

2001 HIGHER SCHOOL CERTIFICATE EXAMINATION  
Physics

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Centre Number

Section I – Part B (continued)

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Student Number

Marks

Question 21 (3 marks)

A fan that ventilates an underground mine is run by a very large d.c. electric motor. This motor is connected in series with a variable resistor to protect the windings in the coil.

3

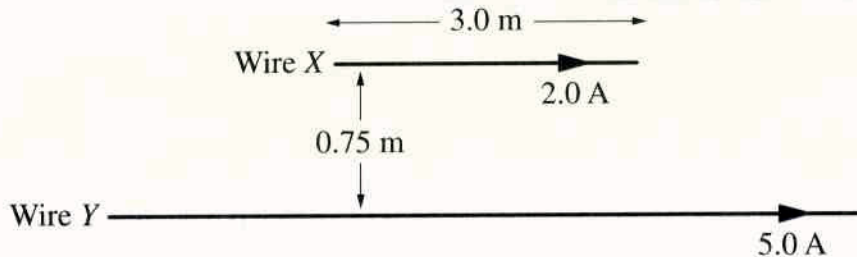
When the motor is starting up, the variable resistor is adjusted to have a large resistance. The resistance is then lowered slowly as the motor increases to its operating speed.

Explain why no resistance is required when the motor is running at high speed, but a substantial resistance is needed when the motor is starting up.

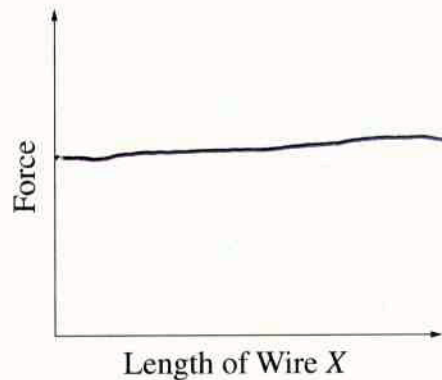
because ~~at~~ when starting up the motor is not warmed up. therefore there is a resistance on it making the motor work more ~~the~~ to warm up. as in high speed the motor is warm up already and does not need resistance at all.

Question 22 (7 marks)

Two parallel wires are separated by a distance of 0.75 m. Wire X is 3.0 m long and carries a current of 2.0 A. Wire Y can be considered to be infinitely long and carries a current of 5.0 A. Both currents flow in the same direction along the wires.



- (a) What is the direction of the force that exists between the two wires? 1  
 ..... *To the left of the page.* .....
- (b) On the axes, sketch a graph that shows how the force between the two wires would vary if the length of Wire X was increased. 2



- (c) In your Physics course you have performed a first-hand investigation to demonstrate the motor effect. Explain how your results demonstrated that effect. 4  
 ..... *The results demonstrate this effect by* .....  
 ..... *if you have two wires travelling in the same* .....  
 ..... *direction they attract, if current is in opposite* .....  
 ..... *direction, they repel.* .....  
 ..... *If the wire has resistance, the current* .....  
 ..... *travels through the wire will decrease.* .....  
 .....  
 .....

**Question 23** (6 marks)

Discuss the effects of the development of electrical generators on society and the environment.

**6**

Most electrical generators are run by or on coal in society the coal being burnt in order to run these generators is harming the environment.

Also pollution and green house gases together do not do anything for living organisms.

It has a large effect on the environment in pollution ways and survival as we have such a demand for electricity.

An alternative for electricity is solar power where by using the environment such as the sun is actually helping us survive without depending on coal and resources such as this.