

2003 HIGHER SCHOOL CERTIFICATE EXAMINATION
Engineering Studies

Section II

70 marks

Attempt Questions 11–16

Allow about 2 hours for this section

Answer the questions in the spaces provided.

Marks

Question 11 — Historical and Societal Influences, and the Scope of the Profession (10 marks)

(a) The range of knowledge in which an aeronautical engineer is trained includes: **4**

- aerodynamics
- fluid mechanics
- engineering materials
- legal and ethical implications.

Demonstrate how each of these four knowledge areas may be appropriately applied to the design or construction of an aircraft or its components.

Aerodynamics - be able design an aircraft/components which will be the most aerodynamic to reduce drag.

Fluid Mechanics - be able to design brakes and gears which will function properly with hydraulic mechanisms.

Engineering materials - need to know which materials are best to use - decided on weather resistant etc.

Legal & ethical issues - need to be able to fit an aircraft with legally sound components eg. way to reduce sound, waste management, fuel consumption.

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Question 11 continues on page 10

Question 11 (continued)

(b) Improvements to materials over the past 200 years have changed the significant design features of civil structures. These features include:

- the height of the structures
- the length of unsupported spans
- the load carried by structures
- the stiffness of structures
- the expected lifespan of structures.

(i) Outline how the improvements to materials have affected any TWO of these features. 3

lifespan - they are able to build civil structures that have a longer lifespan, as well as being able to tell how long the material used will last and when it should be removed for safety reasons.

stiffness - safety measurements. The more stiff, the less likely to warp eg earthquake.

(ii) Discuss how society has been affected by the changes to any TWO of these features. 3

• structures such as skyscrapers are able to be built. Highrises can give great views, and take up less room, but can also take away others' views and can cause overcrowding.

• structures can hold more loads, meaning the taller the building, the more people, machines can be held inside safely. Also, for bridges, can hold heavier and more vehicles.

End of Question 11