

## Engineering Studies

### Section II

70 marks

Attempt Questions 11–16

Allow about 2 hours for this section

Answer the questions in the spaces provided.

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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.

Because the air craft will be traveling at high velocity it would have to be aerodynamic. The hydraulics to work the flap's on both wings and the tail involve fluid-mechanics. the materials that are used will be subjected to a variety of subjected loads and temperatures. the materials have to be able to withstand these. The use of certain materials or fuels could have a negative impact towards the environment but be the best material for the job coming under ethics.

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

Before steel and concrete wood was used to build houses & buildings and concrete now buildings can be built 100's of meters in the air. And now that bridges have reinforced concrete they are able to carry heavier loads and span across further distances with out supports due to its strength.

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

People are now able to travel easier and faster over rivers or valleys due to these features. The harbour bridge now allows people to cross the huge gaps in a matter of minutes. It has also allowed heavier vehicles to be ~~made~~ made which can carry larger loads to cross valleys or rivers previous bridges couldn't support.

**End of Question 11**