BOARD OF STUDIES
NEW SOUTH WALES

2009 HSC Engineering Studies
Marking Guidelines

Section I

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

Section II

Question 11 (a)

Outcomes assessed: H.1

MARKING GUIDELINES

Criteria	Marks
• Lists responsibilities of a site engineer	2
• Lists ONE responsibility	1

Question 11 (b)

Outcomes assessed: H4.1, H4.2

MARKING GUIDELINES

Criteria	Marks
• Outlines an innovation in BOTH engineering materials and construction methods	3
• Outlines an innovation in either materials or construction	2
• Lists ONE innovation in either materials or construction	1

Question 11 (c) (i)

Outcomes assessed: H4.2, H4.3

MARKING GUIDELINES

Criteria	Marks
• Describes issues that engineers need to consider	2
• Outlines ONE issue in some depth	1

Question 11 (c) (ii)

Outcomes assessed: H1.1

MARKING GUIDELINES

Criteria	Marks
• Explains why engineers work in teams, referring to various fields of engineering	3
• Outlines why engineers work in teams OR • Explains within ONE field of Engineering	2
• Lists a reason why engineers work in teams	1

Question 12 (a)

Outcomes assessed: H1.2

MARKING GUIDELINES

Criteria	Marks
• Outlines changes in mechanical properties caused by cold rolling	2
• Lists changes in mechanical properties	1

Question 12 (b) (i)

Outcomes assessed: H3.1

MARKING GUIDELINES

Criteria	Marks
• Gives correct answer or has a minor error	2
• Shows understanding of the concept	1

Question 12 (b) (ii)

Outcomes assessed: H3.1, H6.2

MARKING GUIDELINES

Criteria	Marks
• Gives correct answer or has a minor error	2
• Shows understanding of the concept	1

Question 12 (c) (i)

Outcomes assessed: H1.2, H2.1

MARKING GUIDELINES

Criteria	Marks
• Indicates location A, and provides a correct explanation for the choice	2
• Indicates location A without explanation	1

Question 12 (c) (ii)

Outcomes assessed: H1.2, H2.1

MARKING GUIDELINES

Criteria	Marks
• Explains why round corners are preferable	2
• Shows some knowledge of the effect of the shape of the hole or recess	1

Question 13 (a) (i)

Outcomes assessed: H1.2, H6.2

MARKING GUIDELINES

Criteria	Marks
• Names and describes a suitable test	2
• Names a suitable test and provides a limited description OR • Provides a description of a suitable test	1

Question 13 (a) (ii)

Outcomes assessed: H2.1

MARKING GUIDELINES

Criteria	Marks
• Names and describes a heat treatment process to produce martensite in the case/surface of the head	3
• Names and provides a limited outline of the heat treatment process OR • Describes the correct heat treatment process without reference to the case	2
• Names a suitable process OR • Provides a limited description of heat treatment with reference to the case OR • Incorrect name but provides a description of the hardening process	1

Question 13 (b)

Outcomes assessed: H4.3

MARKING GUIDELINES

Criteria	Marks
• Describes the structure of laminated glass, and explains how this protects people in case of an accident	3
• Describes the structure of laminated glass OR • Provides a limited description of laminated glass and relates to protection	2
• Identifies some feature of structure or protection	1

Question 13 (c)

Outcomes assessed: H3.1, H6.1, H6.2

MARKING GUIDELINES

Criteria	Marks
• Correctly identifies ALL THREE inputs	2
• Correctly identifies ONE of the three inputs	1

Question 14 (a) (i)

Outcomes assessed: H3.1

MARKING GUIDELINES

Criteria	Marks
• Determines correct mass or has minor error	1

Question 14 (a) (ii)

Outcomes assessed: H3.1

MARKING GUIDELINES

Criteria	Marks
• Determines correct reaction and moment or with minor error	3
• Shows understanding of concepts and working towards the moment and/or the reaction OR • Calculates the correct moment	2
• Shows some correct working towards moment OR • Determines the correct vertical reaction	1

Question 14 (b) (i)

Outcomes assessed: H1.2

MARKING GUIDELINES

Criteria	Marks
• Explains why A is used in place of B	2
• Shows some understanding of stress value	1

Question 14 (b) (ii)

Outcomes assessed: H3.1

MARKING GUIDELINES

Criteria	Marks
• Determines correct diameter or with minor error	2
• Shows concept knowledge with some correct working	1

Question 14 (c)

Outcomes assessed: H4.1

MARKING GUIDELINES

Criteria	Marks
• Describes the relationship between pulse width or average voltage across the armature AND the speed of the motor	2
• Provides some knowledge of how PWM affects motor speed	1

Question 15 (a) (i)

Outcomes assessed: H2.2

MARKING GUIDELINES

Criteria	Marks
• Provides a description of the operation of a turboprop engine	2
• Shows some knowledge of turboprop engines as a power source	1

Question 15 (a) (ii)

Outcomes assessed: H6.1

MARKING GUIDELINES

Criteria	Marks
• Shows how control is achieved by linking airflow, lift and pitch	2
• Gives a reason how control is achieved	1

Question 15 (b)

Outcomes assessed: H1.2

MARKING GUIDELINES

Criteria	Marks
• Describes advantages/disadvantages for polymer use	3
• Outlines advantages OR disadvantages of polymer adhesives vs. metal rivets OR • Outlines one advantage and one disadvantage of either OR • Describes one advantage or one disadvantage of either	2
• Lists ONE disadvantage or ONE advantage	1

Question 15 (c)

Outcomes assessed: H3.1

MARKING GUIDELINES

Criteria	Marks
• Calculates drag correctly or with minor error	2
• Shows knowledge of concepts with some correct working	1

Question 15 (d)

Outcomes assessed: H3.1

MARKING GUIDELINES

Criteria	Marks
• Calculates force produced, or with minor error	2
• Shows knowledge of concept with some correct working	1

Question 15 (e)

Outcomes assessed: H3.2

MARKING GUIDELINES

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

Question 16 (a)

Outcomes assessed: H2.1, H4.1

MARKING GUIDELINES

Criteria	Marks
• Lists FIVE or SIX correct responses	3
• Lists THREE or FOUR correct responses	2
• Lists at least TWO correct responses	1

Question 16 (b)

Outcomes assessed: H4.1, H6.1

MARKING GUIDELINES

Criteria	Marks
• Describes multiplexing in a telecom system	2
• Provides ONE feature of multiplexing in a telecom system	1

Question 16 (c)

Outcomes assessed: H1.2, H2.2, H6.2

MARKING GUIDELINES

Criteria	Marks
• Sketches the output of the FM modulator	2
• Sketches the output showing that the frequency is changing but does not represent the message signal	1

Question 16 (d)

Outcomes assessed: H1.2, H2.2

MARKING GUIDELINES

Criteria	Marks
• Compares modulation techniques (FM, AM) used to transmit analogue television	3
• Describes modulation techniques used for transmission of analogue TV	2
• Outlines a modulation technique used for transmission of a TV broadcast OR lists FM or AM	1

Question 16 (e)

Outcomes assessed: H3.2

MARKING GUIDELINES

Criteria	Marks
• Provides correct assembly AND proportion of components with correct standards, or only minor errors	5
• Provides correct assembly AND proportion of components with some errors	4
• Provides correct assembly AND proportion of components with significant errors	3
• Provides basic assembly AND proportion of components	2
• Provides limited assembly AND proportion of components	1

Question 17 (a) (i)

Outcomes assessed: H2.2, H4.2, H4.3

MARKING GUIDELINES

Criteria	Marks
• Outlines social benefits of crash barriers	2
• Outlines ONE social benefit	1

Question 17 (a) (ii)

Outcomes assessed: H4.3

MARKING GUIDELINES

Criteria	Marks
• Describes how barriers are used to reduce the severity of road accidents	2
• Lists some reasons that reduce severity	1

Question 17 (b) (i)

Outcomes assessed: H1.2

MARKING GUIDELINES

Criteria	Marks
• Identifies relevant criteria for assessment	2
• Shows limited knowledge of criteria	1

Question 17 (b) (ii)

Outcomes assessed: H1.2, H2.1

MARKING GUIDELINES

Criteria	Marks
• Explains reasons in support of steel and polymer choices	2
• Gives ONE reason for each or explains reason for choice of either	1

Question 17 (c)

Outcomes assessed: H3.1

MARKING GUIDELINES

Criteria	Marks
• Calculates maximum force or with minor error	2
• Shows understanding of concept with some working	1

Question 18 (a)

Outcomes assessed: H1.1, H1.2

MARKING GUIDELINES

Criteria	Marks
• Gives some criteria relevant to feasibility OR explains one criteria	2
• Gives ONE criteria relevant to feasibility	1

Question 18 (b)

Outcomes assessed: H1.2, H2.1

MARKING GUIDELINES

Criteria	Marks
• Shows how these are similar or different in terms of manufacture, properties etc	3
• Provides properties of these material without comparing them OR • Provides a limited comparison of the materials	2
• Gives some knowledge of the properties of polycarbonate or aluminium	1

Question 18 (c) (i)

Outcomes assessed: H3.1, H6.1, H6.2

MARKING GUIDELINES

Criteria	Marks
• Calculates the value of resistance, or with minor error	2
• Shows some knowledge of concept with some correct working	1

Question 18 (c) (ii)

Outcomes assessed: H1.2, H6.1

MARKING GUIDELINES

Criteria	Marks
• Chooses either circuit but justifies the choice in terms of advantages of one over the other, manufacture, cost, safety etc	3
• Chooses either circuit with some discussion of cost, safety and/or manufacture	2
• Gives relevant comment about one of the circuits	1

Engineering Studies

2009 HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes
Section I			
1	1	Lifting devices – engineering materials	H1.2, H2.1
2	1	Civil structures – engineering mechanics and hydraulics	H3.1, H3.3
3	1	Civil structures – communication	H3.1, H3.3
4	1	Personal and public transport – electricity/electronics	H1.2, H2.1
5	1	Civil structures – communication	H3.1, H3.3
6	1	Personal and public transport – engineering mechanics and hydraulics	H2.1, H3.1
7	1	Lifting devices – engineering materials	H2.1, H3.3
8	1	Personal peers and public transport – electricity electronics	H2.1
9	1	Civil structures – engineering materials	H1.2, H2.1
10	1	Civil structures – engineering mechanics and hydraulics	H3.1, H3.3
Section II **Question 11 — Historical and Societal Influences, and the Scope of the Profession**			
11 (a)	2	Historical and societal influences	H1.1
11 (b)	3	Scope of the profession	H4.1, H4.2
11 (c) (i)	2	Scope of the profession	H4.2, H4.3
11 (c) (ii)	3	Scope of the profession	H1.1
Section II **Question 12 — Civil Structures**			
12 (a)	2	Engineering materials	H1.2
12 (b) (i)	2	Engineering mechanics and hydraulics	H3.1
12 (b) (ii)	2	Engineering mechanics and hydraulics	H3.1, H6.2
12 (c) (i)	2	Engineering mechanics and hydraulics	H1.2, H2.1
12 (c) (ii)	2	Engineering mechanics and hydraulics	H1.2, H2.1
Section II **Question 13 — Personal and Public Transport**			
13 (a) (i)	2	Engineering materials	H1.2, H6.2
13 (a) (ii)	3	Engineering materials	H2.1
13 (b)	3	Engineering materials	H4.3
13 (c)	2	Engineering electricity and electronics	H3.1, H6.1, H6.2

Question	Marks	Content	Syllabus outcomes
Section II **Question 14 — Lifting Devices**			
14 (a) (i)	1	Engineering mechanics and hydraulics	H3.1
14 (a) (ii)	3	Engineering mechanics and hydraulics	H3.1
14 (b) (i)	2	Engineering materials	H1.2
14 (b) (ii)	2	Engineering materials	H3.1
14 (c)	2	Engineering electricity/electronics	H4.1
Section II **Question 15 — Aeronautical Engineering**			
15 (a) (i)	2	Engineering mechanics and hydraulics	H2.2
15 (a) (ii)	2	Engineering mechanics and hydraulics	H6.1
15 (b)	3	Engineering materials	H1.2
15 (c)	2	Engineering mechanics and hydraulics	H3.1
15 (d)	2	Engineering mechanics and hydraulics	H3.1
15 (e)	4	Communication	H3.2
Section II **Question 16 — Telecommunication**			
16 (a)	3	Engineering electricity/electronics	H2.1, H4.1
16 (b)	2	Engineering electricity/electronics	H4.1, H6.1
16 (c)	2	Engineering electricity/electronics	H1.2, H2.2, H6.2
16 (d)	3	Engineering electricity/electronics	H1.2, H2.2
16 (e)	5	Communication	H3.2
Section III **Question 17 — Engineering and the Engineering Report**			
17 (a) (i)	2	Engineering report	H2.2, H4.2, H4.3
17 (a) (ii)	2	Engineering report	H4.3
17 (b) (i)	2	Engineering report	H1.2
17 (b) (ii)	2	Engineering materials	H1.2, H2.1
17 (c)	2	Engineering mechanics and hydraulics	H3.1
Section III **Question 18 — Engineering and the Engineering Report**			
18 (a)	2	Engineering report	H1.1, H1.2
18 (b)	3	Engineering materials	H1.2, H2.1
18 (c) (i)	2	Engineering electricity/electronics	H3.1, H6.1, H6.2
18 (c) (ii)	3	Engineering electricity/electronics	H1.2, H6.1