



B O A R D O F S T U D I E S
NEW SOUTH WALES

2010 HSC Industrial Technology Metal and Engineering Technologies Sample Answers

This document contains ‘sample answers’, or, in the case of some questions, ‘answers could include’. These are developed by the examination committee for two purposes. The committee does this:

- (a) as part of the development of the examination paper to ensure the questions will effectively assess students’ knowledge and skills, and
- (b) in order to provide some advice to the Supervisor of Marking about the nature and scope of the responses expected of students.

The ‘sample answers’ or similar advice are not intended to be exemplary or even complete answers or responses. As they are part of the examination committee’s ‘working document’, they may contain typographical errors, omissions, or only some of the possible correct answers.

Section II

Question 11

Answers could include:

Angle, square tube, rectangular tube
Rigidity, strength, weight/strength ratio

Question 12

Sample answer:

Sand casting

A wooden pattern is made

Pattern packed in two-piece sand mould with risers and runners

- mould is split, pattern removed
- mould put back together
- molten metal poured in through runner until metal appears in riser
- metal allowed to cool and solidify
- casting removed from mould.

Question 13

Sample answer:

Coupling to be bolted to drawbar

- Bolting is safer option than welding – mechanical fastener more reliable than welding, less chance of failure
- Difficulty welding dissimilar metals correctly.

Question 14 (a)

Answers could include:

- Contraction of weld metal as weld turns from molten to solid metal
- Expansion and contraction of the parent metal in the area around the weld affected by heat.

Question 14 (b)

Answers could include:

Pening – hammering the weld while still hot to reduce stresses

Distribution of stresses – welding in a sequence so that each stress equalises another

Restraining parts – forcibly holding pieces in position until cooling is complete

Preheating – heating the metal before welding takes place to reduce stresses set up by heat of welding

Presetting – placing the metal in such a position to allow for distortion to pull pieces into the correct position.

Question 15 (a)

Answers could include:

- Metal turning lathe
- Cylindrical grinder

Question 15 (b)

Answers could include:

<i>Compound slide method</i>	<i>Offset tailstock method</i>
<ul style="list-style-type: none">- set metal in lathe- adjust compound slide to correct angle- progressive cuts until desired taper achieved	<ul style="list-style-type: none">- metal set up between centres- tailstock moved sideways required amount to produce required offset- take progressive cuts until desired taper achieved

Question 16

Answers could include:

Methods – Painting and Galvanising

Discussion of points listed below in relation to each method.

- cost
- ease of application
- protection provided to metal
- effect on metal
- safety issues involved in each.

Section III**Question 17 (a)**

Answers could include:

Environmental considerations which may affect a decision to expand a company or relocate:

- Change in distance from markets/storage/logistics
- Change in distance from suppliers
- The type of manufacturing process involved in the production
- The opportunities to save or recycle waste
- The greater or lesser demand for utilities such as water, electricity, gas and storage
- The environmental consideration of relocating the staff.

Question 17 (b)***Answers could include:***

Small business must assess what stage the business is currently in (establishment, growth, maturity or post maturity phase) and what business plan they have for the next five years and/or succession planning. The business is relocating to enable expansion.

Structural Issues:

- Relocating will enable the adoption of new strategies in production layout, storage, prototype and development work
- The outsourcing of some production would permit reduction in staff numbers or multi-skilling
- Promote multi-skilling, as job skill enlargement and/or job enrichment. It brings about better management structure, with employees getting more responsibility, more job satisfaction, and probably more pay.

Technical Issues:

- Opportunities to adopt new technologies both in production and administration
- Better production flow
- Better-quality control measures can be introduced
- Introduce newest and latest means of production
- Enable a true comparison with competitors
- Whereas some jobs may become redundant, other new jobs will be established
- Gives opportunities for retraining/multi-skilling

Personnel Issues:

- Trained, experienced and loyal staff members are a business's greatest asset.
- Any change must be 'sold' to staff, emphasising the improvement and advantages they will be part of
- Change in technology and structure will infringe on staff and therefore care should be taken not to alienate key staff
- Key staff are identified by using a personnel skills audit process, looking at an individual's experience, skills and personal qualities
- A change is also a chance to 'cull' personnel who fail to contribute
- Retrained, up-skilled, multi-skilled and loyal employees should be recognised publicly and rewarded.