Q.5. Find the 4th term of an H.P whose 7th term is $\frac{1}{20}$ and 13th term is $\frac{1}{38}$.

$t_7 = \frac{1}{20}$ ... are in H.P

$t_7 = 20$ ... are in A.P

$t_{13} = \frac{1}{38}$ ... are in H.P

$t_{13} = 38$ ... are in A.P

Let, 1st term = a, C.d = d

$t_7 = a + (7-1) \times d$

$20 = a + 6d$ ---<i>

$t_{13} = a + (13-1) \times d$

$38 = a + 12d$ ---<ii>

From <i> and <ii>

$a + 6d = 20$

$a + 12d = 38$ (Subtract)

$-6d = -18$

$d = 3$

Putting the value of d in <i>

$a + 6d = 20$

$a + 6 \times 3 = 20$

$a = 20 - 18 = 2$

$t_4 = a + 3d$

$= 2 + 3 \times 3$

$= 2 + 9$

$= 11$ (are in A.P)

$t_4 = \frac{1}{11}$ Ans.

Exercise - 3 B

Q.1. Insert 4 H.M's 1 and $\frac{1}{11}$.

$1, H_1, H_2, H_3, H_4, \ldots \frac{1}{11}$ are in H.P

$1, \frac{1}{H_1}, \frac{1}{H_2}, \frac{1}{H_3}, \frac{1}{H_4} \ldots \frac{1}{11}$ are in A.P

$a = 1, \quad n = 6, \quad t_n = 11$

$t_n = a + (n-1) \times d$

$11 = 1 + (6-1) \times d$

$11 = 1 + 5d$

$5d = 10$

$d = 2$

$\frac{1}{H_1} = 1 + 2 = 3$

$\frac{1}{H_2} = 3 + 2 = 5$

$\frac{1}{H_3} = 5 + 2 = 7$

$\frac{1}{H_4} = 7 + 2 = 9$

$H.M_s = \frac{1}{3}, \frac{1}{5}, \frac{1}{7}, \frac{1}{9} \ldots$

Ans.

Q.2. Insert 4 H.Ms between 1 and 16

1, H_1, H_2, H_3, H_4, 16 are in H.P

$1, \frac{1}{H_1}, \frac{1}{H_2}, \frac{1}{H_3}, \frac{1}{H_4}, \ldots \frac{1}{16}$ are in A.P

$a = \frac{1}{1}$, $n = 6$, $t_n = \frac{1}{16}$

$t_n = a + (n-1) \times d$

$\frac{1}{16} = \frac{1}{1} + (6-1) \times d$

$\frac{1}{16} = \frac{1}{1} + 5d$

$\frac{1}{16} - \frac{1}{1} = 5d$

$5d = \frac{1-4}{16}$

$5d = \frac{-3}{16}$

$16 + 80d = 1$

$80d = 1 - 16$

$d = \frac{-15}{80}$ $\quad \frac{3}{16}$

$d = \frac{-3}{16}$

$H_1 = 1 + \frac{-3}{16} = \frac{16-3}{16} = \frac{13}{16}$

$H_2 = \frac{13}{16} + \frac{-3}{16} = \frac{13-3}{16} = \frac{10}{16}$

$H_3 = \frac{10}{16} + \frac{-3}{16} = \frac{10-3}{16} = \frac{7}{16}$

$H_4 = \frac{7}{16} + \frac{-3}{16} = \frac{7-3}{16} = \frac{4}{16}$

H.Ms $= \frac{16}{13}, \frac{16}{10}, \frac{16}{7}, \frac{16}{4}$ Ans.