

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

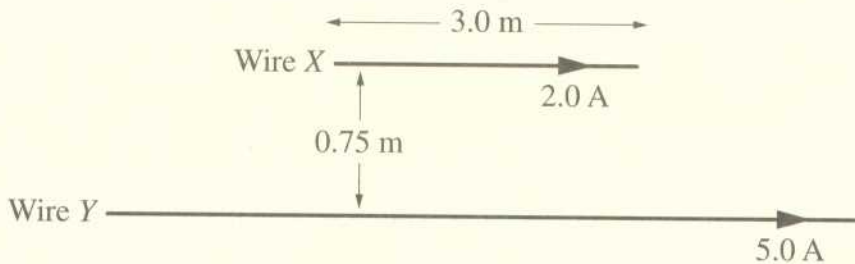
When the motor is starting up, the variable resistor is adjusted to have a large resistance. The resistance is then lowered slowly as the motor increases to its operating speed.

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.

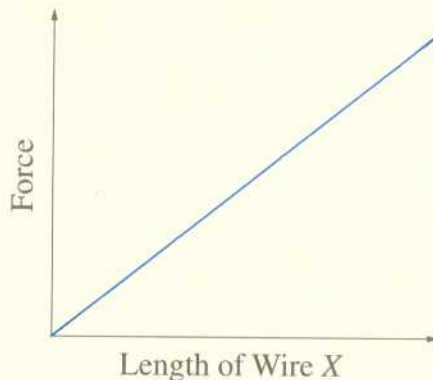
When the motor is starting up there is no back emf acting as the resistance so it needs another resistance so the coil doesn't burn out but when it has built up its speed a back EMF is generated so ~~no~~ which acts as the resistance so no other resistance is needed.

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
 *they are repelling each other*
- (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 ~~no~~ motor effect states that "a current-carrying wire in the magnetic field experiences a force" from the diagram, wire Y creates a magnetic field. Wire X carry 2.0 A current in the magnetic field which is produced by wire Y will makes wire X repel from wire Y. It ~~there for~~ therefore explain^{the} motor effect*

Question 23 (6 marks)

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

6

Electrical generators have enabled society to use electrical power in everyday life - from lighting to cooking we use it constantly throughout the day. Electrical generators have greatly increased standards of living, and have greatly increased economic productivity. Generators have brought power to all ends of life and with the profound positive effect on society it comes with an environmental cost. The trees, fossil fuels and other elements used in generators mean society is quickly depleting the world's natural resources. For the society we live today thanks to electricity the use of wind and hydro schemes will lessen the impact in the future as these technologies are realised.