Rewarding Learning

General Certificate of Secondary Education
January 2015

Engineering

Paper 2

Assessment Unit 3

assessing

Engineering Technology

[GEE32]

TUESDAY 13 JANUARY, AFTERNOON

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 likely to be worthy of credit. They also set out the criteria which they should apply in allocating marks to candidates' responses. The mark schemes should be read in conjunction with these general marking instructions.

Assessment Objectives
Below are the assessment objectives for GCSE Engineering

Candidates must:
- recall, select and communicate their knowledge and understanding of engineering in a range of contexts (AO1);
- apply skills, knowledge and understanding, including quality standards, in a variety of contexts, and plan and carry out investigations and tasks involving a range of tools, equipment, materials and components (AO2); and
- analyse and evaluate products, make reasoned judgements and present conclusions (AO3).

Quality of candidates' responses
In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

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 unanticipated answers, 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 assessment candidates' response to all tasks and questions that require them to respond in extended 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 excellent.

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

Level 1 (Limited): Candidates 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): Candidates 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 4 (Excellent): Candidates presentation, spelling, punctuation and grammar is excellent. 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 excellent. There is excellent use of appropriate specialist vocabulary.

AVAILABLE MARKS

1 **(a)** **(i)** Lighter
Easier to move around
Easier to work with compared to steel
Easier to cut
Good strength to weight ratio
No finish required
Doesn't rust
Others considered [1]

(ii) Extrusion or Impact forward extrusion [1]

(b) **(i)** More easily cleaned
Easier and quicker to manufacture
No finish required
Not toxic
Light weight
Safer [1]

(ii) PET, PVC, polystyrene
Others considered [1]

(c) Modern technology can work 24/7
Once set up and established that there are no mistakes, products can be manufactured continuously.
Less human contact.
Others considered
(2 × [1]) [2]

(d) The same parts can be produced with extreme accuracy
Fast way of producing.
Less waste
The same mould can be used throughout the manufacturing process
Others considered [1]

(e) **(i)** Can be easily shaped into position, whereas box section isn't as easily shaped.
Easier to hold/touch.
Others considered [2]

(ii) A ferrous metal is one which contains iron and can rust.
A non-ferrous metal does not contain iron and cannot rust.
Others considered
(1 × [2]) [2]

(f) **(i)** Assembling the parts of the high chair together using pop rivets. (Robotic assembly)
Spraying
Packaging.
Others considered [1]

(ii) Reduction in staff costs
Less mistakes happen once the production run is set up and established.
Reduction of production process.
Others considered [2]

			AVAILABLE MARKS
(g)	**(i)**	CNC laser measuring systems Pre-programmed tasks using CNC equipment to check operational tolerances and performance parameters. Others considered (2 × [1]) [2]	
	(ii)	Advantage – Less products returned due to faults in the product Disadvantage – High set-up cost for the manufacturer, highly skilled workforce required One response, either advantage or disadvantage Others considered (1 × [2]) [2]	
(h)		To ensure that the production line runs smoothly So that different sections of the factory know exactly what other sections are doing So that the correct materials and components are available to manufacture the high chair Others considered (2 × [1]) [2]	
(i)		Appropriate notes and annotated sketches outlining how the tray is attached to the high chair and how it can be adjusted to different positions. Spring loaded adjustable lever/handle × 2 Lever operated 3 or 4 notches/location points for adjustment Linear movement Handle and frame must be able to interlock Marks awarded for Detail contained in sketches [4] Quality of sketches [3] Detailed notes [3] [10]	
(j)		Appropriate notes and annotated sketches outlining how the back of the high chair can be adjusted to different positions. Hinged Spring loaded handle Locked into different positions Back/forward at different angles to different positions (2–4) Marks awarded for Detail contained in sketches [4] Quality of sketches [3] Detailed notes [3] [10]	
		Total	**40**