(3) let $p(x) = px^2 + 5x + r$

$x-2$ is a factor of $p(x)$

$\therefore p(2) = 0$ by factor theorem

$$p \times 2^2 + 5 \times 2 + r = 0$$

$$4p + 10 + r = 0$$

$$r = -4p - 10 \cdots (1)$$

$x - \frac{1}{2}$ is a factor of $p(x)$

$$\therefore p\left(\frac{1}{2}\right)^2 + 5 \times \frac{1}{2} + r = 0$$

$$\frac{p}{4} + \frac{5}{2} + r = 0$$

$$\Rightarrow \frac{p + 10 + 4r}{4} = 0$$

$$\Rightarrow p + 10 + 4r = 0$$

$$\Rightarrow 4r = -p - 10$$

$$\Rightarrow r = -\frac{p-10}{4} \cdots (11)$$

From (1), (11)

$$\frac{-4p - 10}{1} = \frac{-p - 10}{4}$$

$$\Rightarrow -16p - 40 = -p - 10$$

$$\Rightarrow -15p = -10 + 40$$

$$\Rightarrow p = -2$$

Sub (1)

$$r = -4(-2) - 10$$

$$= 8 - 10$$

$$= -2$$

$\therefore p = r$