



QUESTION WORKBOOK

Oscillations on strings and springs

Further Mechanics 2 · Year FM

7 questions · 27 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

- A1** Explain why a mass hanging on a spring oscillates about the equilibrium position rather than the natural length. [2]

- A2** A mass of 1 kg hangs on a spring of natural length 0.5 m and modulus 40 N. Find ω and the period of small oscillations. [3]

SECTION B · Standard

- B1** A mass of 1 kg hangs on a spring of natural length 0.5 m and modulus 40 N. Find the equilibrium extension, taking $g = 9.8 \text{ m/s}^2$. [3]

- B2** The mass is raised to the point where the spring has its natural length and released from rest. Find its greatest speed and where it occurs. [4]

- B3** State what changes if the spring in the previous question is replaced by a string of the same natural length and modulus. [3]

- B4** A particle of mass 0.5 kg lies on a smooth horizontal table between two springs, each of natural length 0.4 m and modulus 25 N, attached to fixed points and both taut. Find the period of small oscillations. [4]

SECTION C · Stretch

- C1** A particle of mass 0.5 kg hangs at rest from an elastic string of natural length 1 m and modulus 24.5 N attached to a fixed point. It is pulled down 0.5 m below its equilibrium position and released from rest. Find the speed of the particle when the string goes slack, and the greatest height it reaches above the equilibrium position. Take $g = 9.8 \text{ m/s}^2$. [8]