Rewarding Learning

General Certificate of Secondary Education
2012

Technology and Design

Unit 1: Technology and Design Core

[GTD11]

FRIDAY 25 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 reaqsonably 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:

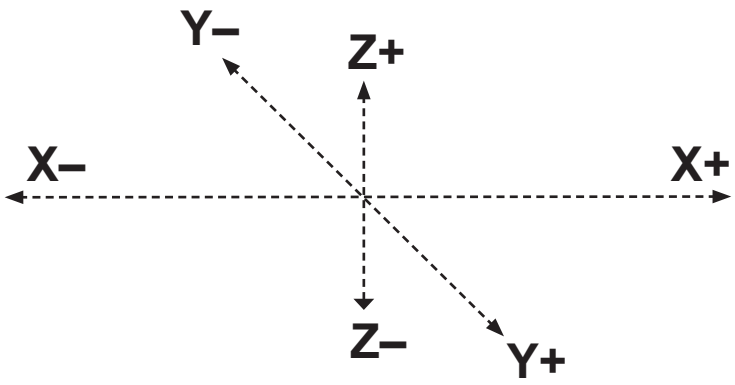
Level 1: Quality of written communication is limited.
Level 2: Quality of written communication is satisfactory.
Level 3: Quality of written communication is very good.

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	 Pressure source/Air supply Hazard Electricity Mandatory/Safety (A) Electronic  Mechanical 9 × [1]	[9]	9
2	**(a)** The material can be held by using clamps attached to the bed of the CNC machine **or** The material may be attached to a sacrifice board either by double sided tape or screws	[1]	
	(b) [1] for each correct axis (x, y, z is acceptable for full marks)  	[3]	
	(c) A design is generated using a CAD software package.	[1]	5
3	**(i)** Gear A Anticlockwise Gear C Anticlockwise Load D Downwards Load E Upwards	[4]	
	(ii) 60 rev/min	[2]	6

					AVAILABLE MARKS
4	(a)	(i)	Advantage: Can be used in any location, Safe etc. Disadvantage: Battery needs recharging, Limited power etc.	[2]	
		(ii)	Slow speed start: Starting a hole, Driving a screw etc. Reverse rotation: Extracting/Removing screw	[1] [1]	
		(iii)	Range of drill size, Variable speed, Motor power Type of chuck, Drilling capacity, Charging time, Spirit level indicator, drill bit storage etc.	[2]	6
5	(a)		Thyristor Point X = Anode Point Y = Gate Point Z = Cathode 4 × [1]	[4]	
	(b)		When S1 closed supply voltage is on If S2 closed the bulb will light Bulb will stay on (latched on) even if S2 is opened Supply voltage must be switched off (S1 opened) before bulb switches off	[5]	9
6	(i)			[3]	
	(ii)		Lower guard And press button A	[1] [1]	
	(iii)		Reference to: Adjustment of Restrictor on flow control valve	[2]	7

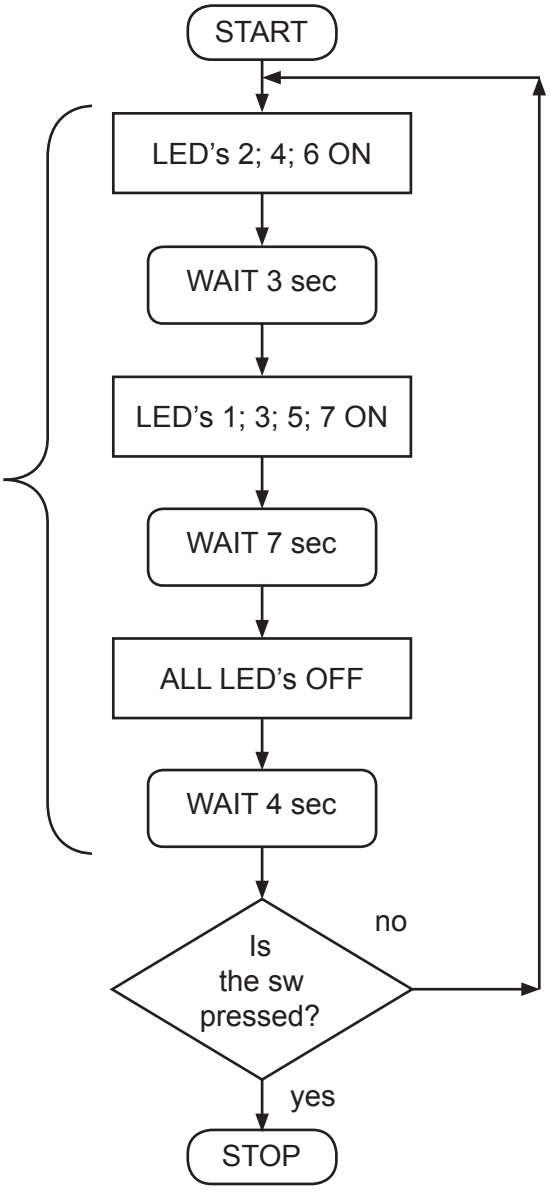
Pneumatic Component	Letter
3/2 Valve Plunger Operated	B
Single Acting Cylinder	C
3/2 Valve Button Operated	A

					AVAILABLE MARKS
7	(a)	(i)	Thermoplastic	[1]	
		(ii)	Rigid polystyrene	[2]	
	(b)	(i)	Good quality finish; produce accurate angles; must be same length or longer than the acrylic; suitable for repeat work; accurate overall shape; etc.	[2]	
		(ii)	Wood; metal	[1]	
			Does not soften/change shape; can be reused	[1]	7
8	(a)		Input: Variable resistor and Light Dependent resistor Process: Transistor and Resistor Output: Bulb 5 × [1]	[5]	
	(b)		Points to include: Light: Resistance of LDR is low ∴ voltage across it is low. Transistor switched off bulb not lit. (0.6 V required at base to switch on transistor). Dark: Resistor of LDR is high ∴ voltage across it is high. Transistor switched on, bulb lit. Variable resistor can adjust the sensitivity of switching. Fixed resistor protects the Transistor. Base leg of transistor switches on ≥0.6V.	[6]	11

AVAILABLE MARKS

9 **(a)** Simplifies the system; show order of sequence; shows how the system may work; they are used in analyzing, designing, documenting or managing a process or program.
2 × [1] [2]

(b) See flow chart [10]



6 × [1]

[1]

[2]

[1]

12

		AVAILABLE MARKS
10 **(a)** Material Mild steel or Steel [1] Reason Strength [1]		
(b) **(i)** Method: Welding [1] Permanent [1]		
(ii) Method: Nuts and bolts/wood screws [1] Semi-permanent [1]		
(c) Ribs welded to bracket/triangulation **or** Stays welded to ring and bracket etc. [2]		8
11 **Indicative Content:** • Mark out and centre punch mild steel • Insert the smallest drill into the drill and tighten with the chuck key • Check the speed of the drilling machine that it is suitable for mild steel • Close guard on the machine • Clamp steel in a machine vice • Set the depth gauge and drill platform of the drill machine • Drill all three holes • Remove and inset second drill bit and tight with chuck key • Drill middle hole • Remove drill bit and insert next drill bit with the chuck key • Drill final hole • Switch off machine and remove steel from machine vice • File excess material on the steel if required		
Safety Precautions: • Make sure the area is safe • Wear goggles • Wear hair tied back • Ensure there is no loose clothing • Ask teacher permission and work under supervision • Remove chuck key • Ensure the guard is in place • Keep hands away from moving parts • One person operating the machine • Ensure the machine vice is fully tightened • Ensure the drill bit(s) is fully tightened • Switch of the machine when finished • Clean the machine and or area before next user • Never use the machine without being fully instructed in its use by the teacher • Check or ask if all setting on the drilling are correct [10]		10

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

When a response is not worthy of credit then a **[0]** mark should be awarded.

Total **90**

AVAILABLE MARKS