

A particle P of mass 0.5 kg is attached to one end of a light elastic string of natural length 0.6 m and modulus of elasticity 12 N . The other end of the string is attached to a fixed point O . The particle P is projected vertically downwards with speed 2 m s^{-1} from the point 0.5 m vertically below O . For an instant when the acceleration of P is 4 m s^{-2} downwards, find the extension of the string and the speed of P . [6]