BOARD OF STUDIES
NEW SOUTH WALES

2012 HSC Engineering Studies
Marking Guidelines

Section I

Multiple-choice Answer Key

Question	Answer
1	A
2	C
3	C
4	D
5	A
6	B
7	A
8	B
9	D
10	D

Section II

Question 11 (a)

Criteria	Marks
• Describes use of rudder for turning AND twisting wing frame or redistribution of weight for banking	2
• Describes use of rudder or twisting wing frame OR • Twisting wing frame or redistribution of weight for banking	1

Question 11 (b)

Criteria	Marks
• Discussion includes changes and developments (1902 to present) for both materials AND propulsion systems AND effects on aircraft performance	3
• Discusses one change (materials OR propulsion) with a link to performance OR both without a link to performance OR • Discusses materials AND propulsion with both linked to performance without a comparison (1902 to present)	2
• Refers only to changes in materials or propulsion systems with no effects on performance OR • Discusses materials or propulsion AND performance without a comparison (1902 to present)	1

Question 11 (c)

Criteria	Marks
• Outlines both risk analysis AND future safety action/strategy	2
• Outlines risk analysis OR future safety action	1

Question 11 (d)

Criteria	Marks
• Identifies THREE relevant problems and justifies appropriate engineering solutions	3
• Identifies TWO relevant problems and justifies appropriate engineering solutions OR • THREE problems with ONE appropriate engineering solution	2
• Identifies ONE problem and justifies appropriate engineering solution OR • TWO or THREE relevant problems with no appropriate engineering solutions	1

Question 12 (a) (i)

Criteria	Marks
• Determines correct answer with correct load and compatible units	1

Question 12 (a) (ii)

Criteria	Marks
• Determines correct answer with compatible units	1

Question 12 (b)

Criteria	Marks
• Names an appropriate material that could be used and justifies the choice	2
• Names an appropriate material OR • Names AND justifies an inappropriate material suitable for a structure	1

Question 12 (c) (i)

Criteria	Marks
• Determines correct answers (magnitude and direction) or with a minor error	2
• Demonstrates understanding of moments with errors or omissions	1

Question 12 (c) (ii)

Criteria	Marks
• Determines correct answers (magnitude and nature) or with a minor error	2
• Determines correct magnitude and incorrect nature OR • Determines correct nature and incorrect magnitude OR • Determines correct cutting plane with some associated working	1

Question 12 (d)

Criteria	Marks
• States TWO suitable composites with TWO correct components for each composite	2
• States TWO suitable composites with minimum TWO correct components OR • States TWO suitable composites with ONE correct component for each OR • States ONE suitable composite with TWO correct components	1

Question 13 (a) (i)

Criteria	Marks
• Calculates using a correct method OR with a minor error	2
• Calculates using a correct method but with no conversion to km/h OR • Calculation using a correct method	1

Question 13 (a) (ii) 1

Criteria	Marks
• Correct calculation of power OR calculation with a minor mathematical error	1

Question 13 (a) (ii) 2

Criteria	Marks
• Correct calculation of distance OR calculation with a minor mathematical error	1

Question 13 (b) (i)

Criteria	Marks
• Correctly identifies the most suitable type of glass and identifies a reason for the curved glass	2
• Identifies the most suitable type of glass OR gives a reason for curvature	1

Question 13 (b) (ii)

Criteria	Marks
• Compares the identified glass type, explaining why it is more suitable	2
• Explains why the identified glass is suitable in windscreens with no comparison	1

Question 13 (c)

Criteria	Marks
• Gives TWO correct reasons	2
• Gives ONE correct reason	1

Question 14 (a)

Criteria	Marks
• Provides detailed contrast	3
• States a positive and a negative of each system	2
• Shows some knowledge of both systems OR • Good knowledge of only one system	1

Question 14 (b) (i)

Criteria	Marks
• Determines correct answer or with minor error	3
• Determines an answer using some incorrect values	2
• Shows some knowledge of stress calculation	1

Question 14 (b) (ii)

Criteria	Marks
• Determines correct answer with compatible units or with minor error	2
• Determines an extension with minor error	1

Question 14 (c)

Criteria	Marks
• Projects counterbore correctly, draws as half section	2
• Draws half section with errors in hole details OR • Draws hole details correctly with full section, or no hatching	1

Question 15 (a)

Criteria	Marks
• Correctly indicates that high aspect ratio wings are more efficient with less drag for amount of lift produced	2
• Correctly indicates that less drag for amount of lift with no reference to aspect ratio	1

Question 15 (b)

Criteria	Marks
• Identifies aileron, elevator and rudder (1 error) and states how three of them control flight	3
• Identifies aileron, elevator and rudder (at least 1) and states how two of them control flight OR • States how three of them control flight	2
• Identifies aileron, elevator and rudder or states how one of them control flight	1

Question 15 (c)

Criteria	Marks
• Description including mould, fibres (fiberglass), thermosetting resin, application (with 1 omission)	2
• Description including mould, fibres (fibreglass), thermosetting resin, application (with 2 ommisions)	1

Question 15 (d)

Criteria	Marks
• Calculating correct or one minor error	3
• Two correct calculations or diagrams • One correct calculations and one diagram	2
• Shows some knowledge of forces involved	1

Question 15 (e)

Criteria	Marks
• Drawing correct with correct standards or only minor errors	5
• Drawing generally correct with correct standards with some minor errors and/or omissions	4
• Drawing generally correct with major errors and/or omissions	3
• Drawing generally correct with some major details	2
• Drawing with some minor details evident	1

Question 16 (a)

Criteria	Marks
• Details advantages gained through these changes	2
• Shows some knowledge gained through these changes	1

Question 16 (b)

Criteria	Marks
• Correctly describes the polymer coating process and identifies/names the suitable polymer	2
• Correctly describes the polymer coating process OR • Correctly names a suitable polymer	1

Question 16 (c)

Criteria	Marks
• Provides a pictorial drawing in proportion AND correct shape	5
• Provides a substantially correct pictorial drawing, mostly complete	4
• Provides a pictorial drawing with several aspects correct	3
• Provides a pictorial drawing with a few aspects correct	2
• Provides a limited AND/OR incomplete pictorial sketch	1

Question 16 (d) (i)

Criteria	Marks
• Correctly describes why demodulation is used in a radio system	2
• Describes demodulation as separating information from a wave	1

Question 16 (d) (ii)

Criteria	Marks
• Describes the demodulation process with reference to the circuit shown	2
• Describes partially the demodulation process with reference to the diode OR capacitor	1

Question 16 (d) (iii)

Criteria	Marks
• Correctly identifies the function of the coil and variable capacitor in the circuit shown	2
• Identifies the function of only the coil in the circuit shown OR • Identifies the function of only the variable capacitor in the circuit shown	1

Section III

Question 17 (a)

Criteria	Marks
• States appropriate considerations relating to location	2
• States ONE appropriate consideration relating to location OR • States engineering considerations but not relating to location	1

Question 17 (b)

Criteria	Marks
• States purpose of flange to join trusses	1

Question 17 (c) (i)

Criteria	Marks
• Constructs correct SFD and BMD	2
• Constructs ONE correct SFD or BMD OR • Constructs either SFD or BMD with incorrect values but correct shapes	1

Question 17 (c) (ii)

Criteria	Marks
• Describes correct change in shape to BMD	1

Question 17 (c) (iii)

Criteria	Marks
• Calculates bending stress using correct method or with minor error	2
• Calculates answer with incorrect order of units, or with minor errors in substitution OR • Calculates answer using axial stress formula (Stress = Load/Area)	1

Question 17 (d)

Criteria	Marks
• Gives reasons why the process is effective OR • Gives a reason with a detailed explanation	2
• Gives one reason why the process is effective	1

Question 18 (a)

Criteria	Marks
• Gives reasons why engineering reports are effective for decision–making	2
• Gives ONE reason indicating why reports are effective decision–making tools	1

Question 18 (b)

Criteria	Marks
• Explains how intellectual property can be protected, giving several methods	3
• Explains how intellectual property can be protected, giving a detailed method OR • Gives a basic explanation of one method and identifies another	2
• Identifies a way in which intellectual property can be protected	1

Question 18 (c) (i)

Criteria	Marks
• Names a principal alloying element	1

Question 18 (c) (ii)

Criteria	Marks
• Gives several reasons why engineers would choose this material	2
• Gives a satisfactory reason from the list below	1

Question 18 (d)

Criteria	Marks
• Applies appropriate formula to calculate correct answer for 1 or 2 pads	2
• Calculates an answer or with minor error OR calculates correct frictional force	1

Engineering Studies

2012 HSC Examination Mapping Grid

Section I

Question	Marks	Content	Syllabus outcomes
1	1	Materials	H2.1
2	1	Materials	H1.2
3	1	Materials	H1.2
4	1	Materials	H2.1
5	1	Mechanics	H3.1
6	1	Communication	H3.3
7	1	Mechanics	H3.4
8	1	Communication	H3.3
9	1	Electronics	H3.1
10	1	Mechanics	H3.1

Section II

Question	Marks	Content	Syllabus outcomes
11		**Historical and Societal Influences, and the Scope of the Profession**	
11 (a)	2	Historical and Society	H4.1
11 (b)	3	Machines and Materials	H41
11 (c)	2	Scope of profession	H5.2
11 (d)	3	Scope of profession and Social influence	H4.3
12		**Civil Structures**	
12 (a) (i)	1	Mechanics and Hydraulics	H3.1
12 (a) (ii)	1	Mechanics and Hydraulics	H3.1
12 (b)	2	Materials	H2.1
12 (c) (i)	2	Mechanics and Hydraulics	H3.1, H6.1
12 (c) (ii)	2	Mechanics and Hydraulics	H3.1, H6.1
12 (d)	2	Engineering Materials	H1.2, H2.1
13		**Personal and Public Transport**	
13 (a) (i)	2	Mechanics – energy	H3.1
13 (a) (ii) 1	1	Mechanics – power	H3.1
13 (a) (ii) 2	1	Mechanics – work	H3.1
13 (b) (i)	2	Materials – glasses	H2.1
13 (b) (ii)	2	Materials – glasses	H1.2
13 (c)	2	Electricity	H2.1
14		**Lifting Devices**	

Question	Marks	Content	Syllabus outcomes
14 (a)	3	Mechanics, Materials, Electricity	H1.2, H2.1
14 (b) (i)	3	Mechanics	H3.1
14 (b) (ii)	2	Mechanics and Materials	H3.1
14 (c)	2	Communication	H3.1
15		**Aeronautical Engineering**	
15 (a)	2	Mechanics	H2.2
15 (b)	3	Mechanics	H2.2
15 (c)	2	Materials	H1.2
15 (d)	3	Mechanics	H3.1
15 (e)	5	Communication	H3.2
16		**Telecommunication**	
16 (a)	2	Electricity/Electronics	H4.1
16 (b)	2	Materials	H1.2
16 (c)	5	Communication	H3.3
16 (d) (i)	2	Electricity/Electronics	H1.2
16 (d) (ii)	2	Electricity and Materials	H1.2
16 (d) (iii)	2	Electricity/Electronics	H1.2

Section III

Question	Marks	Content	Syllabus outcomes
17		**Engineering and the Engineering Report**	
17 (a)	2	Communication	H6.1
17 (b)	1	Scope of the profession	H6.1
17 (c) (i)	2	Mechanics	H3.1
17 (c) (ii)	1	Mechanics	H3.1
17 (c) (iii)	2	Mechanics	H3.1
17 (d)	2	Materials	H1.2, H2.1
18		**Engineering and the Engineering Report**	
18 (a)	2	Engineering Report	H4.3, H5.2
18 (b)	3	Engineering Report	H1.1, H4.3
18 (c) (i)	1	Materials	H2.1, H1.2
18 (c) (ii)	2	Materials	H2.1, H1.2
18 (d)	2	Materials	H3.1