

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

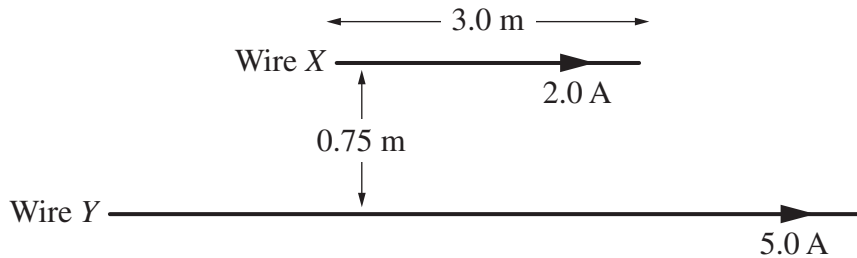
When the motor is starting up, the variable resistor is adjusted to have a large resistance. The resistance is then lowered slowly as the motor increases to its operating speed.

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.

When it is starting there is very little current so the resistors are used to stop the large opposing emf from braking the motor. As the motor increases, the current does as well so it takes over the job of the resistor until it finally isn't needed anymore.

Question 22 (7 marks)

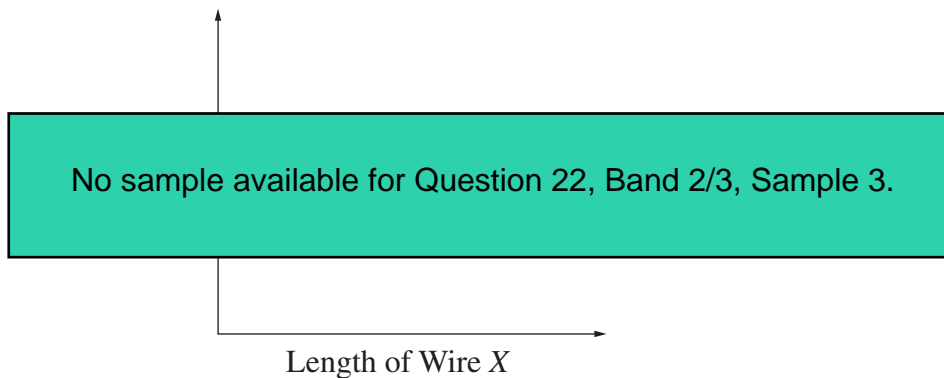
Two parallel wires are separated by a distance of 0.75 m. Wire X is 3.0 m long and carries a current of 2.0 A. Wire Y can be considered to be infinitely long and carries a current of 5.0 A. Both currents flow in the same direction along the wires.



- (a) What is the direction of the force that exists between the two wires? 1

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- (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

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Question 23 (6 marks)

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

6

The development of electrical generators has caused society to ~~rely~~ rely heavily on them. Society has made them a major part of their & everyday lives and as a result if we lost the use of them society as we know it would be over.

Electrical generators have had a negative affect of the environment. Because people use them so much the rate of toxic emissions is rapidly ~~ing~~ increasing.