

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 is...~~ An aeronautical

Engineer must know:

- Aerodynamics because Aerodynamics is the knowledge of aircraft parts like wings, rudders etc ^{and how the aircraft fly} (and he will need to know this to construct an aircraft)
- Fluid mechanics because Fluid mechanics has to do with brakes...etc (" " " ")
- Engineering materials so the engineer knows what materials are needed to make aircraft parts e.g. wings, rudders, doors...etc
- legal and ethical implications because the engineer must know what he can do and can't do to make the aircraft and safety factors etc so he can ensure the safety of the customers and the end product.

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

1. Alloys are used in structures, so the structure ~~is~~ is stronger, tougher etc and what ever the ~~it~~ needs to be to improve the structures.
(Alloys are used in beams to hold the structure up)

2. Concrete are used in ~~the~~ the walls ~~and~~ ground and roofs of structures. Initially people used timber or stone in their structures but concrete takes a long time to break down and is also stronger, stiffer etc and also doesn't erode as fast as stone does so the structure will last longer.

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

1. Originally there was a certain limit on how high the structures can be ~~built~~ built but now because now our materials are much stronger, stiffer tougher etc we can build heavier and bigger structures than before. Our society now lives in cities with buildings that are much bigger and taller than before.

2. People can ~~build~~ now build buildings to suit these needs e.g. If a city has big population ~~the fore they would build~~ but not enough space they can build big high rise apartments.

End of Question 11