7.1 Deformation: Stress & Strain

Question Paper

Course	CIE A Level Physics (9702) 2019-2021
Section	7. Deformation of Solids
Topic	7.1 Deformation: Stress & Strain
Difficulty	Easy

Time allowed: **10**

Score: **/10**

Percentage: **/100**

Question 1

A student wanted to determine the spring constant of a spring. They did this by using different loads to the extend the spring by varying amounts.

To find the spring constant, which quantities are required?

A the elastic limit, extensions and the length of the spring

B the loads and the extensions of the spring

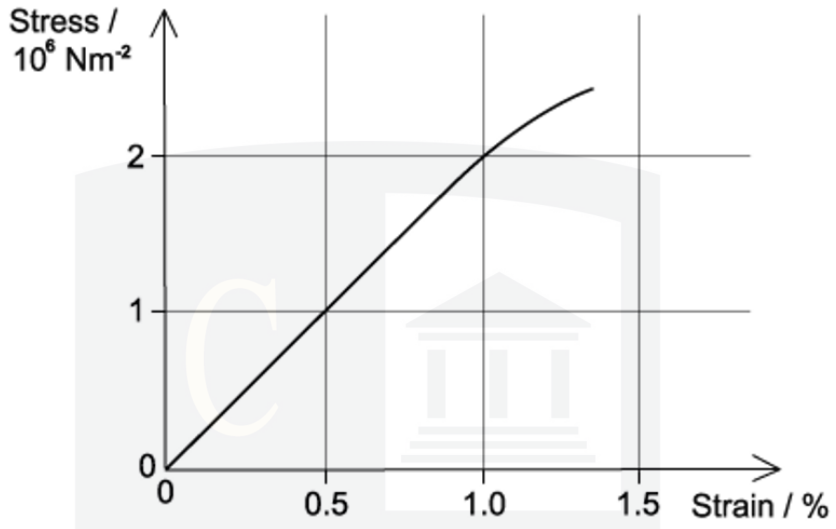
C the elastic limit and the loads

D the loads and the length of the spring

[1 mark]

Question 2

The stress-strain graph for bone is shown below.



What is the Young modulus of bone?

A 2×10^6 N m^{-2}

B 2×10^8 N m^{-2}

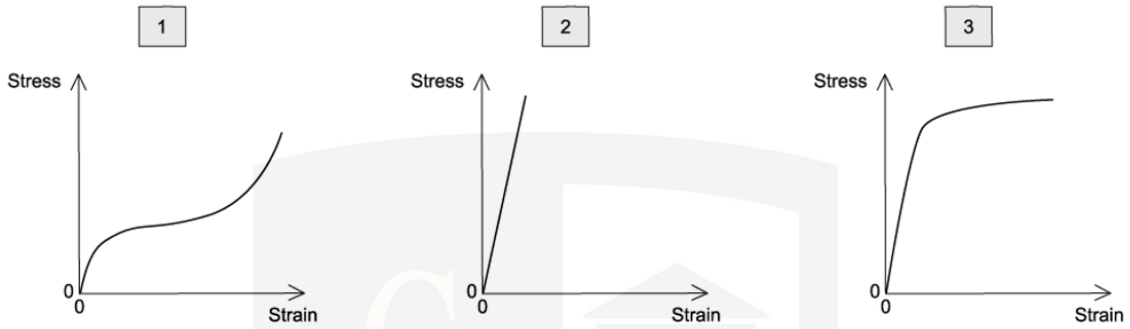
C 1×10^6 N m^{-2}

D 1×10^8 N m^{-2}

[1 mark]

Question 3

The graphs below show the stress-strain graphs of three materials. The graphs do not have the same scales.



The three materials are copper, rubber and glass.

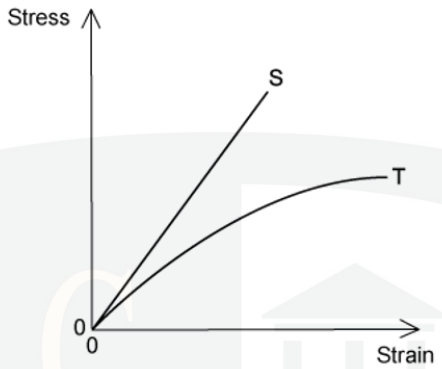
Which materials are represented by the graphs?

	1	2	3
A	rubber	copper	glass
B	rubber	glass	copper
C	glass	copper	rubber
D	copper	glass	rubber

[1 mark]

Question 4

Two wires S and T, with the same initial dimensions, were put under stress and strain, the graph shows the results up to their breaking points.



Which statement is **not** correct?

A material S has a larger ultimate tensile stress

B material S extends elastically

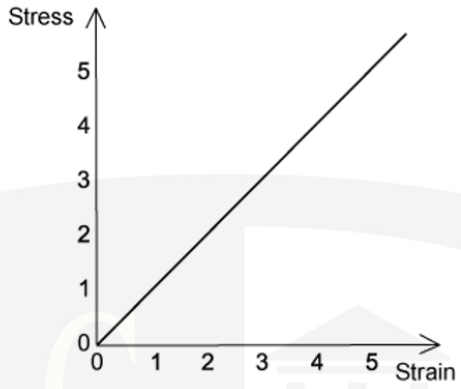
C material S extends more than material T when loaded with the same force

D material S is brittle

[1 mark]

Question 5

A glass rod was put under stress and strain until it broke. The graph of this is shown below.



Which of the following statements is correct about the glass rod?

A the glass shows plastic deformation

B when the cross-sectional area of the rod is doubled, the ultimate tensile stress of the rod is halved

C Hooke's law is obeyed for all values of stress up to the breaking point

D the glass is ductile

[1 mark]

Question 6

An experiment was carried out to determine the Young modulus of steel using a steel wire.

The uncertainties in the measurements are given below.

measurement	uncertainty
load on wire	±2%
length of wire	±0.2%
diameter of wire	±1.5%
extension	±1%

What is the percentage uncertainty in the Young modulus?

A 6.2% **B** 4.7% **C** 1.8% **D** 1.3%

[1 mark]

Question 7

A material is extended elastically within the limit of proportionality. What is equal to the Young modulus of the material?

A gradient of the stress-strain graph

B area under the force-extension graph

C area under the stress-strain graph

D gradient of the force-extension graph

[1 mark]

Question 8

Which of the following is the definition of the ultimate tensile stress of a material?

A the maximum inter-atomic force before the atomic bonds of the material break

B the maximum force that can be applied to a bar of the material before it bends

C the maximum tensile force in a wire of the material before it breaks

D the maximum stretching force per unit cross-sectional area before the material breaks

[1 mark]

Question 9

What is the unit of the Young modulus?

A $N\ m^{-2}$ **B** $N\ m$ **C** $N\ m^{-1}$ **D** $N\ m^{2}$

[1 mark]

Question 10

A student wanted to measure the Young modulus of a wire, to do this they needed to take a number of measurements.

In which row could the measurement **not** be made **directly** with the listed apparatus?

	measurement	apparatus
A	extension of wire	vernier scale
B	area of cross-section of wire	micrometer screw gauge
C	original length of wire	metre rule
D	mass of load applied to a wire	electronic balance

[1 mark]