2001 HIGHER SCHOOL CERTIFICATE EXAMINATION

Physics

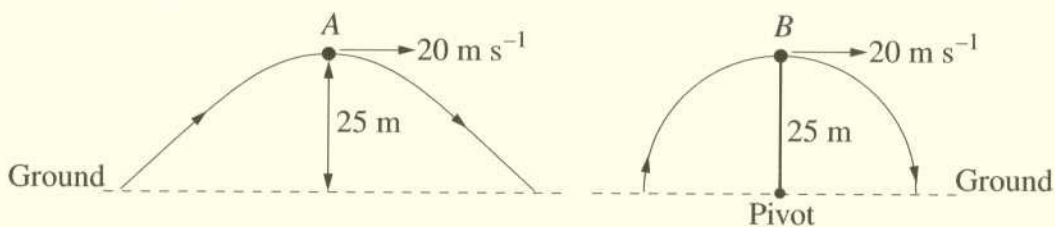**Section I – Part B (continued)**

Centre Number

Student Number

Marks

Question 18 (6 marks)

A 30 kg object, A, was fired from a cannon in projectile motion. When the projectile was at its maximum height of 25 m, its speed was 20 m s^{-1}.

An identical object, B, was attached to a mechanical arm and moved at a constant speed of 20 m s^{-1} in a vertical half-circle. The length of the arm was 25 m.

Ignore air resistance.

(a) Calculate the force acting on object A at its maximum height. **1**

$$A = mg = 30k \times 9.8 = 294 N$$

(b) Calculate the time it would take object A to reach the ground from its position of maximum height. **2**

$$\frac{S}{t} = \frac{u+v}{2}$$
$$\frac{25}{t} = \frac{20}{2}$$
$$20t = 50$$
$$t = 2.5s$$

(c) Describe and compare the vertical forces acting on objects A and B at their maximum heights. **3**

The vertical force of B at maximum height is 0 because it was attached by a mechanical arm.

– 15 –

Marks

Question 19 (4 marks)

How does Einstein's Theory of Special Relativity explain the result of the Michelson–Morley experiment?

4

No sample available for Question 19, Band 1/2, Sample 3.

Question 20 (4 marks)

The electrical supply network uses a.c. and a variety of transformers between the generating stations and the final consumer.

4

Explain why transformers are used at various points in the network.

Transformers are used in various points in the network because different network usually required different voltage of energy. Transformer was used to transmit the required energy in the network. There are step-up transformer for converting low voltage to high voltage energy and the step down transformer