=2^{1/4}$

Hence, (b) is the correct option.

5. Let $x=\sqrt{6+\sqrt{6+\sqrt{6+\sqrt{6}}}}\ ---\alpha$

$x=\sqrt{6+x}$

$\Rightarrow$ $x^2=6+x$

$x^2-x-6=0$

$(x-3)(x+2)=0$

$x=3$ or -2

Hence (d) is the correct option

6. $\sqrt[6]{2\sqrt{2}+3}-\sqrt[3]{1-\sqrt{2}}=-1$

Hence, (d) is the correct option.

7. If $\left(4+\sqrt{15}\right)^{3/2}-\left(4-\sqrt{15}\right)^{3/2}=k\sqrt{6}$

$\left(4+\sqrt{15}\right)^{3/2}-\left(4-\sqrt{15}\right)^{3/2}=9\sqrt{6}$

$\Rightarrow$ k = 9

Hence, (c) is the correct option

8. $x=2+\sqrt{3}, \quad xy=1$

$\Rightarrow$ $y=\dfrac{1}{x}$

$y=2-\sqrt{3}$

$$\frac{x}{\sqrt{2}+\sqrt{x}}+\frac{y}{\sqrt{2}-\sqrt{y}}$$

$x=2+\sqrt{3}$

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

$$=\sqrt{\frac{4+2\sqrt{3}}{2}}$$

$$=\frac{\sqrt{3}+\sqrt{1}}{\sqrt{2}}$$

$$y=2-\sqrt{3}$$

$$\sqrt{y}=\sqrt{\frac{4-2\sqrt{3}}{2}}$$

$$=\frac{\sqrt{3}-1}{\sqrt{2}}$$

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

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

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

$$=\sqrt{2}$$

Hence, (a) is the correct option.

9. $\sqrt{b}+\sqrt{c},\sqrt{c}+\sqrt{a},\sqrt{a}+\sqrt{b}$ are in HP

$\frac{1}{\sqrt{b}+\sqrt{c}},\frac{1}{\sqrt{c}+\sqrt{a}},\frac{1}{\sqrt{a}+\sqrt{b}},$ are in A.P

$$\Rightarrow \quad \frac{1}{\sqrt{c}+\sqrt{a}}-\frac{1}{\sqrt{b}+\sqrt{c}}$$

$$=\frac{1}{\sqrt{a}+\sqrt{b}}-\frac{1}{\sqrt{c}+\sqrt{a}}$$

$\Rightarrow$ $2b = a + c$

$\Rightarrow$ a, b, c are in A.P

Hence, (a) is the correct option

10. If $p = \sqrt{32} - \sqrt{24}$ $\quad q = \sqrt{50} - \sqrt{48}$

$$\frac{1}{p} = \frac{1}{\sqrt{32} - \sqrt{24}} = \frac{\sqrt{32} + \sqrt{24}}{8}$$

$$= \frac{4\sqrt{2} + 2\sqrt{3}}{4} = \frac{2\sqrt{2} + \sqrt{3}}{2}$$

$$\frac{1}{q} = \frac{\sqrt{50} + \sqrt{48}}{2}$$

$$= \frac{5\sqrt{2} + 4\sqrt{3}}{2} = \frac{5}{\sqrt{2}} + 2\sqrt{3}$$

$$\frac{1}{p} = \frac{2}{\sqrt{2}} + \frac{\sqrt{3}}{2}$$

$$\frac{1}{q} = \frac{5}{\sqrt{2}} + 2\sqrt{3}$$

$\Rightarrow$ $\frac{1}{q} > \frac{1}{p}$

$\Rightarrow$ q < p

$\Rightarrow$ p > q

Hence, (b) **is the correct option**

11. If $\frac{4 + 3\sqrt{3}}{\sqrt{7 + 4\sqrt{3}}} = a + \sqrt{b}$ then (a, b)

$$\frac{4+3\sqrt{3}}{\sqrt{7+2\sqrt{6}}} = \frac{4+3\sqrt{3}}{\sqrt{6}+1} = \frac{4+3\sqrt{3}\times\left(\sqrt{6}\text{-}1\right)}{6\text{-}1}$$

$$= -1 + \sqrt{12}$$

$a = -1,\ b = 12$

Hence, (c) is the correct option

12. Rationalising factor of

$\left(\sqrt[3]{a^2}+\sqrt[3]{b^2}+\sqrt[3]{ab}\right)$ is $\left(\sqrt[3]{a}-\sqrt[3]{b}\right)$

Hence, Rationalising factor of $\sqrt[3]{16}+\sqrt[3]{4}+1$

$=\sqrt[3]{4}-1$

Hence, (c) is the correct option.

13. If $x=\sqrt[3]{11}, y\sqrt[4]{12}, z=\sqrt[6]{13}$

$x=(11)^{\frac{1}{3}\times\frac{4}{4}}$

L. C. M of $\begin{array}{r|l} 3 & 3,4,6 \\ 2 & 1,4,2 \\ \hline & 1,2,1 \end{array} = 12$

$y=(12)^{\frac{1}{4}\times\frac{3}{3}}$

$z=(13)^{\frac{1}{6}\times\frac{2}{2}}$

$x=11^{\frac{4}{12}}$

$y=12^{\frac{3}{12}}$

$z=13^{\frac{2}{12}}$

$x=\sqrt[12]{11^4}$

$y=\sqrt[12]{12^3}$

$z=\sqrt[12]{13^2}$

Hence, (b) is the correct option

14. $4^{\frac{1}{3}},5^{\frac{1}{4}},6^{\frac{1}{4}},8^{\frac{1}{3}}$

L.C.M of 3, 4, 6 = 12

$4^{\frac{1}{3}\times\frac{4}{7}},5^{\frac{1}{4}\times\frac{3}{5}},6^{\frac{1}{4}\times\frac{3}{3}},8^{\frac{1}{3}\times\frac{4}{7}}$

$4^{\frac{4}{12}},5^{\frac{3}{12}},6^{\frac{3}{12}},8^{\frac{4}{12}}$

$\sqrt[12]{4^4}, \sqrt[12]{5^3}, \sqrt[12]{6^3}, \sqrt[12]{8^4}$

$\sqrt[12]{256}, \sqrt[12]{125}, \sqrt[12]{216}, \sqrt[12]{4096}$

$\Rightarrow$ $5^{\frac{1}{4}}$ is the smallest number among the Numbers

Hence, (b) is the correct option.

15. $x=\sqrt{5}, y=\sqrt[4]{10}, z=\sqrt[3]{6}$

$5^{\frac{1}{2}}, 10^{\frac{1}{4}}, 6^{\frac{1}{3}}$

$\sqrt[12]{5^6}, \sqrt[12]{10^3}, \sqrt[12]{6^4}$

$\sqrt[12]{15625}, \sqrt[12]{1000}, \sqrt[12]{1296}$

$\Rightarrow$ $x>y>z$

Hence, (c) is the correct option.

16. If $x=\sqrt[2]{9}, y=\sqrt[4]{11}, z=\sqrt[12]{17}$

L. C. M of 3, 4, 6 = 12

$9^{\frac{1}{3}\times\frac{4}{7}}, 11^{\frac{1}{4}\times\frac{3}{3}}, 17^{\frac{1}{6}\times\frac{2}{2}}$

$9^{\frac{4}{12}}, 11^{\frac{3}{2}}, 17^{\frac{2}{12}}$

$\sqrt[12]{9^4}, \sqrt[12]{11^3}, \sqrt[12]{17^2}$

$\sqrt[12]{6561}, \sqrt[12]{1331}, \sqrt[12]{289}$

$\Rightarrow$ $x>y>z$

Hence, (a) is the correct option.

17. $a+x+\sqrt{2ax+x^2}$

$a+x+\sqrt{x(2a+x)}$

$\frac{1}{2}\left[2a+2x+2\sqrt{x(2a+x)}\right]$

$\frac{1}{2}\left[x+2a+x+2\sqrt{x(2a+x)}\right]$

$\Rightarrow \quad \sqrt{a+x+\sqrt{2ax+x^2}}$

$$=\sqrt{\frac{x+2a+x+2\sqrt{x(2a+x)}}{2}}$$

$$=\frac{\sqrt{x}+\sqrt{2a+x}}{\sqrt{2}}$$

Hence, (c) is the correct option.

18. $\sqrt[4]{17+\sqrt{288}}=\sqrt[4]{17+2\sqrt{72}}$

$=\sqrt[2]{\sqrt{8}+\sqrt{9}}$

$=\sqrt{3+2\sqrt{2}}.$

$=\sqrt{\left(\sqrt{2}+1\right)^2}$

$=1+\sqrt{2}$

Hence, (d) is the correct option.

19. $\left(26+15\sqrt{3}\right)^{\frac{2}{3}}+\left(26-15\sqrt{3}\right)^{\frac{2}{3}}$

$= 14$

Hence, (d) is the correct option.

20. If $x=2+2^{\frac{1}{3}}+4^{\frac{1}{3}}$

$\Rightarrow \quad x-2=2^{\frac{1}{3}}+4^{\frac{1}{3}}$

$(x-2)^3=2+4+3.2^{\frac{1}{3}}.4^{\frac{1}{3}}.\left(2^{\frac{1}{3}}+4^{\frac{1}{3}}\right)$

$=6+3.2(x-2)$

$=6+(6x-12)$

$x^3-8-6x^2+12x=6x-6$

$\Rightarrow \quad x^3-6x^2+6x=8-6$

$= 2$

$\Rightarrow \quad x^3 - 6x^2 + 6x = 2$

Hence, (c) is the correct option.

21. $\dfrac{3+\sqrt{6}}{5\sqrt{3}-2\sqrt{12}-\sqrt{32+50}}$

$= \dfrac{3+\sqrt{6}}{5\sqrt{3}-2.2\sqrt{3}-\sqrt{32+5\sqrt{2}}}$

$= \dfrac{3+\sqrt{6}}{5\sqrt{3}-4\sqrt{3}-\sqrt{32+5\sqrt{2}}} = 2\sqrt{2}$

Hence, (c) is the correct option.

22. If $n = \dfrac{\sqrt{a+2b}+\sqrt{a-2b}}{\sqrt{a+2b}-\sqrt{a-2b}}$

$\dfrac{x+1}{x+1} = \dfrac{\sqrt{a+2b}}{\sqrt{a-2b}}$

$\dfrac{(x+1)^2}{(x-1)^2} = \dfrac{a+2b}{a-2b}$

$\dfrac{(x+1)^2+(x-1)^2}{(x+1)^2(x-1)^2} = \dfrac{a+2b+(a-2b)}{(a+2b)-(a-2b)}$

$\dfrac{2(x^2+1)}{4x} = \dfrac{2a}{4b}$

$\Rightarrow \quad bx^2 + b = ax$

$\Rightarrow \quad bx^2 - ax + b = 0$

Hence, (d) is the correct option.

23. The value of

$\left(20+14\sqrt{2}\right)^{\frac{-1}{3}} + \left(20-14\sqrt{2}\right)^{\frac{-1}{3}} = 2$

Hence, (a) is the correct option.

24. If $n = 2\sqrt{2} + \sqrt{7}$

$$\frac{1}{x} = \frac{1}{2\sqrt{2}+\sqrt{7}} = 2\sqrt{2}+\sqrt{7}$$

$$\frac{1}{2}\left(x+\frac{1}{x}\right) = \frac{1}{2}\left[\left(2\sqrt{2}+\cancel{\sqrt{7}}\right)+\left(2\sqrt{2}-\cancel{\sqrt{7}}\right)\right]$$

$$= \frac{\cancel{4}\sqrt{2}}{\cancel{2}} = 2\sqrt{2} = \sqrt{8}$$

Hence, (c) is the correct option.

25. $x = 3 + 3^{\frac{1}{3}} + 3^{\frac{2}{3}}$

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

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

$$x^3 - 27 + 27x - 9x^2 = 3 + 9 + 9(x-3)$$

$$x^3 - 9x^2 + 27x - 27 = 12 + 9x - 27$$

$\Rightarrow$ $3x^2 - 9x^2 + 18x = 12$

Hence, (b) is the correct option.

26. $\sqrt{12 - \sqrt{68 + 48\sqrt{2}}}$

$$= \sqrt{12 - \sqrt{68 + 2\sqrt{576 \times 2}}}$$

$$= \sqrt{12 - \sqrt{68 + 2\sqrt{24 \times 48}}}$$

$$= \sqrt{12 - \sqrt{\left(\sqrt{24}+\sqrt{48}\right)^2}}$$

$$= \sqrt{12 - \left(2\sqrt{6} + 2\sqrt{12}\right)}$$

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

Hence, (a) is the correct option.

27. Let $\sqrt[3]{38+17\sqrt{5}} = x+\sqrt{y}$

$\Rightarrow$ $x^3+3xy = 38, 17\sqrt{5} = \sqrt{y}\left(y+3x^2\right)$

$\Rightarrow$ $y = 5$

$x^3+3.x(5) = 38$

$x^3+15x = 38$

$3x^2+5 = 17$

$3x^2 = 12$

$x^2 = 4$

$x = \pm 2$

Hence, $\sqrt[3]{38+17\sqrt{5}} = 2+\sqrt{5}$

Hence, (b) is the correct option.

28. $\left(4+\sqrt{15}\right)^{\frac{3}{2}} + \left(4-\sqrt{15}\right)^{\frac{3}{2}} = P\sqrt{10}$

$\left(4+\sqrt{15}\right)^{3} + \left(4-\sqrt{15}\right)^{2} +$

$2.\left(4+\sqrt{15}\right)^{\frac{3}{2}}\left(4-\sqrt{15}\right)^{\frac{3}{2}} = P^2(10)$

$2\left(64+3.4\left(\sqrt{15}\right)^2\right) = P^2(10)$

$\not{2}\,(64+12\times 15) = \underset{5}{\not{10}}\,P^2$

$(64+180) = 5P^2$

$224 = 5P^2$

$\Rightarrow$ $P = 7$

Hence, (a) is the correct option.

29. Let $x = \sqrt{12+\sqrt{12+\sqrt{12+\sqrt{12+}}}}$ ---

$$x=\sqrt{12+\sqrt{12+\sqrt{12+\sqrt{12+}}}}\ ---$$
$$x=\sqrt{12+x}$$
$$x^2=12+x$$
$$x^2-x-12=0$$
$$(x-4)(x+3)=0$$
$\Rightarrow$ $x-4=0$ or $x+4=0$

$\Rightarrow$ $x=4$ $\quad x=-3$

Hence, (c) is the correct option.

30. $\sqrt{2},\quad \sqrt[2]{3},\quad \sqrt[4]{5}$

$$2^{\frac{1}{2}},\ 3^{\frac{1}{2}},\ 5^{\frac{1}{4}}$$
$$2^{\frac{1}{2}\times\frac{2}{3}},\ 3^{\frac{1}{2}\times\frac{2}{2}},\ 5^{\frac{1}{4}}$$
$$2^{\frac{2}{4}},\ 3^{\frac{2}{4}},\ 5^{\frac{1}{4}}$$
$$\sqrt[4]{4},\ \sqrt[4]{9},\ \sqrt[4]{5}$$

Hence, (c) is the correct option.

SECTION - II
Assertion - Reason Questions

31. $\sqrt{a^2-b^2}\neq\sqrt{a-b}$

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

Hence (c) is the correct option.

32. $\sqrt{15},\sqrt{13},\sqrt{11}$ are pure surds

$$\sqrt[5]{320}=\sqrt[5]{32\times10}=\sqrt[5]{32}\times\sqrt[5]{10}$$
$$=2\sqrt[5]{10}$$

Hence (a) is the correct option.

33. $\sqrt{3} < \sqrt[4]{10} < \sqrt[3]{6}$

$4\sqrt{12} - \sqrt{50} - 7\sqrt{48}$

$= 8\sqrt{3} - 5\sqrt{2} - 28\sqrt{3}$

$= -20\sqrt{3} - 5\sqrt{2}$

Hence (a) is the correct option.

34. $\sqrt{14} \times \sqrt{21} = \sqrt{29y}$

$\left(\text{since} \quad \sqrt{a} \times \sqrt{b} = \sqrt{ab}\right)$

$\sqrt[n]{x} \times \sqrt[n]{y} = \sqrt[n]{xy}$

Hence (a) is the correct option.

35. $\left(5 - \sqrt{3}\right) + \left(5 + \sqrt{3}\right) = 10$ is rational

$\left(5 - \sqrt{3}\right)\left(5 + \sqrt{3}\right) = 25 - 3 = 22$ is also rational

Hence $\left(5 - \sqrt{3}\right)$ and $\left(5 + \sqrt{3}\right)$ are conjugate surds

Hence (a) is the correct option.

36. $\dfrac{5 + 2\sqrt{3}}{7 + 4\sqrt{3}} \times \dfrac{7 - 4\sqrt{3}}{7 - 4\sqrt{3}}$

$= \dfrac{35 + 14\sqrt{3} - 20\sqrt{3} - 8 \times 3}{49 - 48}$

$= 11 - 6\sqrt{3} = a + b\sqrt{3}$

$a = 11$

$\dfrac{1 + \sqrt{2}}{\sqrt{5} + \sqrt{3}} + \dfrac{1 - \sqrt{2}}{\sqrt{5} - \sqrt{3}}$

$= \dfrac{\sqrt{5} + \sqrt{10} - \sqrt{3} - \sqrt{6} + \sqrt{5} - \sqrt{10} + \sqrt{3} - \sqrt{6}}{5 - 3}$

$$= \frac{\not{2}\left(\sqrt{5}-\sqrt{6}\right)}{\not{2}}$$

$$= \sqrt{5}-\sqrt{6} = -0.213$$

Hence (a) is the correct option.

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

$$x+\frac{1}{x} = \left(5+2\sqrt{6}\right)+\left(5-2\sqrt{6}\right) = 10$$

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

Hence (b) is the correct option.

38. $\sqrt{75} = 5\sqrt{3}$

$5\sqrt{3}\times\sqrt{3} = 5\times 3 = 15$ which is rational

$\sqrt{3}$ is R.F.

Hence (b) is the correct option.

39. $\sqrt{10} = 3.162$

$$\frac{1}{\sqrt{10}} = \frac{1}{3.162} = 0.316$$

$$\sqrt[3]{36} = \sqrt[3]{3\times 3\times 2\times 2}$$

Hence (b) is the correct option.

40. $4\sqrt{3}-3\sqrt{12}+2\sqrt{75}$

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

$$\sqrt[4]{81}-8.\sqrt[3]{216}+15.\sqrt[5]{32}+\sqrt{225}$$

$$= 3-8.6+15.2+15$$

$$= 3-48+30+15 = 0$$

Hence (b) is the correct option.

SECTION - III

Linked Comprehension Type

41. If $\dfrac{5+2\sqrt{3}}{7+4\sqrt{3}}=a+b\sqrt{3}$

$$\frac{5+2\sqrt{3}}{7+4\sqrt{3}}\times\frac{7-4\sqrt{3}}{7-4\sqrt{3}}$$

$$=35+14\sqrt{3}-20\sqrt{3}-24$$

$$=11-6\sqrt{3}$$

$\Rightarrow$ $a=11,\quad b=-6$

Hence (a) is the correct option.

42. $x=5-2\sqrt{6}$

$$\frac{1}{x}=5-2\sqrt{6}$$

$$x+\frac{1}{x}=\left(5+2\sqrt{6}\right)+\left(5-2\sqrt{6}\right)=10$$

Hence (b) is the correct option.

43. $2\sqrt{3}-\sqrt{5}$ is a rationalising factor of $2\sqrt{3}+\sqrt{5}$

$$\left(2\sqrt{3}-\sqrt{5}\right)\left(2\sqrt{3}+\sqrt{5}\right)=\left(2\sqrt{3}\right)^2-\left(\sqrt{5}\right)^2$$

$=12-5=7$ which is rational

Hence (c) is the correct option.

44. $\sqrt{11-4\sqrt{7}}$

$$=\sqrt{11-2\sqrt{7\times4}}$$

$$=\sqrt{7}-2$$

Hence (a) is the correct option.

45. $\sqrt{15-x\sqrt{14}}=\sqrt{8}-\sqrt{7}$

$$15-x\sqrt{14}=15-2\sqrt{56}$$

$=15-4\sqrt{14}$

$\Rightarrow \quad x=4$

Hence, (c) is the correct option.

46. $\sqrt{(2x-3)+2\sqrt{x^2-3x+2}}$

$=\sqrt{x-1+x-2+2\sqrt{(x-1)(x-2)}}$

$=\sqrt{\left[\sqrt{(x-1)}+\sqrt{(x-2)}\right]^2}$

$=\sqrt{x-1}+\sqrt{x-2}$

Hence (a) is the correct option.

47. Let $\sqrt[3]{3\ 7-3\ \ 0\ \sqrt{3}}=x-\sqrt{y}$

$x^3+3x^2=37$ and $\sqrt{y}\left(y+3x^2\right)=30\sqrt{3}$

$\Rightarrow \quad$ y=3, $\quad 3x^2+y=30$

$3x^2=27$

$x=3;\ y=3$

Hence (c) is the correct option.

48. $\left(4+\sqrt{15}\right)^{\frac{3}{2}}+\left(4-\sqrt{15}\right)^{\frac{3}{2}}=p\sqrt{10}$

$\Rightarrow \quad P=7$

Hence (c) is the correct option.

49. $\sqrt[3]{9\sqrt{3}=11\sqrt{2}}=\sqrt{3}-\sqrt{2}$

Hence (a) is the correct option.

50. $10^{\frac{1}{4}},6^{\frac{1}{3}},3^{\frac{1}{2}}$

$10^{\frac{1}{4}\times\frac{3}{5}},6^{\frac{1}{3}\times\frac{4}{4}},3^{\frac{1}{2}\times\frac{1}{6}}$

L. C. M of 2, 3, 4 = 12

$\sqrt[12]{10^3}, \sqrt[12]{6^4}, \sqrt[12]{3^6}$

$\sqrt[12]{1000}, \sqrt[12]{1296}, \sqrt[12]{729}$

Hence, $\sqrt{3}$ is the smallest number

Hence, (c) is the correct option.

51. $\sqrt[5]{2}, \sqrt[6]{5}, \sqrt[9]{6}$

$3 \underline{| 3, 6, 9}$
1,2,3

$2^{\frac{1}{3}}, 5^{\frac{1}{6}}, 6^{\frac{1}{9}}$

L.C.M. of 3, 6, 9 = 18

$2^{\frac{1}{3} \times \frac{6}{6}}, 5^{\frac{1}{6} \times \frac{3}{3}}, 6^{\frac{1}{9} \times \frac{2}{2}}$

$\sqrt[18]{2^6}, \sqrt[18]{5^3}, \sqrt[18]{6^2}$

$\sqrt[18]{64}, \sqrt[18]{125}, \sqrt[18]{36}$

$\Rightarrow$ $\sqrt[6]{5}$ is the smaller surd

Hence, (b) is the correct option.

52. $3^{\frac{1}{3}}, 8^{\frac{1}{6}}, 25^{\frac{1}{9}}$

$3^{\frac{1}{3} \times \frac{6}{6}}, 8^{\frac{1}{6} \times \frac{3}{3}}, 25^{\frac{1}{9} \times \frac{2}{2}}$

$\sqrt[18]{3^6}, \sqrt[18]{8^3} \sqrt[18]{25^2}$

$\sqrt[18]{729}, \sqrt[18]{512} \sqrt[18]{625}$

$\Rightarrow$ $\sqrt[6]{8}$ is the smaller surd

Hence, (b) is the correct option.

53. $n = \frac{\sqrt{2}+1}{\sqrt{2}-1}$ $\quad$ $y = \frac{\sqrt{2}-1}{\sqrt{2}+1}$

Then $x + y = \frac{\sqrt{2}+1}{\sqrt{2}-1} + \frac{\sqrt{2}-1}{\sqrt{2}+1}$

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

= 2 (2 + 1) = 6

Hence, (c) is the correct option.

54. $$\frac{2}{\sqrt{10+2\sqrt{21}}}-\frac{1}{\sqrt{12-2\sqrt{35}}}+\frac{1}{\sqrt{8-2\sqrt{15}}}$$

$$=\frac{2}{\sqrt{\left(\sqrt{7}+\sqrt{3}\right)^2}}-\frac{1}{\sqrt{\left(\sqrt{7}+\sqrt{5}\right)^2}}+\frac{1}{\sqrt{\left(\sqrt{5}+\sqrt{3}\right)^2}}$$

$$=\frac{2}{\sqrt{7}+\sqrt{3}}-\frac{1}{\sqrt{7}-\sqrt{5}}+\frac{1}{\sqrt{5}-\sqrt{3}}$$

$$=\frac{\sqrt{7}-\sqrt{3}}{2}-\frac{\sqrt{7}+\sqrt{5}}{1}+\frac{\sqrt{5}+\sqrt{3}}{1}$$

$$=\frac{\sqrt{7}-\sqrt{3}-\sqrt{7}-\sqrt{5}-\sqrt{5}+\sqrt{3}}{2}$$

$$=\frac{0}{2}=0$$

Hence (b) is the correct option.

55. If $x=\frac{\sqrt{3}}{2}$ then

$$\frac{1+x}{1+\sqrt{1+x}}+\frac{1+\frac{\sqrt{3}}{2}}{1+\sqrt{1+\frac{\sqrt{3}}{2}}}$$

$$1+x=1+\frac{\sqrt{3}}{2}=\frac{2+\sqrt{3}}{2}=\frac{4+2\sqrt{3}}{4}$$

$$\sqrt{1+x}=\sqrt{\frac{4+2\sqrt{3}}{4}}=\frac{\sqrt{3}+1}{2}$$

Hence,

$$\frac{1+x}{1+\sqrt{1+x}}=\frac{\frac{2+\sqrt{3}}{2}}{1+\frac{\sqrt{3}+1}{2}}=\frac{2+\sqrt{3}}{3+\sqrt{3}}$$

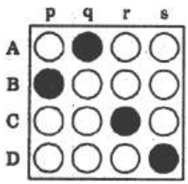
$$=\frac{\left(2+\sqrt{3}\right)\times\left(3-\sqrt{3}\right)}{9-3}$$

$$=\frac{6+3\sqrt{3}-2\sqrt{3}-3}{6}=\frac{3+\sqrt{3}}{6}$$

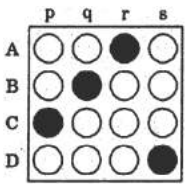
Hence (a) is the correct option.

SECTION - IV
Matrix - Match Type

56.



57.



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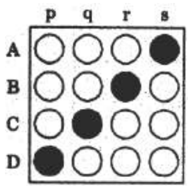
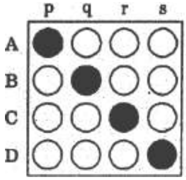


59.



60.