Rewarding Learning

General Certificate of Secondary Education
January 2012

Engineering

Paper 2

Assessment Unit 3

assessing

Engineering Technology

[GEE32]

TUESDAY 31 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, klnowledge 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 evidence, 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 assessing candidates’ responses 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): Candidate’s 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 m ay lack clarity and coherence. There is little use of specialist vocabulary.

Level 2 (Satisfactory): Candidate’s 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 us of specialist vocabulary.

Level 3 (Excellent): Candidate’s 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)** Outline **one** reason why tubular steel is a suitable material to make the frame of an ironing board.

Can be moulded easily
Readily available
Other answers considered [2]

(ii) Explain how tubular steel has helped to improve the characteristics of an ironing board.

Good strength to weight ratio
Different finishes can be applied easily
Other answers considered [2]

(b) Modern technology is used extensively in the manufacture of ironing boards.

Give **one** example of how modern technology has enhanced the manufacture of ironing boards.

Better accuracy
They can be manufactured much faster
Other answers considered [2]

(c) The ironing board shown in the pre-release material is assembled using a number of fittings. Give **one** example of a mechanical fitting and where it has been used in the construction of an ironing board.

Fitting – Spring [1]
Where it has been used – Attached to the lever for height adjustment [1]
Other answers considered [2]

(d) State **two** computerised production processes used in the manufacture of an ironing board.

Robotic welding
Pressing
Punching
CNC drilling
CNC cutting to size
Robots moving parts on the production line
Other answers considered
(2 × [1]) [2]

(e) **(i)** Give **two** examples of how CAM has helped control the manufacturing costs of an ironing board.

Labour costs reduced due to a reduced workforce
Less waste
Other answers considered
(2 × [2]) [4]

(ii) How has CAM made ironing boards more reliable for the customer?

More accurately made, all measurements exact
More precise
Other answers considered [2]

		AVAILABLE MARKS
(f)	Give **one** advantage of using CAD at the design stage of the ironing board for the manufacturer. Designs can be modified easily A design can be viewed from different angles All measurements can be checked before production Other answers considered [2]	
(g)	Systems and control technology is used extensively throughout the manufacture of ironing boards. Describe giving **one** example how computer control is used during the production stage. CNC drilling Other answers considered [2]	
(h)	The plastic feet of the ironing board are manufactured by a process known as injection moulding. In the box below using annotated sketches and the correct terminology explain this process. Appropriate diagram explaining the injection moulding process. Marks will be awarded for: – Detail contained in sketches [4] – Quality of sketches [3] – Detailed notes [3] [10]	
(i)	In the box below using notes and sketches explain how the mechanism which allows the user to iron at different heights operates. Appropriate diagram showing how the mechanism which allows the user to iron at different heights operates. Marks will be awarded for: – Suitability of chosen method [4] – Quality of sketches [3] – Detailed notes [3] [10]	40
	Total	**40**