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Answers Key:

4 Marks

1. The two irrational numbers between 2 and 2.5 can be taken as
   2.101001000100001...
   2.201001000100001...

2. $= \frac{40}{2\sqrt{10}+\sqrt{2\times2\times5}+\sqrt{2\times2\times10}-2\sqrt{5}}$
   $= \frac{40}{2\sqrt{10}+\sqrt{20}+\sqrt{40}-2\sqrt{5}}$
   $= \frac{40}{4\sqrt{10}} = \frac{10}{\sqrt{10}}$
   $\sqrt{10} = 3.162$

3. $a = 7 - 4\sqrt{3} = 4 + 3 - 4\sqrt{3}$
   $= 2^2 + \left(\sqrt{3}\right)^2 - 2(2)(\sqrt{3})$
   $= \left(2 - \sqrt{3}\right)^2$
   $\sqrt{a} = 2 - \sqrt{3} \quad \ldots(1)$
   $\frac{1}{\sqrt{a}} = \frac{1}{2-\sqrt{3}}$
   $= \frac{1}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}} = \frac{2+\sqrt{3}}{4-3}$
   $= 2 + \sqrt{3} \ldots(2)$
   From (1) and (2)
   $\sqrt{a} + \frac{1}{\sqrt{a}} = \left(2 - \sqrt{3}\right) + \left(2 + \sqrt{3}\right) = 4$

4. x = 4-√15
   $\frac{1}{x} = \frac{1}{4-\sqrt{15}} \times \frac{4+\sqrt{15}}{4+\sqrt{15}}$
   $\frac{1}{x} = \frac{4+\sqrt{15}}{16-15}$
   $\frac{1}{x} = 4 + \sqrt{15}$
   $\left(x + \frac{1}{x}\right)^2 = \left(4 - \sqrt{15} + 4 + \sqrt{15}\right)^2$
   = $(8)^2$
   = 64

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3 Marks

5. Let x = 0.0333 ...(i)
   On multiplying Eq. (i) by 10, we get
   10 x = 0.333 ....(ii)
   Again, multiplying Eq. (ii) by 10, we get
   100 x = 3.333 .....(iii)
   On subtracting Eq. (ii) from Eq. (iii), we get
   100 x - 10x = 3.333 ... - 0 .333
   $\Rightarrow$ 90 x = 3
   $\therefore\ x = \frac{3}{90}$ ...(iv)
   Again, let y = 0.444 ... ...(v)
   On multiplying Eq. (iv) by 10, we get
   10y = 4.444 ...
   On subtracting Eq. (iv) from Eq. (v), we get
   10y - y = 4 .444 ... - 0.444 ...
   $\Rightarrow\ 9y = 4\ \Rightarrow y = \frac{4}{9}$
   ∴Sum of 0.0333.... and 0.444...=x+y
   $= \frac{3}{90} + \frac{4}{9} = \frac{3+40}{90} = \frac{43}{90}$

6. $\frac{2+\sqrt{3}}{2-\sqrt{3}} = \frac{2+\sqrt{3}}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}}$
   $= \frac{(2+\sqrt{3})^2}{(2)^2-(\sqrt{3})^2} \left[\because (a+b)(a-b) = a^2 - b^2\right]$
   $= \frac{(2+\sqrt{3})^2}{4-3}$
   $= (2+\sqrt{3})^2 = 4 + 3 + 4\sqrt{3} \ \left[\because\ (a+b)^2 = a^2 + b^2 + 2ab\right]$
   $= 7 + 4\sqrt{3}$
   $But \quad \frac{2+\sqrt{3}}{2-\sqrt{3}} = a + b\sqrt{3}$
   $\because\ a + b\sqrt{3} = 7 + 4\sqrt{3}$
   On comparing coefficient of a and b from both sides, we gieta=7, b=4
   $\therefore\ a^2 + b^2 = (7)^2 + (4)^2 = 49 + 16 = 65$

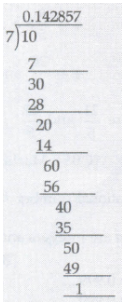
7. $\frac{214}{33}$

8. $\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{2}{\sqrt{3}+\sqrt{5}}$
   $= \frac{1}{(\sqrt{2}+1)} \times \frac{(\sqrt{2}-1)}{(\sqrt{2}-1)} + \frac{1}{(\sqrt{3}+\sqrt{2})} \times \frac{(\sqrt{3}-\sqrt{2})}{(\sqrt{3}-\sqrt{2})} + \frac{2}{(\sqrt{5}+\sqrt{3})} \times \frac{(\sqrt{5}-\sqrt{3})}{(\sqrt{5}-\sqrt{3})}$
   $\frac{(\sqrt{2}-1)}{2-1} + \frac{(\sqrt{3}-\sqrt{2})}{3-2} + \frac{2(\sqrt{5}-\sqrt{3})}{5-3}$
   = √2-1 + √3 - √2 + √5-√3 = √5 - 1

9. $\frac{4}{3\sqrt{3}-2\sqrt{2}}+\frac{3}{3\sqrt{3}-2\sqrt{2}}=\frac{21\sqrt{3}+2\sqrt{2}}{19}$
$=\frac{21(1.732)+2(1.414)}{19}$
$=\frac{39.2}{19}$
= 2.063

2 Marks

10. 34
11. $a=2, \quad b=\frac{5}{6}$
12. Draw a line XY and take a fixed length as unit length, which represents integers on this line.
(i) On the right side of O, take OA = 1 unit, then OB = 2 units. Divide the 3rd unit BC into 8 equal parts. Mark a point P on BC, such that BP represents 3/8 of a unit.
Therefore, OP represents $2\frac{3}{8}$.
(ii) On the left side of O, take OD = 1 unit, then DE =1 unit. Divide the 2nd unit DE into 7 equal parts. Make a point Q on DE such that DQ represents 5/7 of a unit.
Therefore, OQ represents $-\left(1\frac{5}{7}\right)$.
13. -0.00875 = $\frac{875}{100000}$
$=\frac{35}{4000}=\frac{7}{800}$
14. x = $\frac{1}{7}$



x = $0.\overline{142857}$

Multiple Choice Question

15. (c) a real number
16. (d) real
17. (b) 0.056
18. (c) non terminating and non repeating
19. (d) non-terminating non-recurring
20. (c) an irrational number
21. (b) positive and rational
22. (d) negative and rational
23. (d) 5
24. (b) $\frac{3}{5}$

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