Cambridge Technicals

Engineering

Unit 24: Project management for engineers

Level 3 Cambridge Technical Certificate/Diploma in Engineering
05873

Mark Scheme for June 2024

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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 posted on the RM Cambridge Assessment Support Portal http://www.rm.com/support/ca

3. Log-in to RM Assessor and mark the **required number** of practice responses ("scripts") and the **number of required** standardisation responses.

    YOU MUST MARK 5 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

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% 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, the RM Assessor messaging system, or by email.

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.

   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 a tick to confirm that the work has been seen.

7.   Award No Response (NR) if:
      •   there is nothing written in the answer space
      Award Zero '0' if:
      •   anything is written in the answer space and is not worthy of credit (this includes text and symbols).
      Team Leaders must confirm the correct use of the NR button with their markers before live marking commences and should
      check this when reviewing scripts.

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.**
      If you have any questions or comments for your team leader, use the phone, the RM Assessor messaging system, or e-mail.

9.   *A*ssistant 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:
      a. **To determine the level** – start at the highest level and work down until you reach the level that matches the answer
      b. **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 (updated for RM assessor marking)**

Annotation	Meaning
✔	Valid point, mark awarded
✖	Incorrect
?	Response unclear
BOD	Benefit of doubt (mark awarded)
TV	Too vague (mark not awarded)
REP	Repetition (no additional marks awarded)
L1	Level 1 response (identification)
L2	Level 2 response (explanation)
L3	Level 3 response (analysis)
L4	Level 4 response (evaluation)
CONT	Context (required for high L4 award only)
NAQ	Not answered question
BP	Blank page
SEEN	Noted but no credit given
OFR	Own figure rule

12. **Subject specific marking instructions**

For Level of Response marked questions marked over 4 levels, the candidate can move directly from L1 to L3 if they analyse a valid piece of knowledge.

L3 analysis is required before L4 can be accessed.

Question			Answer	Marks	Guidance
1	**(a)**		Responses include: **Strength of competition** e.g., popularity/performance of firms making similar products/rivals. **Market size** e.g., total sales/demand/potential buyers/buyers for a <u>type</u> of product or industry (by value or volume).	2	One mark for meaning of "strength of competition". One mark for meaning of "market size". **NB** 'Strength' of competition, not nature, size, quantity or behaviour of competition. 'Competitors' does not show understanding of the meaning of 'competition'. 'Other manufacturers' TV. **NB** Market 'size' not market 'share' or market 'growth'. Must be clear the answer refers to sales/demand of the market and not just the company's own sales/demand. No context required.
1	**(b)**		Responses include: **Positive impact** • faster completion/complete on time • higher quality deliverables/better results/better quality. **Negative impact** • increased cost/greater budget spend/not in budget.	2	One mark for the identification of a positive impact. One mark for the identification of a negative impact. Impact must be on project **outcomes** i.e., time, cost or quality. 'On target' TV.

Question			Answer	Marks	Guidance
1	**(c)**		Indicative content: |		Project initiation	Project planning	Project implementation	Project closure
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Manage project quality			✓	
Issue frequent project execution reports			✓	
Employ project control techniques			✓	
Conduct a project feasibility study	✓					4	One mark for each correct identification. Contradictory response rule applies (see preamble item 5) i.e., if two or more ticks are shown on one row, award zero for that row.
1	**(d)**		Responses include: • report on/comment/deliver a presentation/outline/discuss/ summarise/provide an update on progress, etc • request permission for an activity or change of plan • listen to others • answer questions • vote.	2	One mark for a correct identification up to a maximum of two identifications. Do **not** award 'create the agenda', 'chair the meeting' or 'write the minutes' as these are the remit of the project sponsor. However, do award if the delegation is explicitly stated e.g., 'chair the meeting' (0); 'chair the meeting at the sponsor's request' (1). Do not award 'make decisions' as the committee as a whole does this.

| 1 | (e) | | Use level of response criteria.

Responses include:

• active listening
• communication
• conflict management/managing tension
• cost control/budgeting
• critical thinking
• decision-making
• delegation
• establishing rapport
• evaluation skills/ability to assess performance
• information management
• leadership/good people skills
• motivating
• negotiation
• planning
• problem solving
• risk mitigation
• scheduling
• team building
• time management/good time keeping. | 12 | Level of response:

Level 4: 10-12 marks
Candidate evaluates skills Casey will need to use to manage Project C effectively.

Level 3: 7-9 marks
Candidate analyses skills Casey will need to use to manage Project C effectively.

Level 2: 4-6 marks
Candidate explains skills Casey will need to use to manage Project C effectively.

Level 1: 1-3 marks
Candidate identifies skills Casey will need to use to manage Project C effectively.

L1: identification of a skill.

L2: understanding of skill/reasons for skill.

L3: advantage of identified skill on project implementation/project outcomes/the project manager/the business.

L4: judgement of the most important skills, **supported** by an **advantage** (rather than reason).

Award 10 marks for a justified overall judgement of which skill is most important, with no context.

Award 11 marks for a justified overall judgement of which skill is most important, with contextual reference. |

| | | | Exemplar response:

One skill that Casey will need to manage Project C effectively is good time management (L1). Good time management will allow the company to produce tea bags with are plastic free as quickly as possible (L3).

Casey will also need to be a skilled negotiator (L1) as he will need to convince Riley Maya of the need for funding in direct competition with the other two Project Managers (L2). Securing sufficient funds will help Project C gain the necessary resources it needs, leading to better quality outcomes for the project (L3).

In addition, Casey will need to use good conflict management skills (L1) to manage any tensions within the team (L2). This will ensure that time is not wasted with petty rivalries that may impede the progress of the project (L3).

I think that conflict management skills are the most important. This is because due to the commercial nature of this project the critical control of the project is 'time' (CONT), and any conflict that arises will slow down the progress of the project (L4). Good conflict management is especially important for this project because conflict is fairly likely given that one of the newly appointed graduates appears to be quite confrontational (L4). | | Award 12 marks for a justified overall contextual judgement of which skill is most important, with the use of contextual argument.

NB To access L4, at least **two skills** must have been identified (and at least one of these needs to have been analysed) i.e. 2 x L1 plus 1 x L3.

For context look for tea, contractors, external consultant, plastic-free, time is critical control, other two projects, etc.

NB Must be skills, do not award character traits e.g. cooperation, adaptability, appreciation, resource management, resourcefulness.

Do **not** award different leadership styles e.g. directive, supportive, etc as these are styles rather than skills.

'Monitoring skills' TV.

Do **not** award answers about not having the skills i.e. poor time management (0) would lead to missing deadlines (0); The question is about the skills which Casey needs, not the impact of poor skills.

However, do award answers written in the inverse because an advantage can be to avoid something bad happening i.e. time management skills (L1) will help avoid project overrun (L3). |

| 2 | (a) | | Responses include:

Quality plan
   • quality targets/standards,
   • quality control methods/checks.

Risk analysis
   • identification of risks/risks that could arise,
   • severity of risks, likelihood of risks
   • risk owners
   • mitigation of risk
   • risk resolution.

Project schedule
   • named activities
   • order of completion
   • timings e.g. date/times/duration/deadlines/timeline/time frame. | 3 x 2 | For each planning document, award:
One mark for correct identification to a maximum of two identifications.

Quality: 'requirements' TV.
Do not award 'quality assurance' (0).

Risk: Accept references to issues/problems/things that could go wrong.

Schedule: Do **not** award tools e.g. PERT, Gantt chart, CPA network diagram, etc. |
| 2 | (b) | (i) | Responses include:

End user e.g., consumer, person who uses a product, someone who drinks the herbal tea. | 1 | For one mark.

No context required.

Do **not** award 'customer'/buyer of product.

Contradictory response rule applies i.e. if multiple answers given, mark the first. |

2	(b)	(ii)	Indicative content: **The media** • high interest/very interested/most interested • high power/powerful • manage closely/actively manage/control. **Supermarket stockists** • low interest/limited interest • high power/powerful • keep satisfied. Exemplar responses: The media have high levels of interest (1) and power (1). They need to be managed closely (1). Supermarket stockists have high power (1) but low levels of interest (1). They need to be kept satisfied (1).	2 x 3	For each external stakeholder, award: One mark for correct level of power. One mark for correct level of interest. One mark for identification of how to manage. The media – do **not** award 'monitor'. Supermarket stockists – do **not** award 'keep happy'.

| 2 | (b) | (iii) | Responses include:

Reliability
 • different result if repeated
 • differing opinions e.g. Ryan and Casey
 • subjective/personal perspective/assumption/(best) guess.

Degree of detail
 • differences within a group
 • not specific/divergence within the group
 • generalisation.

Exemplar responses:

For the information to be reliable the stakeholders would need to be plotted in the same relative positions each time (1). Being subjective, if Casey drew Fig 1. again, they might assign them differently (+1).

The information on Fig. 1 lacks detail because it is based on broad generalisations about stakeholder groups (1). For example, one of the suppliers may have far more power and interest than some of the other suppliers (+1). | 2 x 2 | For each consideration, award:
One mark for each valid point of explanation to a maximum of two marks.

Do **not** award arguments relating to accuracy. |

| 3 | (a) | | Responses include:

Activities that can be done concurrently
• helps meet deadlines
• reduces time taken.

Critical activities
• aids prioritisation
• identifies which to monitor closely/focus on.

The amount of slack time an activity has
• allows flexibility/leeway/extra time/can be held back
• aids resource reallocation.

Exemplar responses:

Knowing which activities can be completed concurrently allows for less time to be needed (1) because tasks can take place at the same time (+1).

Knowing which activities must not be delayed tells Casey which activities need monitoring very closely (1) to avoid an extension to the project completion time (+1).

Knowing the amount of slack time an activity has allows Casey to know how much flexibility there is in its starting time (1). Because short delays will not delay the completion of the project (+1). | 3 x 2 | In each case, award:
One mark for an advantage plus one further mark for explanation.

Advantage to the project required. |
| 3 | (b) | (i) | Indicative content:

EST Activity A: (Week) 0/as soon as project starts/right at the beginning/1st day

LFT Activity B: Week 7 | 2 | One mark for each correct identification.

EST Activity A: '1st week' TV

LFT Activity B: '7' TV |

| 3 | (b) | (ii) | Indicative content:

• All three activities are on the critical path.

Exemplar responses:

All three activities are on the critical path (1). Each node has matched earliest start times and latest finish times and all three activities have zero float. For example, Activity C's float time is $15 - 8 - 7 = 0$ (+2).

Since 8 weeks plus 6 weeks plus 1 week equals the full 15 weeks (+2) all activities are critical (1).

Activity A is critical as it has no float time. Activity B is critical as it has no float time. Activity C is also critical as it has no float time. (1 +1)

All three activities are on the critical path (1) because none of them have any float time (+1). | 3 | One mark for identifying that all three activities are on the critical path.
Plus
Up to two marks for explanation.

For the explanation marks:
Award two marks for a detailed explanation supported by data calculation or one mark for a valid theoretical explanation. |

| 3 | (c) | | Indicative content:

$E = \dfrac{O + 4M + P}{6}$ (1)

M = 50   4M = 200 (1)

O = 50 x 90/100 = 45   (1)

P = 50 x 180/100 = 90 (1)

$E = \dfrac{45 + 200 + 90}{6} = \dfrac{335}{6}$ = **55.8ė weeks** | 6 | Up to six marks.

Award full marks (6 marks) for correct answer supported by appropriate workings. Correct units required. Accept 55.8 or 56 weeks.

Else award:

1 mark for correct formula/method stated or applied.

1 mark for each correct figure for O = 45
1 mark for each correct figure for P = 90
1 mark for each correct figure for 4M = 200

Award 5 marks for '55 weeks'

Award 5 marks for a correct numerical answer but with incorrect units (or no units). |
| 3 | (d) | (i) | Indicative content:

• premises. | 1 | For one mark. |

| 3 | (d) | (ii) | Responses include:

Benefit
• faster completion/no delay/keep on schedule (as meeting can go ahead on time)
• higher quality/meet quality standards (due to fewer interruptions, etc)

Drawback
• greater budget spend, costs money (due to hotel room, travel expenses, etc)
• reduces quality (due to late start, non-arrivals, etc)
• delays the project (due to late arrivals to venue, etc)

Exemplar responses:

The outcome of the project should be better quality (1) because the meeting is likely to suffer from fewer interruptions (+1).

One drawback would be the additional cost (1) of booking a meeting room (+1). | 2 x 2 | One mark for a benefit plus one further mark for explanation.
AND/OR
One mark for a drawback plus one further mark for explanation.

Impact on project outcomes required. |

| 4 | (a) | | Responses include:

Advantage
    • lower cost
    • less time consuming/faster
    • wide scope.

Disadvantage
    • less tailored/less specific/not as relevant
    • may be out of date.

Exemplar responses:

One advantage of selecting a contractor using secondary research is that it will be faster (1) than using primary research. That means that the upgrade by the contractor (CONT +1) can be completed in a timely manner, improving the company's ales more quickly (+1).

One disadvantage of only using secondary research is that it is not specific (1) to the needs of the company. This might reduce the quality of the tea bags (CONT +1) that Hedgerow Tea Ltd can produce, causing the company to lose even more customers (+1). | 2 x 3 | In each case, award:
One mark for an advantage
PLUS
One mark for analysis
AND/OR
One mark for context.

The analysis mark must be for impact on the company (rather than the project or stakeholders).

'Inaccurate' TV.
'Unreliable' TV.
'Quick' TV, but accept 'quicker'.

For context look for tea, contractors, external consultant, plastic-free, time is critical control, etc. |

| 4 | (b) | | Indicative content:

• Test: <u>mean</u> <u>mass</u> ($\overline{m}$) of <u>mint</u> tea bags (1).
• Findings: mean mass ($\overline{m}$) = 433,760(1)/250,000 (1) = 1.73504 (1).
• Result: FAIL (1). | 5 | Up to five marks.

One mark for details of test.
Up to three marks for details of findings.
One mark for result.

Award three marks for details of findings for $\overline{m}$ = 1.735/1.74 (workings not required). Do **not** accept 1.73.

'Completed by' is **not** required. |

Question			Answer	Marks	Guidance
4	(c)	(i)	Indicative content: • Obtain acceptance of completion • Review lessons learned.	2	One mark for each correct identification. Contradictory response rule applies (see preamble item 5) i.e., if three or more items are ticked, award zero.

Question			Answer	Marks	Guidance
4	**(c)**	**(ii)**	Responses include: Provide future project managers with: • improved training/external courses • (automatic access to) an external consultant • documentation/notes/hints and tips/procedural outline (relating to how to manage a project) • identifies where to target support • identifies which type of support is best • which types of support are ineffective. Exemplar responses: A training course for prospective project managers could be designed (1) using the best practice that Casey has learnt from the external consultant (CONT +1). Feedback from Casey can be used to identify the best types of support that can be put in place (1) for future Project Managers.	2	Award: Two marks for a contextual explanation. (CONT annotation required) One mark for a non-contextual explanation **NB** Do not award general benefits of feedback. The question asks how the company can improve its support for future Project Managers. For context look for tea, contractors, external consultant, plastic-free, time is critical control, etc.

Question			Answer	Marks	Guidance
4	**(d)**		Responses include: • objective feedback (1) o measurable o based on facts o capable of being proven/disproven o verifiable o avoids subjectivity. Exemplar response: Complaints analysis is an objective feedback method (1). Objective feedback is based on measurable facts rather than on opinion (1). Whilst the content of each complaint is subjective, it is the classification, type and number of complaints that is being analysed (1). Each of these things is quantifiable and, therefore, measurable (1).	4	Up to four marks. Award: One mark for identifying that complaints analysis is an objective feedback method. PLUS Up to three further marks for explanation.

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