A horizontal overhead power line carries a current of 90 A in east to west direction. What is the magnitude and direction of the magnetic field due to the current 1.5 m below the line?

Current in the power line, I = 90 A

Point is located below the power line at distance, r = 1.5 m

Hence, magnetic field at that point is given by the relation,

$$|\vec{B}| = \frac{\mu_0}{4\pi} \frac{2l}{r}$$

Where,

$\mu_0 = $ Permeability of free space

$= 4\pi \times 10^{-7}$ T m A^{-1}

$$|\vec{B}| = \frac{4\pi \times 10^{-7}}{4\pi} \times \frac{2 \times 90}{1.5}$$

$$= 1.2 \times 10^{-5}\ T$$

The current is flowing from East to West. The point is below the power line. Hence, according to Maxwell's right hand thumb rule, the direction of the magnetic field is towards the South.