

2003 HIGHER SCHOOL CERTIFICATE EXAMINATION
Engineering Studies

Section II (continued)

Marks

Question 13 — Personal and Public Transport (10 marks)

A railway track has rails made of 0.8% carbon steel.

- (a) The surface of the rails has been induction heated and water quenched. Describe the final structure and properties of the rail. 3

The final stage to this is the metal is forced through a hole which is shaped to the railway then after it has come through the rail is spray lightly with water then set out to harden.

- (b) A suburban train weighing 400 tonnes has to climb a gradient of 1 in 50 at a constant velocity of 60 km per hour. 3

If the power required to overcome rolling resistance at this velocity is 450 kW, calculate the overall power needed to climb the gradient.

Power = 10.666

Question 13 continues on page 16

Question 13 (continued)

- (c) (i) Describe how an electric motor is used to convert electricity into rotary motion. 2

In an electric motor there are two copper brushes which are pushed together on opposite sides of a cylinder like shape which has copper windings to gether with metal plates on it. When the electric is past through this there are ~~two~~ magnets which are N and S. When this

- (ii) Describe TWO different applications of electrical motors that are used in transport systems.

electric motors are use in today's train and this is because there isn't ~~any~~ polution coming from it. And in years to come we will have electric cars etc.

End of Question 13

happens the center core is spin inside and builds up speed with the more electric is past through.