

Cambridge Technicals

Engineering

Unit 2C: Application of engineering principles

Level 2 Cambridge Technical Certificate/Diploma in Engineering
05887 - 05888

Mark Scheme for June 2025

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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MARKING INSTRUCTIONS**PREPARATION FOR MARKING****RM ASSESSOR**

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training: OCR Essential Guide to Marking*.
2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are available in RM Assessor
3. Log-in to RM Assessor and mark the **required number** of practice responses (“scripts”) and the **required number** of standardisation responses.

MARKING

1. Mark strictly to the mark scheme.
2. Marks awarded must relate directly to the marking criteria.
3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% (traditional 40% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.
4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone, email or via the RM Assessor messaging system.
5. **Crossed-Out Responses**
Where a candidate has crossed out a response and provided a clear alternative then the crossed-out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed-out response where legible.

Rubric Error Responses – Optional Questions

Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM Assessor,

which will select the highest mark from those awarded. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

Multiple-Choice Question Responses

When a multiple-choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).

When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses

When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only one mark per response)

Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth two or more marks)

If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space).

Longer Answer Questions (requiring a developed response)

Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there, then add the annotation 'SEEN' to confirm that the work has been seen and mark any responses using the annotations in section 11.

7. There is a NR (**No Response**) option. Award NR (No Response):

- if there is nothing written at all in the answer space
- OR if there is a comment which does not in any way relate to the question (e.g., 'can't do', 'don't know')
- OR if there is a mark (e.g., a dash, a question mark) which is not an attempt at the question.

Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).

8. The RM Assessor **comments box** is used by your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**

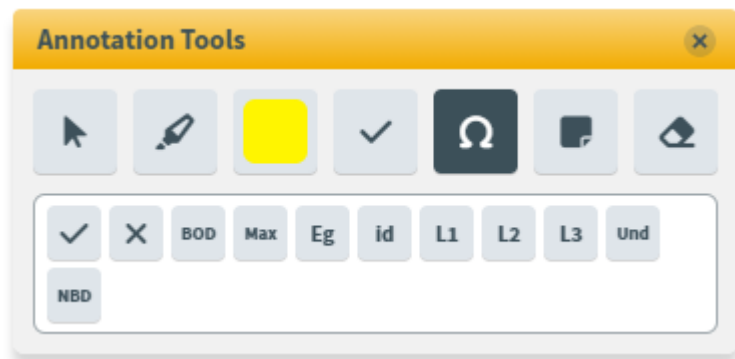
9. *Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.*

10. For answers marked by levels of response: Not applicable in F501

To determine the level – start at the highest level and work down until you reach the level that matches the answer

To determine the mark within the level, consider the following

Descriptor	Award mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of marks available)
Consistently meets the criteria for this level	At top of level

11. Annotations**Annotation**

ü

X

?

BOD

NBD

id

Eg

Und

L1

L2

L3

Meaning

Valid point, mark awarded

Incorrect

Response unclear

Benefit of the doubt (mark awarded)

No Benefit of the Doubt/Too vague (mark not awarded)

Knowledge

Example/application

Understanding/development

Level 1 response

Level 2 response

Level 3 response

Question			Answer	Marks	Guidance														
1	(a)		$N = 60P/2\pi T \text{ (1)}$ $= (60 \times 600)/(2\pi \times 200) \text{ (1)}$ $= \mathbf{28.65 \text{ rev/min}} \text{ (1)(1)}$	4	Award 4 marks for a correct answer of 28.65 or 28.65 rev/min with no workings. Award 1 mark for correct unit with incorrect answer.														
1	(b)		Description of factors affecting the loss of efficiency to include factors and causes. • Wear – Due to metal parts rubbing together and eroding over time • Friction – Due to contact between parts • Noise – What causes noise in a mechanical system • Vibration – Due to imbalance of parts • Thermal – Effects of heat on the system 1 mark for each factor and 1 for each cause up to maximum of 5 marks	5	Marks awarded for cause must be associated with relevant factor														
2	(a)		<table><tr><th>Material</th><th>Ferrous, Non-Ferrous or Thermoplastic</th></tr><tr><td>Brass</td><td>Non-Ferrous</td></tr><tr><td>Cast iron</td><td>Ferrous</td></tr><tr><td>Nylon</td><td>Thermoplastic</td></tr><tr><td>Polycarbonate</td><td>Thermoplastic</td></tr><tr><td>Stainless steel</td><td>Ferrous</td></tr><tr><td>Zinc</td><td>Non-Ferrous</td></tr></table>	Material	Ferrous, Non-Ferrous or Thermoplastic	Brass	Non-Ferrous	Cast iron	Ferrous	Nylon	Thermoplastic	Polycarbonate	Thermoplastic	Stainless steel	Ferrous	Zinc	Non-Ferrous	6	
Material	Ferrous, Non-Ferrous or Thermoplastic																		
Brass	Non-Ferrous																		
Cast iron	Ferrous																		
Nylon	Thermoplastic																		
Polycarbonate	Thermoplastic																		
Stainless steel	Ferrous																		
Zinc	Non-Ferrous																		

Question			Answer	Marks	Guidance
2	(b)		Manipulation and forming processes: • Bending • Extrusion • Folding • Injection moulding • Vacuum forming 3 x (1)	3	
2	(c)		Rapid prototyping is the low lead time fabrication (1) of a component (1) using 3D computer aided design (CAD) or computer aided manufacturing. (CAM) (1)	3	Accept 3D printing for 1 mark
3	(a)	(i)	A fixed value resistor is a resistor of one value only. (1)	1	
		(ii)	The E series is a system of preferred numbers for use in electronic components. The series are E3, E6, E12, E24, E48, E96 and E192. (1) For example, the E12 series has 12 values for each multiple of ten; it is used for resistors with 10% tolerance. The values are 10, 12, 15, 18, 22, 27, 33, 39, 47, 56, 68, 82. (1)	2	
3	(b)	(i)	Single pole single throw (SPST) (1)	1	
		(ii)	Push Button (1)	1	Accept PTM or PTB

Question			Answer	Marks	Guidance
3	(c)		AC induction motor operation:- An electric current (1) is needed in a rotor to produce torque i.e. turning moment. (1) This torque is obtained by electromagnetic induction (1) from the magnetic fields of the stator winding.(1)	4	
3	(d)		AC Induction motor applications: • Pumps • Fans • Compressors • Conveyors • Cranes • Drilling machines 3 x (1 Mark)	3	Accept any other correct application.
4	(a)		A check valve allows flow of fluid in one direction (1) whilst resisting fluid flow in the other direction. (1) Application – Fitted to a pump to ensure no back flow. Shower hand spray. Kitchen spray. Water meters. (1)	3	Accept any other correct applications.
4	(b)		A pilot valve is a tiny valve that regulates the flow of a restricted-flow control feed to another piloted valve. This separate valve is usually used to regulate a high-pressure or high-flow supply. (1) Pilot valves allow a tiny and controlled feed to control a much greater pressure that would otherwise take a larger force to operate. (1) Application – Used to regulate directional control valves, pumps, cylinders, and motors from a distance. (1)	3	Accept any other correct applications.

Question			Answer	Marks	Guidance
4	(c)		A poppet valve has an orifice that is opened and closed by raising and lowering a seating surface into the orifice. (1) An internal spring holds the valve in place in the closed position. (1) Application - used to control the timing and quantity of gas or vapor flow into or out of an engine. (1)	3	Accept any other correct applications.
4	(d)		A spool valve directs fluid from one port to another to another port. (1) This gives directional control. (1) Application – Used in hydraulic systems to control the flow of fluid to different parts of the system such as actuators. (1)	3	Accept any other correct applications.

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