Practice Question Set For A-Level

**Subject: Physics** 

Paper-1 Topic: 3\_ElectricCircuits



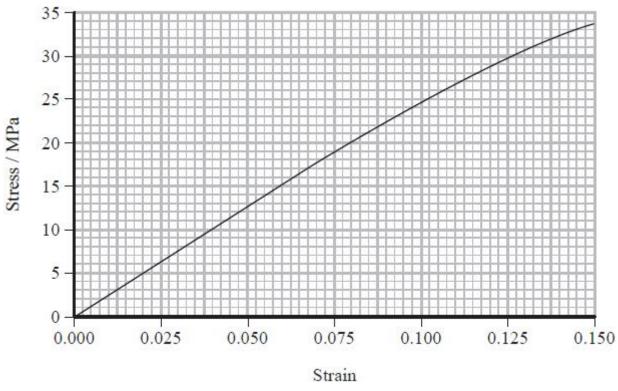
Name of the Student:	
Max. Marks: 17 Marks	Time: 17 Minutes

Q1.

Seat belts are being tested by a car manufacturer. In the test, a car moving at a steady speed of 28 m s<sup>-1</sup> collides with a wall and stops.

A crash-test dummy in the driving seat is wearing a seat belt made from polyester webbing. The seat belt has a cross-sectional area of 0.85 cm<sup>2</sup> and a total length of 2.0 m. A student suggests that in the collision the seat belt absorbs all the kinetic energy of the dummy.

The graph shows how stress varies with strain for the seat belt.



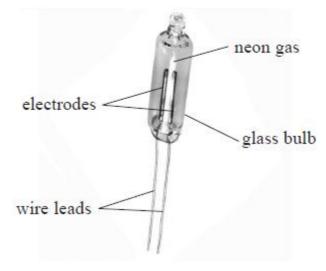
Strain	
(i) Show that the area under the graph represents the energy stored per unit volume in the seat b	elt.
	(2)
(ii) Use the graph to determine whether the seat belt absorbs all the kinetic energy of the dummy	from part (a).
In this collision, the maximum strain of the seat belt is 0.075	
	(3)

A student connects three identical 3 V bulbs to a 6 V battery of negligible internal resistance. The circuit notudes two switches, $S_1$ and $S_2$ , as shown. $ \begin{array}{c} 6 \text{ V} \\ \hline A \end{array} $ bulb 1 bulb 2 bulb 2  The student closes $S_1$ and records the brightness of each bulb.  With $S_1$ still closed, the student closes $S_2$ .				
A student connects three identical 3 V bulbs to a 6 V battery of negligible internal resistance. The circuit negligible two switches, $S_1$ and $S_2$ , as shown.  A bulb 1 bulb 2 bulb 2 bulb 3 bulb				(Total for question = 5 marks)
The student closes $S_1$ and records the brightness of each bulb. With $S_1$ still closed, the student closes $S_2$ .	<b>12.</b>			
The student closes $S_1$ and records the brightness of each bulb.  With $S_1$ still closed, the student closes $S_2$ .			attery of negligible	internal resistance. The circuit
$\begin{array}{c} bulb\ 1 \\ bulb\ 3 \\ \\ \end{array}$ The student closes $S_1$ and records the brightness of each bulb. With $S_1$ still closed, the student closes $S_2$ .		6 V	J	
The student closes $S_1$ and records the brightness of each bulb. With $S_1$ still closed, the student closes $S_2$ .				
The student closes $S_1$ and records the brightness of each bulb. With $S_1$ still closed, the student closes $S_2$ .	A			$\setminus$ S <sub>1</sub>
The student closes $S_1$ and records the brightness of each bulb. With $S_1$ still closed, the student closes $S_2$ .		bulb 1	bulb 2	
$\begin{array}{c} \text{bulb 3} \\ \text{The student closes S}_1 \text{ and records the brightness of each bulb.} \\ \text{With S}_1 \text{ still closed, the student closes S}_2. \end{array}$	•	$\otimes$	$-\otimes$	
The student closes $S_1$ and records the brightness of each bulb. With $S_1$ still closed, the student closes $S_2$ .		+	$S_2$	
Vith $S_1$ still closed, the student closes $S_2$ .		- 1		
			h bulb.	
explain how the brightness of bulb 1 compares with the brightness of bulb 2 before and after $S_2$ is closed.			orightness of bulb 2	2 before and after $S_2$ is closed.

-	-	

## Q3.

The neon lamp shown is a glass bulb filled with neon gas at low pressure.



(Source: https://media.digikey.com/Photos/Visual%20Communications%20Company%20VCC/ A1A.JPG)

* When in use, the neon gas between the electrodes emits electromagnetic radiation.	
Explain why this happens when there is an electric current between the electrodes.	
	(6

(Total for question = 6 marks)