

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)

3

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.

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.

substantiated

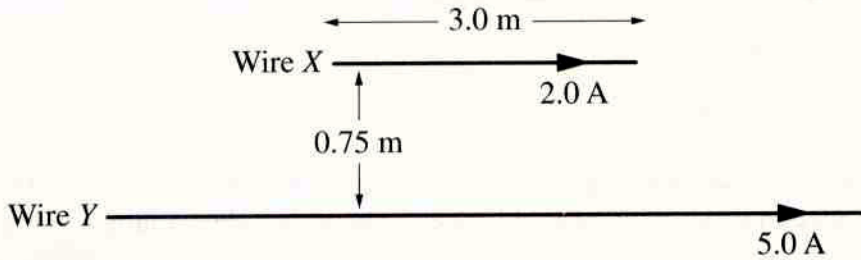
- can get a surge of electricity as generator starts because of eddy currents.

- when the motor speed increases supply current demand is constant.

- Back EMF will have no effect.

Question 22 (7 marks)

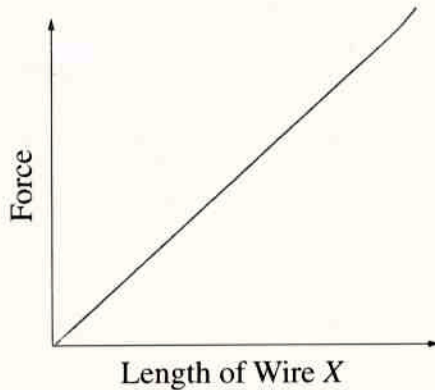
Two parallel wires are separated by a distance of 0.75 m. Wire X is 3.0 m long and carries a current of 2.0 A. Wire Y can be considered to be infinitely long and carries a current of 5.0 A. Both currents flow in the same direction along the wires.



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

..... the two wires are being repelled!

- (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 motor effect you get a current carrying
 wire that
 can be pushed
 then place a magnet near the
 wire when the magnet is push
 near the wire will be repelled in one
 direction if the magnet is turned
 upside down then the wire will move in the
 opposite direction.

Question 23 (6 marks)

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

6

Electrical generators have greatly benefitted society by providing electricity to homes to give light and run appliances, making life much easier for people. Electrical generators have also had an effect on the environment such as air pollution from burning coal to run them.