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| Surname | Other names |
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| | |

**Pearson BTEC Level 1/Level 2 First Certificate**

Centre Number

Learner Registration Number

# Engineering

## Unit 9: Interpreting and Using Engineering Information

Friday 19 May 2017 – Morning
**Time: 1 hour**

Paper Reference
**21174E**

**You do not need any other materials.**

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

### Information

- The total mark for this paper is 50.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

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1/1/1/1/1/1/1/1/1/1

P 4 8 3 1 0 A 0 1 2 0

Pearson

**Answer ALL questions.**

**Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.**

**1** Engineers use a range of methods to share information related to the manufacture and use of products and systems.

(a) Abbreviations are used on drawings to represent features, such as details of holes.

**(3)**

(i) Name the drawing feature represented by the abbreviation.

CL .....

(ii) Name the drawing feature represented by the abbreviation.

INT .....

(iii) State the abbreviation used to represent a countersink feature.

.....

(b) Production plans are used to set out step-by-step instructions for machining operations.

Identify **two** pieces of information that would be found in a production plan.

**(2)**

☒ **A** Feeds and speeds

☒ **B** Accident record

☒ **C** Timings

☒ **D** Design

☒ **E** Gantt chart

(c) Engineers use health and safety signs to share information.

Identify the correct name for each of these health and safety signs.

Draw **one** line from each health and safety sign to **one** health and safety sign name.

**(2)**

| Health and safety sign | Health and safety sign name |
|---|---|
|  @alohaspiritiStock (Background is green) | Danger of death |
| | Biohazard |
| | First aid |
|  @alohaspiritiStock (Background is yellow) | Poison |
| | Emergency eye wash |

(d) Figure 1 shows a symbol used by engineers to represent a mechanical component.

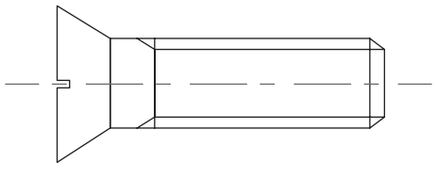

**Figure 1**

Name the mechanical component.

**(1)**

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**(Total for Question 1 = 8 marks)**

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**QUESTION 2 BEGINS ON THE NEXT PAGE**

**2** A range of different types of working drawing and sources of information are used by engineers.

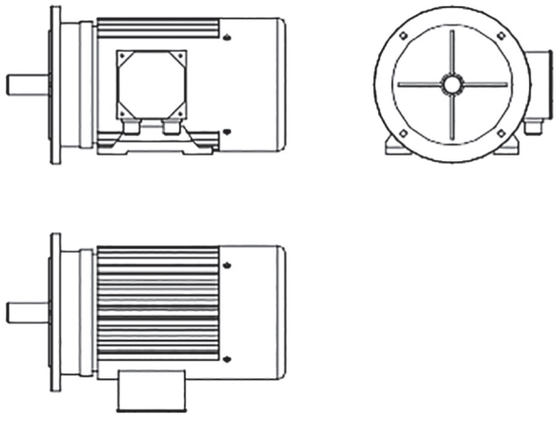

**Figure 2**

(a) Figure 2 shows an example of an orthographic projection for a motor.

Name the specific type of orthographic projection shown in Figure 2.

**(1)**

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.....

(b) Engineers use a number of information sources when completing a manufacturing task.

Identify **two** sources of information that are most appropriate to a manufacturing task.

**(2)**

- ☒ **A** Installation diagram
- ☒ **B** Machinery service manual
- ☒ **C** Bend allowance chart
- ☒ **D** Maintenance programme
- ☒ **E** Data sheet for finishing materials

(c) State **one** piece of information, other than the critical path, that is found on a schedule for manufacture.

**(1)**

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.....

(d) Figure 3 shows an example of a critical path analysis used during the completion of an engineering project.

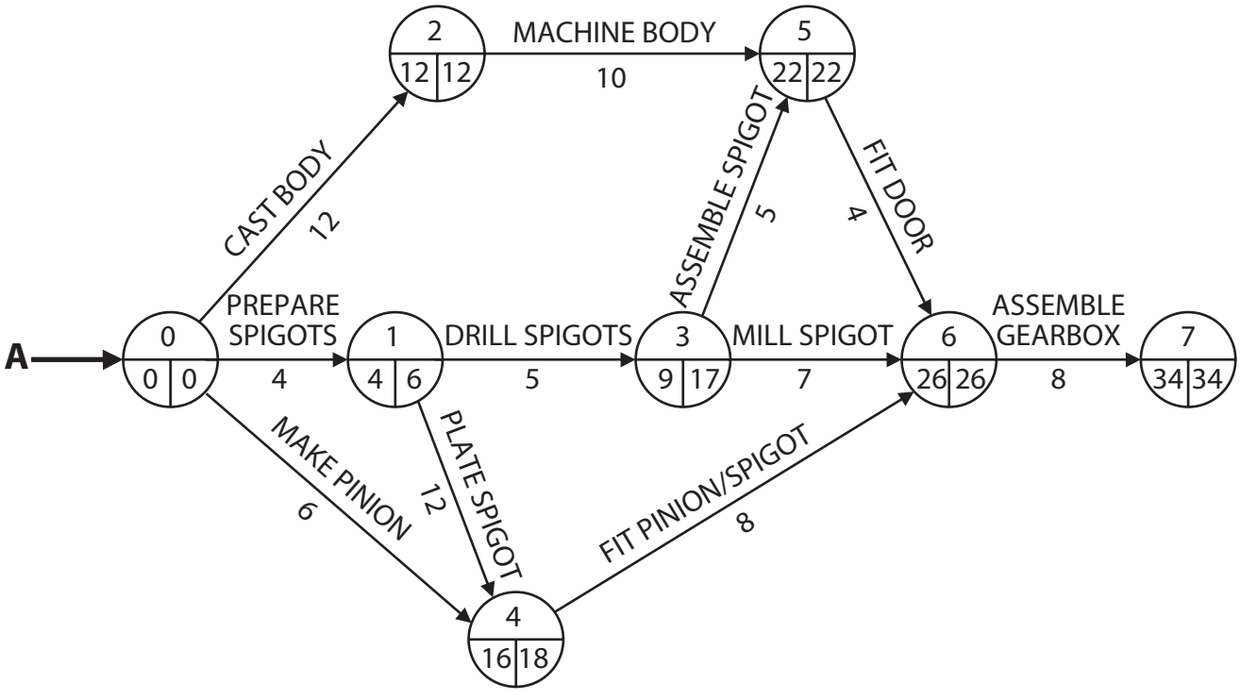


**Figure 3**

Name the feature shown at A.

**(1)**

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**(Total for Question 2 = 5 marks)**

**3** (a) Engineers interpret drawing information when they are manufacturing products.

Identify **two** types of information that are production details.

**(2)**

- ☒ **A** Assembly sequence
- ☒ **B** Treatments
- ☒ **C** Billing
- ☒ **D** Assembly point
- ☒ **E** Research

(b) Engineers use a range of documents when carrying out activities, including working instructions.

Name **one** example of working instructions.

**(1)**

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**(Total for Question 3 = 3 marks)**

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**QUESTION 4 BEGINS ON THE NEXT PAGE**

**4** Engineering technicians use a range of documentation and sources of information when they are machining components or constructing and repairing circuits.

(a) One type of documentation used by engineering technicians is a component drawing.

State **two** pieces of information that would be found on a component drawing.

**(2)**

1 .....

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2 .....

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(b) Explain **one** reason why an electronics engineering technician would refer to a circuit component data sheet when constructing electronic circuits.

**(2)**

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(c) Electronics engineering technicians sometimes use exploded diagrams when constructing electronic circuits.

Explain **one** disadvantage of using an exploded diagram when constructing a complex electronic circuit.

**(2)**

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(d) Electronics engineering technicians carry out repairs on circuits.

Explain **one** reason why an electronics engineering technician would need to refer to a component pin configuration specification when repairing electronic circuits.

**(2)**

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**(Total for Question 4 = 8 marks)**

**5** BT99 Thermal Engineering designs and installs heating and ventilation systems for domestic and commercial customers.

(a) BT99 Thermal Engineering produces graphical representations of heating systems using symbols.

Identify **one** type of graphical representation.

**(1)**

- ☒ **A** Job card
- ☒ **B** Material list
- ☒ **C** Schematic diagram
- ☒ **D** Risk assessment

(b) BT99 Thermal Engineering provides manufacturers' manuals to the technicians that install heating and ventilation systems.

State **two** reasons why installation technicians would need to refer to illustrations from manufacturers' manuals.

**(2)**

1 .....

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2 .....

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(c) After completing the installation of a heating and ventilation system, BT99 Thermal Engineering provides the end user with a user guide containing diagrams, charts and drawings that relate to the system.

Explain **one** reason why BT99 Thermal Engineering would include a flow chart in the user guide.

**(2)**

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(d) For each completed installation, BT99 Thermal Engineering produces a physical layout diagram, which is also included in the user guide.

Explain **two** advantages to the end user of the installation of including a physical layout diagram in the user guide.

**(4)**

1 .....

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2 .....

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**(Total for Question 5 = 9 marks)**

**6** 1BD-CAD produces engineering drawings for a range of customers who do not have their own CAD (Computer Aided Design) technicians.

(a) 1BD-CAD uses the following notation to represent dimensions on drawings.

$$\frac{140}{135}\,\text{mm}$$

State the meaning of the notation shown.

**(1)**

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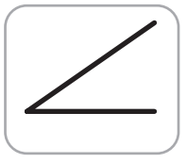
.....

(b) 1BD-CAD uses a range of standard symbols on CAD drawings to represent features, including geometric tolerances.

Identify the correct name for each of these geometric tolerance symbols.

Draw **one** line from each geometric tolerance symbol to **one** geometric tolerance symbol name.

**(2)**

| **Geometric tolerance symbol** | **Geometric tolerance symbol name** |
|---|---|
|  | Angle |
| | Maximum metal condition |
| | Profile of a surface |
|  | Straightness |
| | Symmetry |

(c) 1BD-CAD can produce A1 size drawings that engineers use when working on a construction site.

Explain **one** implication for engineers working on a construction site of not folding large engineering drawings in a specific way.

**(2)**

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(d) 1BD-CAD produces all of the engineering drawings for its customers using CAD software. The drawings are stored on the 1BD-CAD computer network.

Explain **two** implications for customers if the original CAD drawings are corrupted and 1BD-CAD does not maintain a back-up system.

**(4)**

1 .....

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2 .....

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**(Total for Question 6 = 9 marks)**

**7** BA9 Engineering is a manufacturer of precision components that are used in the biomedical engineering sector to assemble bionic limbs. The company monitors the quality of these components during manufacturing using quality control information such as Statistical Process Control (SPC) charts and Pareto charts.

Evaluate the effectiveness of using SPC charts and Pareto charts to reduce the quantity of faulty components produced by the company.

**(Total for Question 7 = 8 marks)**

**TOTAL FOR PAPER = 50 MARKS**

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