Rewarding Learning

General Certificate of Secondary Education
2017

Technology and Design

Unit 1: Technology and Design Core

[GTD11]

TUESDAY 23 MAY, MORNING

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses. The mark schemes should be read in conjunction with these general marking instructions.

Assessment objectives

Below are the assessment objectives for GCSE Technology and Design.

Students must:

- recall select and communicate their knowledge and understanding of technology and design in a range of contexts (AO1);
- apply skills, knowledge and understanding, in a variety of contexts and in designing and making products (AO2); and
- analyse and evaluate products, including their design and production (AO3).

Flexibility in marking

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of an unanticipated answer, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

Positive Marking

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Examiners should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate.

Awarding zero marks

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Types of mark schemes

Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

Levels of response
Tasks and questions requiring candidates to respond in extended writing are marked in terms of levels of response. In deciding which level of response to award, examiners should look for the "best-fit" bearing in mind that weakness in one area may be compensated for by strength in another. In deciding which mark within a particular level to award to any response, examiners are expected to use their professional judgement. The following guidance is provided to assist examiners.

- ***Threshold performance*:** Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.

- ***Intermediate Performance*:** Response which clearly merits inclusion in the level and should be awarded a mark at or near the middle of the range.

- ***High Performance*:** Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

Marking calculations
In marking answers involving calculations, examiners should apply the "own figure rule" so that candidates are not penalised more than once for a computational error.

Quality of written communication
Quality of written communication is taken into account in assessing candidates' responses to all tasks and questions that require them to respond in written form. These tasks and questions are marked on the basis of levels of response. The description for each level of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within levels of response as follows:

Level 1: Quality of written communication is limited.
Level 2: Quality of written communication is satisfactory.
Level 3: Quality of written communication is very good.

In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below:

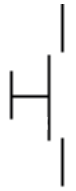
Level 1 (Limited): The level of accuracy of presentation, spelling, punctuation and grammar is limited. The candidate makes a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary.

Level 2 (Satisfactory): The level of accuracy of presentation, spelling, punctuation and grammar is satisfactory. The candidate makes a satisfactory selection and use of an appropriate form and style of writing supported with appropriate use of diagrams as required. Relevant material is organised with some clarity and coherence. There is some use of specialist vocabulary.

Level 3 (Very Good): The level of accuracy of presentation, spelling, punctuation and grammar is very good. The candidate successfully selects and uses the most appropriate form and style of writing, supported with precise and accurate use of diagrams where appropriate. Organisation of relevant material is very good. There is very good use of appropriate specialist vocabulary.

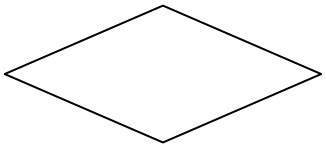
	AVAILABLE MARKS

1



[1]

Electronic [1]
Mechanical [1]
Meshed Gears [1]
Reed Switch [1]
Electricity [1]



[1]

Pneumatic [1]
Push Button [1] 9

2 **(a)** • A computer file is a resource for storing information [1], which is available to a CNC program to manufacture a product [1]. [2]

(b)
- To create a faster production process for components
- Making more precise dimensioned components
- Uses only the required amount of raw material (thus minimizing waste)
- Reduces energy consumption
- Reduces final costs/price
- Manufactures identical repeat components

[any **two**]
(2 × [1]) [2] 4

3 **(i)** A Pear shaped
B Eccentric
C Heart shaped
(3 × [1]) [3]

(ii) Roller [1]

(iii) Rotary [1]
Reciprocating [1] 6

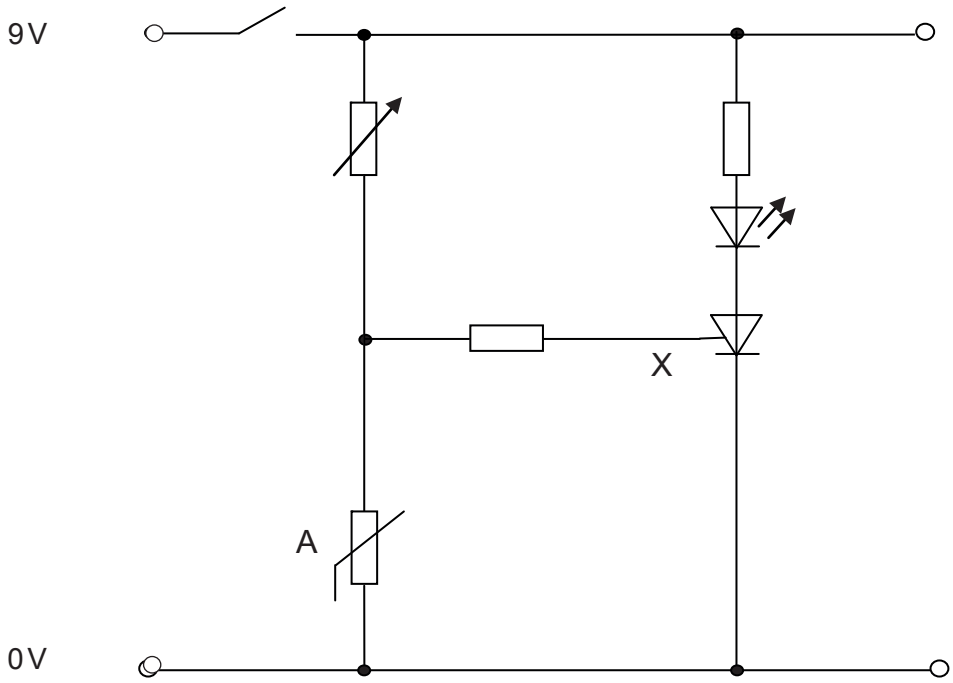
4

Method	Material	Permanent/ Semi-permanent
Tensol cement	Plastic	Permanent
Wire nails	Wood	Semi-permanent
Dowels	Wood	Permanent

(6 × [1]) [6] 6

				AVAILABLE MARKS
5	(a)	Correct motor symbol connected at X.	[1]	
				
		Correct diode symbol connected at Y [1], correct orientation [1].	[2]	
				
	(b)	A = Single pole single throw switch/SPST switch. B = Variable resistor. C = Light Dependent resistor (LDR). D = Resistor. E = Transistor. (5 × [1])	[5]	
	(c)	(i) To enable the motor/transistor to switch on [1] in dark conditions [1] **or** to enable the motor to switch off [1] in light conditions [1]	[2]	
		(ii) To protect the transistor [1] from back EMF [1]	[2]	12
6	(a)	(i)		
		Lever Roller Trip	[2]	
		(ii) Roller trip.	[1]	
	(b)	(i) One way flow restrictor/flow regulator/unidirectional flow restrictor	[1]	
		(ii) To control the speed of the outstroke of the cylinders	[1]	
		(iii) • Both cylinders outstroke	[1]	
		• Both cylinders instroke	[2]	8
7	(a)	(i) An alloy is a mixture [1] of two or more metals/ or ref. to properties [1]	[2]	
		(ii) Non-ferrous metal	[1]	
		(iii) Hacksaw or junior hacksaw	[1]	
		(iv) Pedestal polishing machine, buffing machine	[1]	
	(b)	(i) Coping saw or scroll saw machine or Hegner saw machine (any **one**)	[1]	
		(ii) Hardwood	[1]	7

8



AVAILABLE MARKS

(a) **(i)** Symbol for a thermistor as shown at A. [1]

(ii) Close switch to complete the circuit [1]
as temperature falls (–t) thermistor resistance increases [1]
therefore output voltage is directed to X [1].

OR

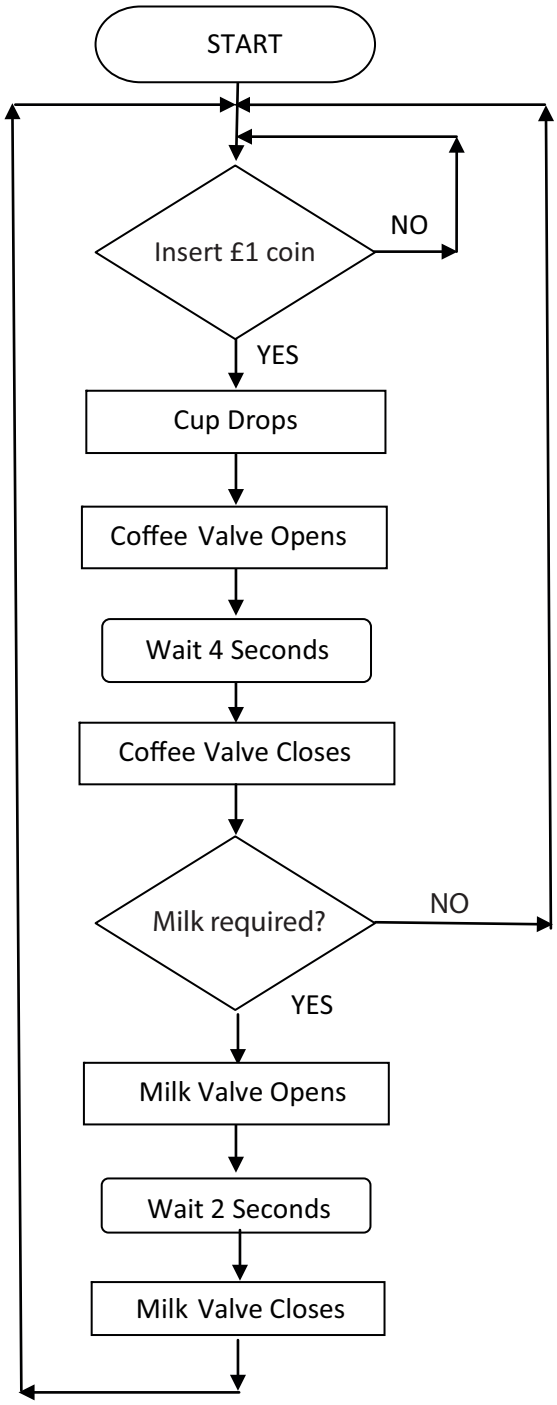
as temperature rises (+t) thermistor resistance increases [1]
therefore output voltage is directed to X [1]. [3]

Other suitable answers will be considered

(iii) Temperature sensing circuit
Potential divider circuit
Voltage divider circuit
(any **one**) [1]

(b) Thyristor [1], LED [2], protective resistor [1],
Connections: from point X [1], top and bottom rail [1]. [6] 11

9



[12]

AVAILABLE MARKS

12

		AVAILABLE MARKS
10	**(a)** Easily grasped for lifting Easier to bend Doesn't lose CSA when bent Suitable shape for axle Does not need cut or strengthened at the bends (any **two**) (2 × [1]) [2]	
	(b) Length of cable that can be wound on reel The method for winding reel The type of material for reel Provision of power outlet sockets The number of sockets Location or size of winding handle Adherence to safety standards (any **three**) (3 × [1]) [3]	5

11 Indicative Content:

- Use marking blue or felt tip marker
- Mark out four holes along centre line using a scriber, centre punch, hammer, rule or a jig, engineer's square etc.
- Mark out holes at specified positions along centre line
- Mark centre bending line
- Clamp the metal in a machine vice
- Insert a 8 mm drill bit into a pillar drilling machine using a chuck key
- Drill the four holes in the correct locations
- Remove drill bit using a chuck key
- Insert a countersunk drill bit into the pillar drilling machine using a chuck key
- Countersink the four holes
- Remove the metal from the machine vice
- Remove any metal bits or burr from back of the metal with a file
- Insert a folding bar into a vice or insert the bar into a metal folding machine or metal vice
- Bend the bar with a hammer **or** raise lever/handle in folding machine
- Using an engineer's square to check if the metal is at right angles
- Remove metal from folding bar or machine.

Safety Precautions:

- Use vice to hold material for marking out
- Be aware of the sharp corners on the metal edges
- Wear goggles when using the drilling machine
- Hair tied back if required
- Ensure there is no loose clothing
- Ensure the drilling machine guard is in position
- Ensure drilling machine vice is fully tightened
- Ensure the drill bit is correctly tightened
- Remove chuck key from chuck before switching on machine
- Ensure the drilling machine is turned off after use
- Wash hands after using the machines. [10] 10

Response Type	Description	Mark Band
Limited	Students correctly identify very few steps in the manufacturing process and some or no safety precautions. The level of accuracy of spelling, punctuation and grammar is limited in most cases. Form and style is generally limited as is the use of specialist terms.	**[1]–[4]**
Satisfactory	Students correctly identify some steps in the manufacturing process most of which are in order with some or no safety precautions. The level of accuracy of spelling, punctuation and grammar is satisfactory in most situations. The form and style is satisfactory in most cases and specialist terms are used appropriately in some cases.	**[5]–[7]**
Very good	Students correctly identify majority of steps in the manufacturing process most of which are in order with a number of safety precautions. The level of accuracy of spelling, punctuation and grammar is very good. The form and style is of a high standard and specialist terms are used appropriately at all times.	**[8]–[10]**

Total **90**

AVAILABLE MARKS