

# 2015 HSC Industrial Technology Automotive Technologies Marking Guidelines

## Section I

### Multiple-choice Answer Key

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

## Section II

### Question 11

Criteria	Marks
<ul style="list-style-type: none"> <li>Correctly identifies purpose of synchromesh</li> </ul>	1

**Sample answer:**

Synchromesh synchronises the main shaft with the selected gear.

**Answers could include:**

So that main shaft and gear shaft mesh smoothly.

### Question 12

Criteria	Marks
<ul style="list-style-type: none"> <li>Provides a clear understanding of why exhaust valves require more maintenance than inlet</li> </ul>	3
<ul style="list-style-type: none"> <li>Provides a sound understanding of why exhaust valves require more maintenance than inlet</li> </ul>	2
<ul style="list-style-type: none"> <li>Some understanding of exhaust valves evident</li> </ul>	1

**Sample answer:**

- Exhaust valves are in line with the exhaust (output) of the waste gases. Therefore they get covered more in waste material.
- When the exhaust valves are open, hot exhaust gases and carbon cause the deterioration of the valve seats. This must be rectified to ensure smooth running of the engine.

### Question 13

Criteria	Marks
<ul style="list-style-type: none"> <li>Indicates the main features of the procedure to bleed a hydraulic brake system</li> </ul>	3
<ul style="list-style-type: none"> <li>Indicates some features of the procedure to bleed a hydraulic brake system</li> </ul>	2
<ul style="list-style-type: none"> <li>Gives a relevant feature related to bleeding a hydraulic brake system</li> </ul>	1

**Sample answer:**

- Ensure the reservoir is filled with brake fluid and kept full during the procedure.
- Pump the brake pedal to build pressure in the system and keep pressure on the pedal.
- Loosen the bleed screw to remove air bubbles.
- Tighten the bleed screw.
- Repeat the process until all the air is removed.

**Question 14**

Criteria	Marks
<ul style="list-style-type: none"> <li>Gives characteristics and features of how the internal combustion engine and electric motor work together to provide efficient motoring in a hybrid vehicle</li> </ul>	3
<ul style="list-style-type: none"> <li>Sketches in general terms how the internal combustion engine and electric motor work together in a hybrid vehicle to provide efficient motoring</li> </ul>	2
<ul style="list-style-type: none"> <li>Lists some relevant information regarding the internal combustion engine OR electric motor in a hybrid vehicle</li> </ul>	1

**Sample answer:**

The vehicle is generally powered by an electric motor driven by energy stored in batteries. When more power is needed, or when the battery level is low, the petrol/diesel motor takes over to power the vehicle.

**Question 15**

Criteria	Marks
<ul style="list-style-type: none"> <li>Accurately identifies the cause and effect of the interaction between the camshaft, crankshaft and timing belt to ensure the engine operates correctly</li> </ul>	5
<ul style="list-style-type: none"> <li>Gives the characteristics and features of the interaction between the camshaft, crankshaft and timing belt to ensure the engine operates correctly</li> </ul>	3–4
<ul style="list-style-type: none"> <li>Lists the main features of the interaction between the camshaft, crankshaft and timing belt</li> </ul>	1–2

**Sample answer:**

As the crankshaft rotates it moves the pistons up and down for the inlet, compression, combustion and exhaust strokes. The timing belt connects the crankshaft to the camshaft so that its cams operate the inlet and exhaust valve in the correct timing with these strokes to allow the engine to function correctly.

## Section III

### Question 16 (a)

Criteria	Marks
• Detailed understanding of the causes and effects of restructuring a business on quality control	5
• Provides characteristics and features of the causes and effects of restructuring a business on quality control	3–4
• Indicates the main features of restructuring and/or quality control	1–2

#### *Answers could include:*

- Restructuring can involve personnel, systems, processes, physical environment
- Effects can be positive and negative
- Restructuring can cause stress/anxiety on workers, causing a lowering of the quality of the product/services
- Workers moved during a restructure may initially lack the skills to perform new tasks, retraining must be under taken to provide knowledge to overcome lack of experience. This can lead to a short drop in quality of the product/services.
- New workers can provide a fresh attitude and show less complacency, possibly improving the quality of product/services
- The introduction of new machinery can improve the quality of products through increased accuracy, precision and output
- Restructuring personnel into specific teams with designated roles can help to improve product quality through skill specialisation

**Question 16 (b)**

Criteria	Marks
<ul style="list-style-type: none"> <li>Provides a detailed judgement of the value of new technology with an explanation of its effects on production and efficiency in the industry</li> </ul>	10
<ul style="list-style-type: none"> <li>Provides an effective judgement of the value of new technology with a description of its effects on production and efficiency in the industry</li> </ul>	8–9
<ul style="list-style-type: none"> <li>Provides some measure of the value of new technology with features of its effects on production and efficiency in the industry</li> </ul>	5–7
<ul style="list-style-type: none"> <li>Attempts to provide an assessment of the effect of new technology on production and/or efficiency in the industry</li> </ul>	3–4
<ul style="list-style-type: none"> <li>Lists aspects of new technology or production or efficiency in the industry</li> </ul>	1–2

**Sample answer:**

There are ways to determine the value of new technology improving production and efficiency. CAD drawings have allowed faster production due to reduced time in planning and drawing. These drawings are able to have elements such as a library of parts, which can be reused and save time for the business, therefore increasing efficiency in the production of drawings. For example, if you consistently use one component of a drawing, eg a particular cog, then you can save complex drawings and reuse and edit them. CAD drawings allow for electronic distribution of drawings around the world via the internet (even attached to emails). This could previously not have been done with hand drawings, as the drawings would have to be physically sent. This fast method of distribution is a significant cost saving, which is more efficient due to the time and cost saved by not having down time when waiting for delivery. With electronic distribution, there are no postal costs and no flying workers around the world with drawings/plans to attend meetings. In addition, if you were sending physical drawings, these may be lost. CAD allows for multiple backups to be made so the work will be able to be sent again reducing duplication of effort. As this globalisation has been made so much easier by the introduction of new technologies, you also have access to a global work force, and companies can get more qualified and experienced staff which are then likely to work more efficiently, thus increasing the amount of drawings produced in a set time.

3D printing allows rapid prototyping in the early stages of production. It allows concept sketches to be produced quickly, and then tested as a physical prototype to scale. This physical prototype is faster to generate than previous methods such as creating cardboard models thus reducing money the company may have spent on labour costs and freeing up this capital for re-investment. This model can then be shown to clients and feedback given which is then applied to the model. The time within the design process in preparing for production is then minimised, as changes can be made quickly and easily to the model based on feedback. This is a more efficient process, as previously, feedback would be received, drawing would have to be modified then new drawings printed, or perhaps new models created. This can all be done in the one process now with the model that is used for the prototype can then be repurposed and sent out for production, thus saving time in making a separate prototype and product, therefore being more efficient. Some 3D printers also print in different resins that can be used for things such as moulding and casting of multiple copies of objects. This is time and cost efficient and allows smaller businesses that do not have access to large budgets to be competitive in the market.

# 2015 HSC Industrial Technology Automotive Technologies Mapping Grid

## Section I

Question	Marks	Content	Syllabus outcomes
1	1	Body electrical systems	H1.2, H2.1, H4.3
2	1	Engine and related components	H1.2, H2.1, H4.3
3	1	Engine and related components	H1.2, H2.1, H4.3
4	1	Tools and equipment	H1.2, H2.1, H4.3
5	1	Automotive design	H1.2, H2.1, H4.3
6	1	Transmission	H1.2, H2.1, H4.3
7	1	Suspension system	H1.2, H2.1, H4.3
8	1	Intake and exhaust systems	H1.2, H2.1, H4.3
9	1	Tools and equipment	H1.2, H2.1, H4.3
10	1	Engine types	H1.2

## Section II

Question	Marks	Content	Syllabus outcomes
11	1	Transmission	H1.2, H4.3
12	3	Engine and related components	H1.2, H2.1, H4.3
13	3	Braking system	H1.2, H2.1, H4.3
14	3	Engine types	H1.2, H2.1, H4.3
15	5	Engine and related components	H1.2, H2.1, H4.3

## Section III

Question	Marks	Content	Syllabus outcomes
16 (a)	5	Structural considerations	H1.1, H2.1, H6.1, H6.2
16 (b)	10	Structural considerations	H1.1, H2.1, H7.2