* EX-5.3 :-

1. i) $S_n = \frac{n}{2}(2a + (n-1)d)$

$S_{10} = \frac{10}{2}(2(2) + (10-1)5)$

$= 5(4 + 45) = 5 \times 49 = \underline{245}$

ii) $S_n = \frac{n}{2}(2a + (n-1)d)$

$S_{12} = \frac{12}{2}(2(-37) + (12-1)4)$

$= 6(-74 + 44) = 6(-30) = \underline{-180}$

iii) $S_n = \frac{n}{2}(2a + (n-1)d)$

$S_{100} = \frac{100}{2}(2(0.6) + (100-1)1.1)$

$= 50(1.2 + 108.9) = 50 \times 110.1 = \underline{5505}$

iv) $S_n = \frac{n}{2}(2a + (n-1)d)$

$S_{11} = \frac{11}{2}\left(2\left(\frac{1}{15}\right) + (11-1)\frac{1}{60}\right)$

$= \frac{11}{2} \times \frac{18}{60} = \underline{\frac{33}{20}}$

2) i) $a = 7, d = \frac{7}{2}, a_n = 84, n = 23$

$S_n = \frac{n}{2}(a+l)$

$S_{23} = \frac{23}{2}(7+84)$

$= \frac{23}{2}(91) = \underline{1046.5}$

ii) $a = 34, d = -2, a_n = 10, n = 13$

$S_n = \frac{n}{2}(a+l)$

$S_{13} = \frac{13}{2}(34+10)$

$= \frac{13}{2}(44) = \underline{286}$

iii) $a = -5, d = -3, a_n = -230, n = 76$

$S_n = \frac{n}{2}(a+l)$

$S_{76} = \frac{76}{2}(-5+(-230))$

$= 38(-235) = \underline{-8930}$

3. i) $a + (n-1)d = 50$

$5 + (n-1)3 = 50$

$n - 1 = \frac{45}{3} = 15$

$\therefore n = 15 + 1 = \underline{16}$

$S_{16} = \frac{16}{2}(5+50)$

$= 8 \times 55 = \underline{440}$

ii) $a + 12d = 35$

$7 + 12d = 35$

$d = \frac{28}{12} = \frac{7}{3}$

$S_{13} = \frac{13}{2}(7 + 35)$

$= 13 \times 21 = \underline{273}$

iii) $a + 11d = 37$

$a + 11(2) = 37$

$a = 37 - 33 = \underline{4}$

$S_{12} = \frac{12}{2}(4 + 37)$

$= 6 \times 41 = \underline{246}$

iv) $a + 2d = 15$

$a = 15 - 2d$

$S_{10} = \frac{10}{2}(2a + (n-1)d)$

$= 5(2(15 - 2d) + (10 - 1)d)$

$= 5(30 - 4d + 9d)$

$25 = 30 + 5d$

$d = \underline{-1}$

$a_{10} = a + 9d$

$= 15 - 2d + 9d$

$= 15 + 7d = 15 + 7(-1) = \underline{8}$

v) $S_9 = \frac{9}{2}(2a + (9-1)d)$

$75 = \frac{9}{2}(2a + 8d)$

$75 \times \frac{2}{9} = 2a + 8(5)$

$\frac{50}{3} = 2a + 40$

$a = \frac{-70}{3 \times 2} = \frac{-35}{3}$

$a_9 = a + 8d = \frac{-35}{3} + 8(5) = \underline{\underline{\frac{85}{3}}}$

vi) $S_n = \frac{n}{2}(2a + (n-1)d)$

$90 = \frac{n}{2}(4 + 8n - 8)$

$90 \times 2 = n(8n - 4)$

$180 = 8n^2 - 4n$

$8n^2 - 4n - 180 = 0$ or $2n^2 - n - 45 = 0$

$2n^2 - 10n + 9n - 45 = 0$

$2n(n-5) + 9(n-5) = 0$

$(2n+9)(n-5) = 0$

$2n + 9 = 0$ or $n - 5 = 0$

$n = -\frac{9}{2}$ (Rejected) or $n = \underline{\underline{5}}$

$a_n = a + (n-1)d$

$a_5 = 2 + (5-1)8 = 2 + 32 = \underline{\underline{34}}$

vii) $S_n = \frac{n}{2}(a + a_n)$

$210 = \frac{n}{2}(8 + 62)$

$n = \frac{210 \times 2}{70} = \underline{\underline{6}}$

$a_6 = 62$

$a + 5d = 62$

$8 + 5d = 62$

$d = \frac{54}{5} = \underline{\underline{10.8}}$

vii) $S_n = \frac{n}{2}(a + a_n)$

$-14 = \frac{n}{2}(a + 4)$

$-28 = na + 4n$

$a_n = 4$

$\Rightarrow a + (n-1)d = 4$

$\Rightarrow \frac{-4n - 28}{n} + (n-1)2 = 4$

$\Rightarrow -4n - 28 + 2n^2 - 2n = 4n$

$\Rightarrow 2n^2 - 10n - 28 = 0$ or $n^2 - 5n - 14 = 0$

or $n^2 - 7n + 2n - 14 = 0$

$\Rightarrow n(n-7) + 2(n-7) = 0$

$\Rightarrow (n+2)(n-7) = 0$

$n + 2 = 0$ or $n - 7 = 0$

$n = -2$ (Rejected) or $n = 7$

$a = \frac{-28 - 4n}{n} = \frac{-28 - 28}{7} = \frac{-56}{7} = -8$

ix) $S_n = \frac{n}{2}(2a + (n-1)d) = 192$

$192 = \frac{8}{2}(2(3) + (8-1)d)$

$192 = 4(6 + 7d)$

$6 + 7d = 48$

$d = \frac{42}{7} = 6$

x) $S_n = \frac{n}{2}(a + l)$

$144 = \frac{9}{2}(a + 28)$

$32 = a + 28$

$a = 32 - 28 = 4$