BOSTES | BOARD OF STUDIES TEACHING & EDUCATIONAL STANDARDS NSW

2014 HSC Industrial Technology
Metal and Engineering Technologies
Marking Guidelines

Section I

Multiple-choice Answer Key

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

Section II

Question 11

Criteria	Marks
• Identifies a suitable machine to produce cylindrical pieces	1

Sample answer:

- Metal lathe
- CNC lathe

Question 12

Criteria	Marks
• Provides characteristics and features of safety procedures that need to be taken while MIG welding	3
• Sketches in general terms some safety procedures	2
• Provides a safety procedure	1

Answers could include:

Ensure good housekeeping in work area:

- Clear area of any flammable liquids and materials
- Ensure there is adequate ventilation/extraction and lighting in the area of operation
- Do not wear loose clothing or jewellery
- Inspect equipment before use for damaged parts, lenses and gas lines
- Ensure all guards and shields in place.

Instruct others to avoid working close to the area where welding is to take place – if they are not associated with that operation.

- Position the flash blind in appropriate area to lessen the ultraviolet light effect on other personnel
- Locate cables away from the areas where there is a possibility of falling objects which may damage cables
- Adjust the welder to the appropriate settings to suit the job

PPE

- Welding mask
- Eye protection
- Protective clothing
- Steel-capped boots
- Long hair restrained
- Leather gloves

Question 13

Criteria	Marks
• Provides features of cutting fluids that improve the machining of mild steel	3
• Provides a feature of cutting fluids that improves the machining of mild steel	2
• Provides some relevant information	1

Answers could include:

Flushing away chips (swarf) from cutting zone
Better tool performance as frictional heat is quenched by the oil stream
Improves surface finish
Improves tool life
Higher cutting speed

Question 14

Criteria	Marks
• Indicates the main features of a method of casting	3
• Sketches in general terms some features of a method of casting	2
• Gives a feature of a method of casting	1

Sample answer:

Sand casting
1. Place a pattern in the sand to create a mould
2. Incorporate the pattern and sand in a gating system
3. Remove the pattern
4. Fill the mould cavity with molten metal
5. Allow the metal to cool
6. Break away the sand mould and remove the casting

Die casting
The basic die casting process consists of injecting molten metal under high pressure into a steel mould called a die. Die casting machines are typically rated in clamping tons equal to the amount of pressure they can exert on the die. Machine sizes range from 400 tonnes to 4000 tonnes. Regardless of their size, the only fundamental difference in die casting machines is the method used to inject molten metal into a die.

Answers could include:

- Plaster mould casting
- Investment casting
- Evaporative-pattern casting
- Centrifugal casting.

Question 15

Criteria	Marks
• Provides characteristics and features of different methods of surface treatments	5
• Sketches in general terms some processes used to treat the surface of a metal	3–4
• Lists methods of surface treatment or processes used in surface treatments	1–2

Sample answer:

Surface texture of metal is improved by finishes. Before attempting treatment the surface of the metal must be cleaned by completely removing oxidation, mill scale, rust, grease, dirt etc.

Painting – apply primer, rub it down lightly with emery cloth and apply two coats of enamel paint. It is cheap and easy to apply. Needs a recoat after a few years.

Galvanising – process of dipping metal into molten zinc. Metal is fluxed with zinc chloride before dipping. Layers of zinc oxide coat the metal providing it with a protective surface that can protect the metal from rusting and give it a more durable and scratch-free finish. Not all objects can be hot-dipped. Some may be too large or even too small, making the process impossible. Another disadvantage can occur is in processing. If done incorrectly, for example, if they are cooled too quickly, the zinc has the possibility of peeling or chipping off.

Electroplating – decorative, provides corrosion resistance, ease of cleaning procedures, or increases surface hardness. Changes properties of the surface of an object. Some disadvantages of electroplating might be that it's time consuming, it may not be uniform, and the coating may be brittle.

Bluing – a passivation process in which steel is partially protected against rust, named after the blue/black appearance of the resulting protective finish.

Answers could include:

- Powder coating
- Nitriding
- Flame spraying
- Electro-coating
- Hot dipping
- Cladding
- Lacquering.

Section III

Question 16 (a)

Criteria	Marks
• Detailed understanding of the characteristics and features of how government legislation has impacted work practices	6
• Sound understanding of the characteristics and features of how government legislation has impacted work practices	4–5
• Basic understanding of features of government legislation and link to work practices	2–3
• Provides some relevant information	1

Sample answer:

Government legislation, such as the Equal Employment Opportunity Act, has had significant impacts on work practices. For example, when advertising, interviewing, and appointing someone to a position in an organisation care and diligence is required to ensure everybody has an opportunity to apply, get interviewed and appointed, regardless of gender, disability, race, beliefs etc. This may mean equal access now requires ramps, elevators, disabled toilets in all workplaces.

Question 16 (b)

Criteria	Marks
• Provides a judgement based on detailed criteria of the effect of new and emerging technologies on work practices	9
• Provides a judgement based on criteria of the effect of new and emerging techniques on work practices	7–8
• Provides an understanding of the value and effect of new and emerging technologies on work practices	5–6
• Main features of the value or effect of new and emerging technologies on work practices	3–4
• Provides some relevant information	1–2

Answers could include:

The internet has now allowed people to do some of their work from home as they can access the company's software and data from home.

This is very positive for three main reasons:

1. Travel time is reduced. This means the worker can spend more time with his/her family which has positive effects for the happiness of the worker.
2. Fewer people travelling on roads to and from work means less traffic. Less traffic means faster travelling and less frustration before getting to work.
3. More work can be done as working alone at home means no distractions from other workers.

Industrial Technology
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2014 HSC Examination Mapping Grid

Section I

Question	Marks	Content	Syllabus outcomes
1	1	Processes, Tools and Machinery	H1.2, H2.1, H4.3
2	1	Processes, Tools and Machinery	H1.2, H2.1, H4.3
3	1	Processes, Tools and Machinery	H1.2, H2.1
4	1	Materials & Processes	H1.2, H4.3
5	1	Materials & Processes	H4.3
6	1	Materials & Processes	H1.2, H4.3
7	1	Processes, Tools and Machinery	H1.2, H2.1, H4.3
8	1	Processes	H3.2
9	1	Materials & Processes	H1.2, H4.3
10	1	Personnel	H3.2

Section II

Question	Marks	Content	Syllabus outcomes
11	1	Tools & machinery	H1.2, H2.1
12	3	WHS, Processes	H1.2, H2.1, H4.3
13	3	Materials, Processes	H1.2, H2.1, H4.3
14	3	Tools & Processes	H1.2, H2.1, H4.3
15	5	Materials and Processes	H1.2, H2.1, H6.1, H6.2

Section III

Question	Marks	Content	Syllabus outcomes
16 (a)	6	Personnel Issues	H1.1, H2.1
16 (b)	9	Technological Considerations	H1.1, H2.1, H7.2