



QUESTION WORKBOOK

Hooke's law and elastic strings

Further Mechanics 1 · Year FM

7 questions · 26 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

- A1** State Hooke's law, defining every symbol, and say what the modulus of elasticity is measured in. [3]

- A2** An elastic string of natural length 2 m and modulus 80 N is stretched to a length of 2.5 m. Find the tension. [2]

SECTION B · Standard

- B1** A particle of mass 3 kg hangs in equilibrium from an elastic string of natural length 1.2 m and modulus 147 N. Find the extension and the total length, taking $g = 9.8 \text{ m/s}^2$. [4]

- B2** Two points A and B are 3 m apart on a smooth horizontal table. A particle is joined to A by a string of natural length 1.2 m and modulus 24 N, and to B by a string of natural length 1.2 m and modulus 36 N. Find the tension in equilibrium. [5]

- B3** State two ways in which a spring differs from a string in these problems. [2]

- B4** A particle of mass 2 kg rests on a smooth plane inclined at 30° to the horizontal, held by an elastic string of natural length 1 m and modulus 49 N running up the line of greatest slope to a fixed point. Find the extension. [4]

SECTION C · Stretch

- C1** One end of an elastic string of natural length 1.5 m and modulus 49 N is attached to a fixed point O on a rough horizontal table. A particle of mass 2 kg is attached to the other end and rests in equilibrium on the table. The coefficient of friction between the particle and the table is 0.2. Find the set of possible distances of the particle from O, taking $g = 9.8 \text{ m/s}^2$. [6]