7.2 Deformation: Elastic & Plastic Behaviour

Question Paper

Course	CIE A Level Physics (9702) 2019-2021
Section	7. Deformation of Solids
Topic	7.2 Deformation: Elastic & Plastic Behaviour
Difficulty	Easy

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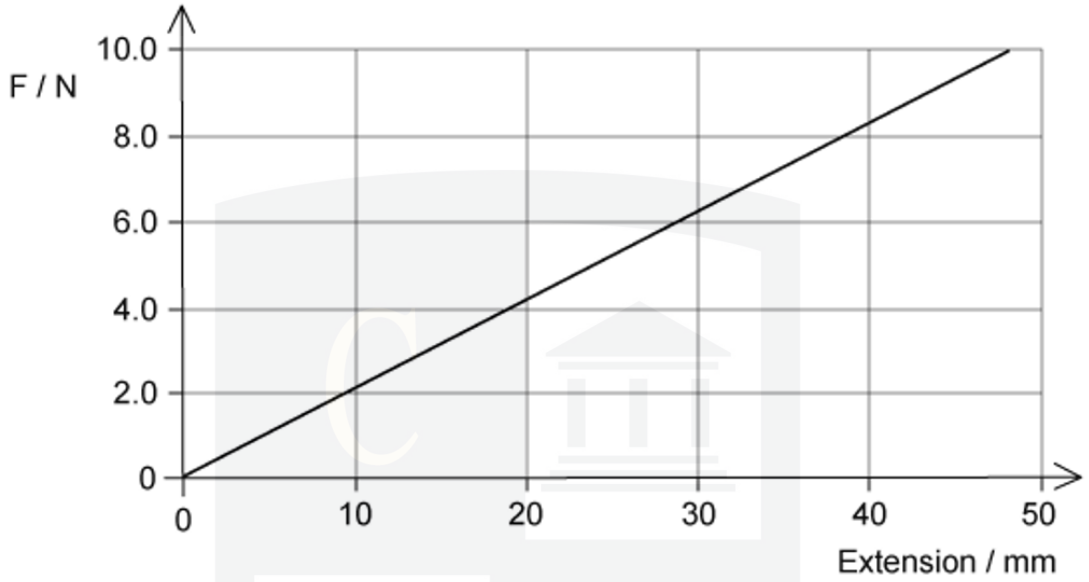
Time allowed: **10**

Score: **/10**

Percentage: **/100**

Question 1

A spring is extended with varying forces; the graph below shows the results.



What is the energy stored in the spring when the extension is 30 mm?

A 0.25 J **B** 0.95 J **C** 0.095 J **D** 0.19 J

[1 mark]

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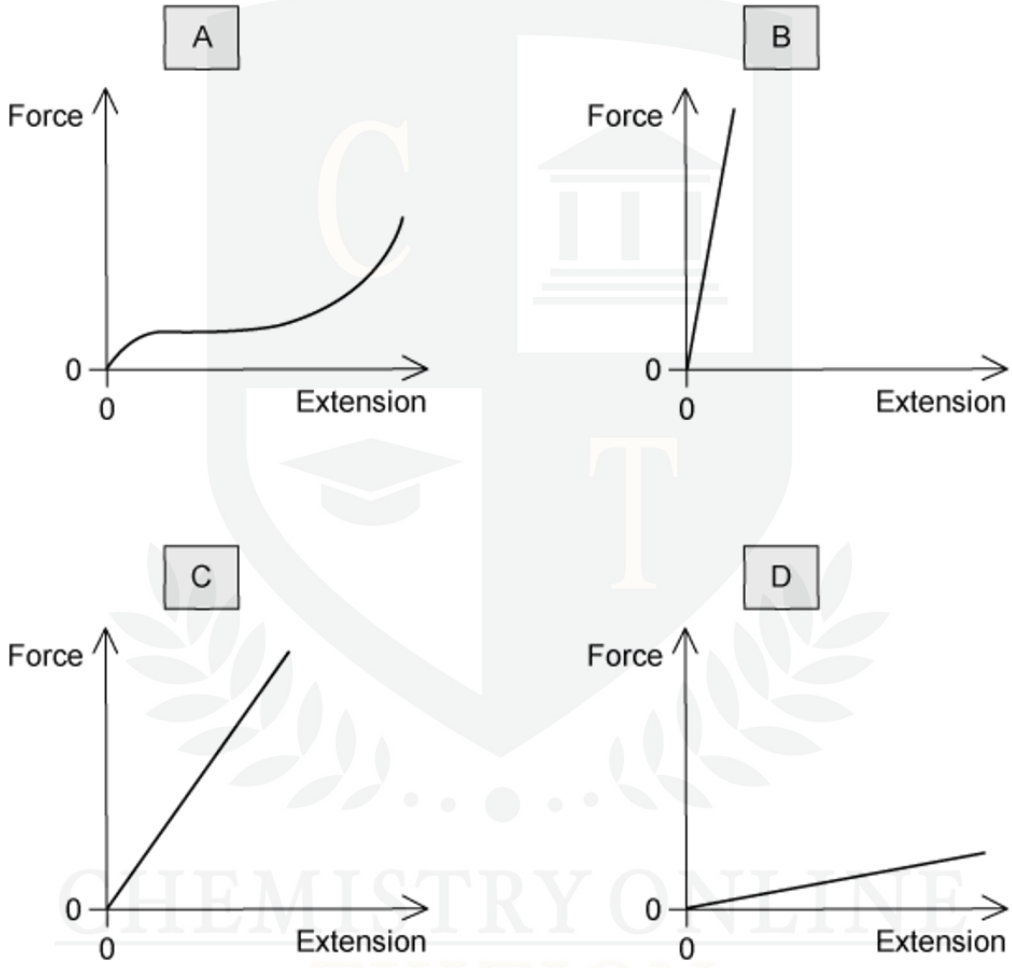
Question 2

The graphs below all show force-extension graphs; they are all drawn to the same scale.

Which graph shows the object that has been deformed and has the greatest amount of elastic potential energy?



[1 mark]

Question 3

Which of the following is the correct definition for elastic and plastic behaviour?

	elastic behaviour of a material	plastic behaviour of a material
A	returns to its original shape and size	suffers permanent deformation
B	obeys Hooke's Law	extends continuously under a steady load
C	has a linear force-extension curve	has a horizontal force-extension curve
D	extends only within the limit of proportionality	extends beyond the limit of proportionality

[1 mark]

Question 4

A metal wire had a tension *F* and extension *x* with a Young modulus of *E*; the wire obeyed Hooke's law

Which expression represents the elastic strain energy stored in the wire?

A $\frac{1}{2}Fx$ **B** Ex **C** $\frac{1}{2}Ex$ **D** Fx

[1 mark]

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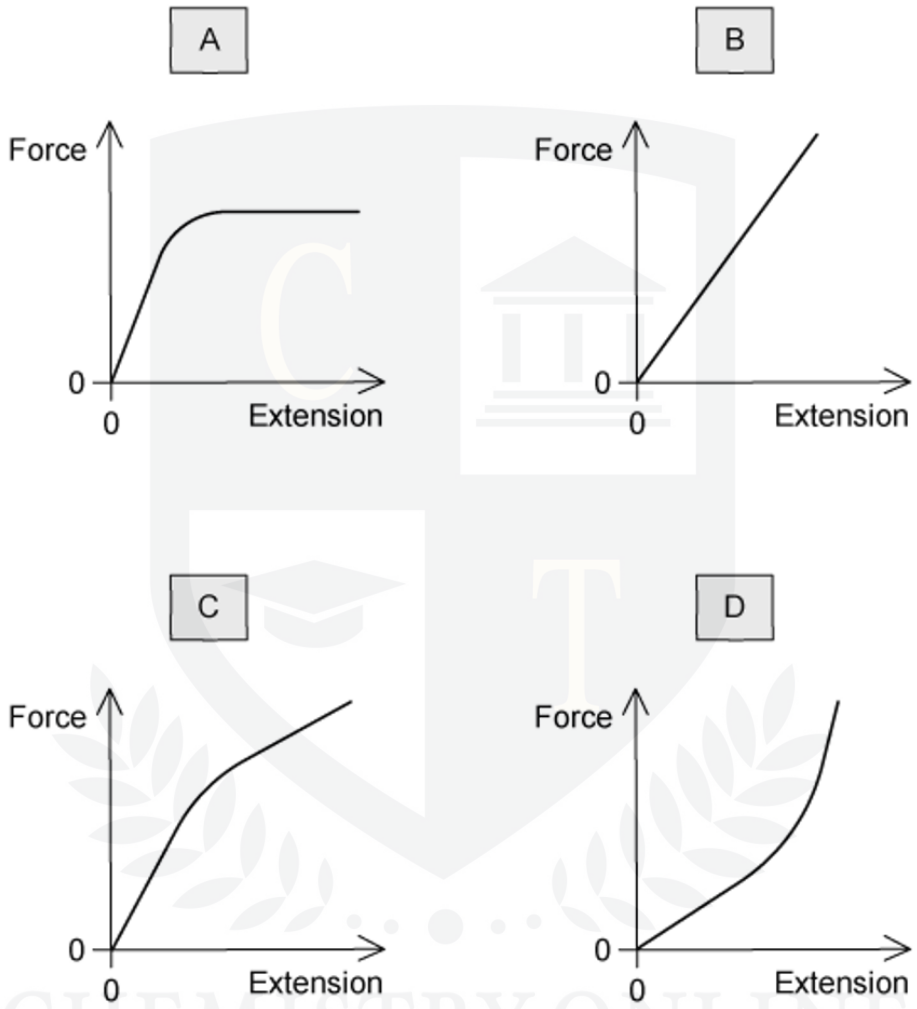
Question 5

The graphs below are force-extension graphs, which one is a rubber band this is stretched almost to its breaking point?



[1 mark]

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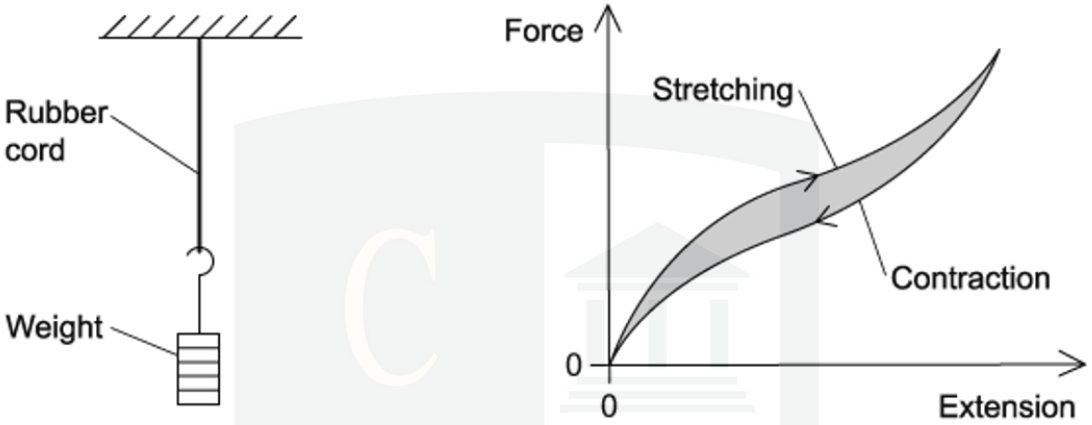
Question 6

A weight was attached to the lower end of a length of rubber. The rubber was hung from a solid support. The weight was gradually increased from zero then gradually reduced to zero.



The graph shows the force-extension curve for contraction (below) and the force-extension curve for stretching.

What does the shaded area between the curves represent?

A the amount of elastic energy stored in the rubber

B the work done by the rubber cord during contraction

C the work done on the rubber cord during stretching

D the amount of thermal energy dissipated in the rubber

[1 mark]

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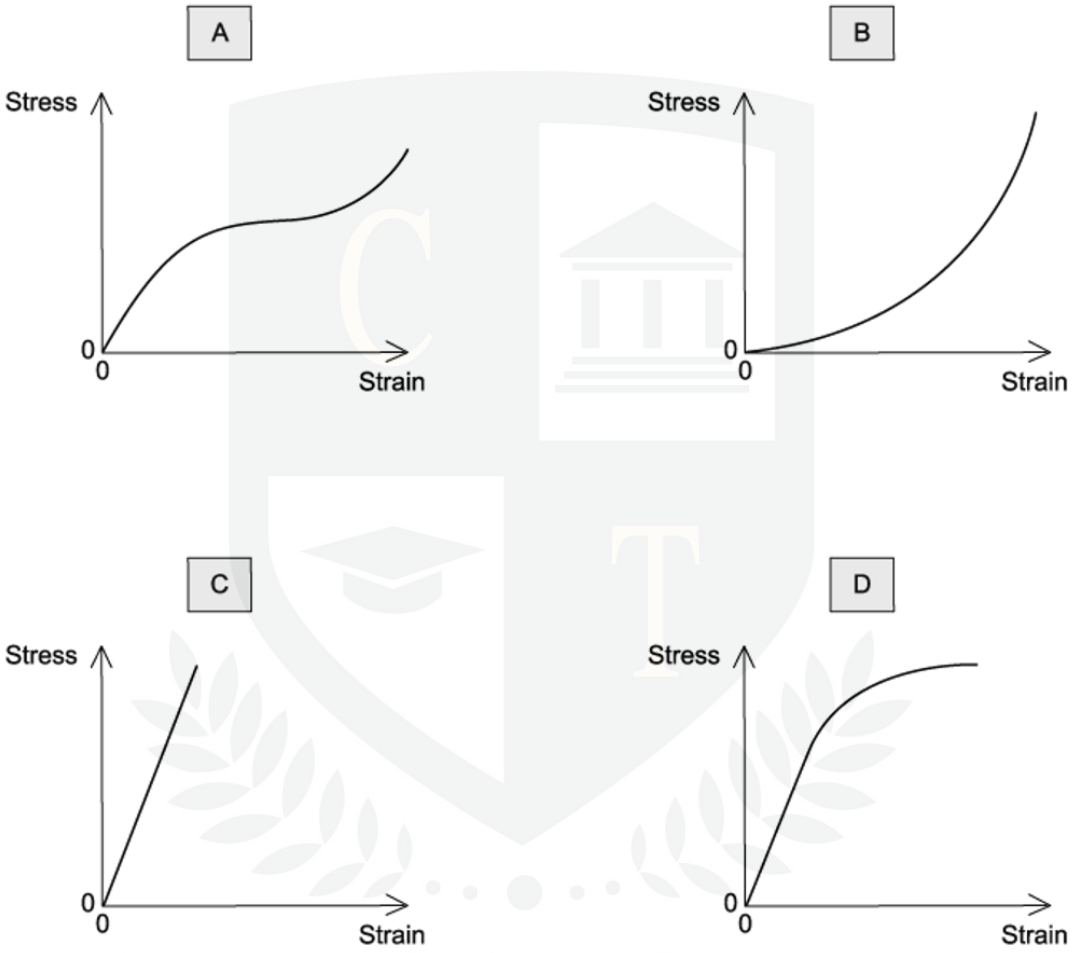
Question 7

Graphs of the stress-strain for four different materials are shown below.

Which one shows the correct graph for a ductile metal?



[1 mark]

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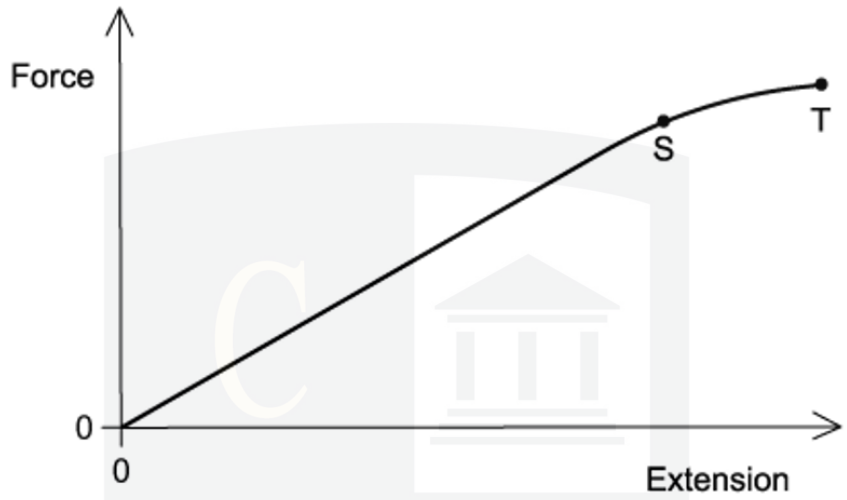
Question 8

A student drew a force-extension graph for a sample of metal. She subjected the sample to a force that increased to a maximum then decreased to zero.



When the sample contracts it follows the same force-extension curve as when it was being stretched.

What is the behaviour of the metal between S and T?

A both elastic and plastic

B elastic but not plastic

C not elastic and not plastic

D plastic but not elastic

[1 mark]

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Question 9

Four rods were made from four different materials; all the rods had the same dimensions.

At room temperature, which of the following would sustain the biggest plastic deformation?

A the ductile material steel

B the brittle material glass

C the brittle material carbon

D the ductile material aluminium

[1 mark]

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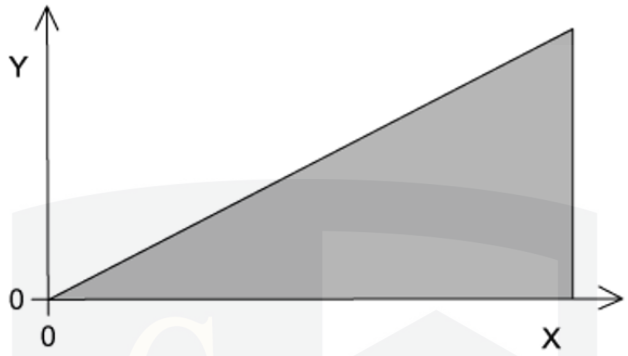
Question 10

A student experimented on a metal wire; the graph below was plotted.



The area under the graph shows the total strain energy stored in the wire when stretched.

How should the axes be labelled?

	Y	X
A	mass	extension
B	force	extension
C	strain	energy
D	stress	strain

[1 mark]

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