

# 2015 HSC Industrial Technology Electronics Technologies Marking Guidelines

## Section I

### Multiple-choice Answer Key

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

## Section II

### Question 11

Criteria	Marks
• Correctly states the purpose	1

*Sample answer:*

Stores electrical charge.

### Question 12

Criteria	Marks
• Provide characteristics and features of a solenoid and its operation	3
• Sketches in general terms the main features of a solenoid	2
• Outlines a feature of a solenoid	1

*Sample answer:*

Electromechanical device used for switching.

Electrical component converting electricity into a mechanical output (linear movement).

Large coil of wire producing a strong magnetic field; converting electricity into a mechanical operation.

*Answers could include:*

Coil switch

Cars – starter motor

**Question 13**

Criteria	Marks
• Provides characteristics and features of circuit design software	3
• Outlines some features of circuit design software	2
• Identifies a feature of circuit design software	1

**Sample answer:**

Circuit design software can be used to design and test circuits, it can produce circuit layouts for PCB, it is faster, cheaper and safer than alternatives. Circuits can be designed using a simulation of components and circuit layout to test circuit design.

**Answers could include:**

Advantages:

- Speed
- Testing
- Continuity
- Component layout
- PCB design
- Simulation of circuits
- Software eliminates wastage from circuit. (Less PCB offcuts).
- Smaller circuit boards: less components/materials used

**Question 14**

Criteria	Marks
• Demonstrates the cause and effect of the correct use of an electronic hand-held measuring instrument to measure current in a circuit	3
• Provides characteristics or features of using an electronic hand-held measuring instrument to measure current in a circuit	2
• Identifies a feature of the use of an electronic measuring instrument to measure current	1

**Sample answer:**

A multimeter can be used to test for current. The circuit needs to be open and the (+)(-) electrodes placed between the break. The multimeter must be switched to (A) amp on the dial and at the appropriate (V) range for the circuit tested.

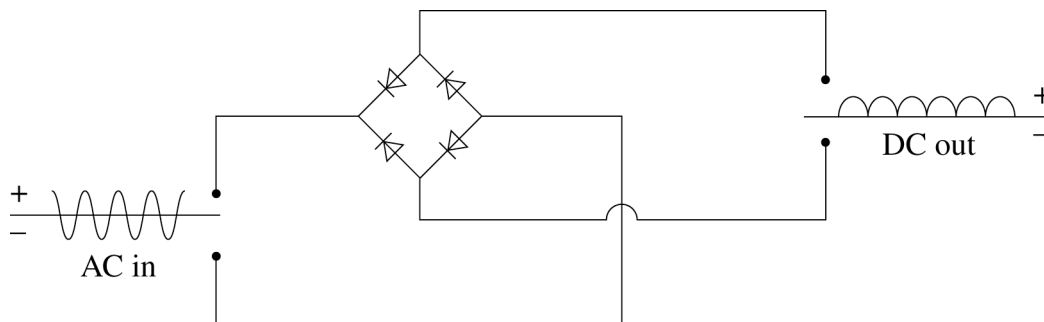
A Ammeter can be used to test for current (Amperes).

**Question 15**

Criteria	Marks
• Comprehensive explanation of AC to DC rectification with a relevant diagram	5
• Sound explanation of AC to DC rectification with a diagram	3–4
• Basic explanation of AC to DC rectification and/or basic diagram	1–2

**Sample answer:**

Rectification is the process of converting AC current into DC. Power diodes are used to achieve constant DC.

**Answers could include:**

- Half-wave rectification uses a simple diode, and only half the current can be used
- Full-wave rectification uses a bridge rectification (four power diodes arranged as a bridge) this process inverts the (-) negative portion of AC and then recombines it with its (+) positive counterpart
- An electrolytic capacitor acts as a reservoir and filters it releasing it steadily to provide a stable DC

## Section III

### Question 16 (a)

Criteria	Marks
<ul style="list-style-type: none"> <li>Detailed understanding of the causes and effects of restructuring a business on quality control</li> </ul>	5
<ul style="list-style-type: none"> <li>Provides characteristics and features of the causes and effects of restructuring a business on quality control</li> </ul>	3–4
<ul style="list-style-type: none"> <li>Indicates the main features of restructuring and/or quality control</li> </ul>	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
• Provides a detailed judgement of the value of new technology with an explanation of its effects on production and efficiency in the industry	10
• Provides an effective judgement of the value of new technology with a description of its effects on production and efficiency in the industry	8–9
• Provides some measure of the value of new technology with features of its effects on production and efficiency in the industry	5–7
• Attempts to provide an assessment of the effect of new technology on production and/or efficiency in the industry	3–4
• Lists aspects of new technology or production or efficiency in the industry	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 Electronics Technologies Mapping Grid

## Section I

Question	Marks	Content	Syllabus outcomes
1	1	Electrical principles – insulators	H1.2
2	1	Components circuitry – diodes	H1.2, H4.3
3	1	Electricity principles – output	H1.2, H4.3
4	1	Electricity principles – voltage	H1.2, H4.3
5	1	Electricity principles – voltage	H1.2, H4.3
6	1	Electricity principles – EMF	H1.2, H4.3
7	1	Electricity principles – IC	H1.2, H4.3
8	1	Components – LED	H1.2, H4.3
9	1	Electricity principles – transistors	H1.2, H4.3
10	1	Electricity principles – resistance	H1.2, H4.3

## Section II

Question	Marks	Content	Syllabus outcomes
11	1	Electricity principles – capacitors	H1.2, H4.3
12	3	Electricity principles – capacitors	H1.2, H2.1, H4.3
13	3	Processes – circuit software	H1.2, H4.3, H5.1
14	3	Instruments and test equipment	H3.2, H4.3
15	5	Electricity principles – rectification	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