The number of integral values of m for which the quadratic expression, $(1+2m)x^2-2(1+3m)x+4(1+m), x\in R$, is always positive, is :

(1) 3 (2) 8

(3) 7 (4) 6

(3) Let the given quadratic expression

$(1 + 2m)x^2 - 2(1 + 3m)x + 4(1 + m)$, is positive for all $x \in R$, then

$$1 + 2m > 0 \qquad ...(1)$$

$D < 0$

$$\Rightarrow \quad 4(1 + 3m)^2 - 4(1 + 2m)4\,(1 + m) < 0$$

$$\Rightarrow \quad 1 + 9m^2 + 6m - 4[1 + 2m^2 + 3m] < 0$$

$$\Rightarrow \quad m^2 - 6m - 3 < 0$$

$$\Rightarrow \quad m \in (3-2\sqrt{3}, 3+2\sqrt{3})$$

From (1)

$$\therefore \quad m > -\frac{1}{2}$$

$$m \in \left(3-2\sqrt{3}, 3+2\sqrt{3}\right)$$

Then, integral values of $m = \{0, 1, 2, 3, 4, 5, 6\}$

Hence, number of integral values of $m = 7$