

## 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.

Each of the knowledges mentioned above significantly help the engineer in knowing the method of construction and certainly how each component in the aircraft operate. - Aerodynamic help engineers understand the body of frame work involved in this area of construction, fluid mechanics - help the understanding of the fuel process and principle of high octane fuel for aircrafts. engineering materials - Assist the engineer in knowing the types of components involved in the construction eg: precipitation hardening etc - all help engineers. Legal and ethical implications, help in understanding security measures and expectations from the wider community.

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

• The load carried by structures 200 years ago has significantly changed over the years - trusses and beams are now being designed to handle the world's busy life style eg: civil structures are able to carry more load than what they were designed for 200 years ago.

• The height of the structures: nowadays the big height of civil structures reveals the advancement of engineering and how the big heights are able to support such load.

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

• The stiffness of structures - reveals to society that structures compared to before are now provingly very safe and stable and society has impacted from this greatly as they are now more trustful and believe that civil structures are safe and stronger than before. The expected life span: which is a major concern for society - has now increased with the concrete reinforcements in place and galvanic protection such as paint or molten zinc. Society feels safer and comfortable compared to civil structures 200 yrs ago.

End of Question 11