

Cambridge Technicals Engineering

Unit 24: Project management for engineers

Level 3 Cambridge Technical Certificate/Diploma in Engineering 05873

Mark Scheme for January 2023

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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 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 <u>http://www.rm.com/support/ca</u>
- 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 10 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% (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 or 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. 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:
 - 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
\checkmark	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)
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, candidates can analyse an L1 point and proceed directly to L3.

L3 analysis is required before L4 can be accessed.

(Question	Answer	Marks	Guidance
1	(a)	 Indicative content: authorising the project to start steering committee, project board, the directors chairing steering committee meetings Sarah, project sponsor, Managing Director producing the final project report Johnny, project manager 	3	One mark for each correct identification, to a maximum of three identifications.
1	(b)	 Responses include: time controls to complete as soon as possible, to minimise overrun, time is money, to avoid delays, to beat the competition, etc cost controls to stay within budget, to minimise spending, to save money, to maximise profits, to be able to afford to complete the project, etc quality controls to ensure the deliverables are marketable, to reach required standards, to avoid erosion of standards, to maintain reputation, to produce an acceptable product, etc 	3	One mark for each correct identification, to a maximum of three identifications.
1	(c)	 Responses include: being fully engaged in what someone is saying fully concentrating on what has been said rather than passively hearing listening with all senses take in/absorb the information understand what one is being told 	1	 For one mark. No context required. Do not award answers <u>solely</u> related to: putting in practice what one hears remembering what one hears gaining/obtaining feedback.

Question	Answer		Guidance	
1 (d)	 Responses include: decision making is delegated team expected to do its own problem solving freedom for team members minimum intervention non-directive/limited instruction hands off approach/little active monitoring not pro-active deals with issues <u>as and when</u> they arise relies on feedback <u>from</u> the team Exemplar responses: A responsive leadership style is non-directive (1). This allows the engineers to use their professional expertise to solve problems (1), potentially leading to the development of a better-quality device (1). A responsive leadership style encourages subordinates to make decisions (1). This may slow down the decision-making process (1), increasing the likelihood that a competitor could bring a new product to market ahead of Better Health plc (1).	2 x 3	In each case: One mark for a feature, plus one mark for explanation and a further one mark for analysis. First mark: Feature required (rather than advantage/disadvantage). Second mark: Explanation of cause or consequence. Third mark: Analytical impact (can be positive or negative). Accept impacts on the business, the project, the project manager, the team leaders and team members. Do not award answers relating to: • being ready for issues • being democratic/collaborative • getting ideas from the team • utilising team resources • holding meetings NB question relates to responsive leadership style, not a democratic leadership style. Do not award vague answers e.g. responds to problems, listen to problems, giving feedback, etc.	

0	Question				Answe	r		Marks	Guidance
1	1 (e)		(e) Indicative content:		3	One mark for each correct identification, to a maximum of three identifications.			
					s	tage			Contradictory response rule applies to each row of the
			Activity	Project initiation	Project planning	Project implementation	Project closure		grid (see preamble item 5) e.g. if two ticks in the same row, award zero for that row.
			Take corrective action			*			
			Obtain acceptance that the project deliverable has been achieved				~		
			ldentify risk owners		~				
1	(f)		Indicative cont					 2	Award two marks if all correct. Award one mark if four out of the five are correct.
			 M = Measu A = Agreed 	urable	/achievab	le			
			 R = Realist T = Time 	tic/Relevan	t				

(Questi	ion	Answer	Marks	Guidance
1	(g)		 Indicative content: proactive endeavour a provision/alternative plan/backup plan, plan b use when a negative event/unfortunate eventuality/ emergency/unforeseen event/issue occurs to minimise loss/return to normal operations as quickly as possible/ensure project can continue Exemplar response: A contingency is a provision (1) made to deal with negative circumstances which may arise (1). For example, identifying an alternative supplier of components, in case the regular supplier is unable to supply (1). 	3	Up to two marks for explanation AND/OR One mark for a suitable example. Do not award examples of reactive fire-fighting.
2	(a)		 Responses include: morals doing what is (morally) right behaving in a way which is good and virtuous personal principles that govern behaviour meeting the minimum standards of social acceptability doing above and beyond what the law requires 	1	For one mark. Do not award examples. Do not award 'good intentions'. No context required.
2	(b)	(i)	Indicative content: Type of information: Quantitative Source of information: Internal	2	One mark for each correct identification, to a maximum of two identifications. Contradictory response rule applies (see preamble item 5) e.g. both options on a row are circled, award zero for that row.

Question	Answer	Marks	Guidance
Question 2 (b) (ii) 4	Answer Use level of response criteria. Responses include: • time factors – 7 hour meetings, 20 meetings • cost – travel expenses, fee, lunch, accommodation • detailed feedback/wealth of information • attendees feel obligated to report positively (due to payment because meeting lasts a full day) Exemplar response: An all day meeting gives researchers lots of time (L1) to ask attendees questions. This should provide detailed information (L2) which the company can use to improve the design of its prototype (L3). However using all day focus groups means that the attendees need to be paid (L1). Paying travel and accommodation expenses for those travelling from Europe will be expensive (L2), significantly increasing the costs of the project (L3). Overall, I think Johnny has made the right decision. Using all day focus groups allows the company to obtain detailed information on the features required. Designing a device (CONT) that meets the requirements of end users is far more likely to gain sales than a less well researched product. Therefore, the increased amount of sales revenue in the long-term should more than compensate for the short-term increase in costs of using this research method (L4).	Marks 12	GuidanceLevel of response:Level 4: 10-12 marksCandidate evaluates Johnny's decision to use all day focus groups to collect the information.Level 3: 7-9 marksCandidate analyses factor(s) related to using all day focus groups.Level 2: 4-6 marksCandidate explains factor(s) related to using all day focus groups.Level 1: 1-3 marksCandidate identifies factor(s) related to using all day focus groups.Level 1: 1-3 marksCandidate identifies factor(s) related to using all day focus groups.Level 4:Award 10 marks for a justified overall judgement about whether Johnny has made the correct decision, with no context.Award 11 marks for a justified overall judgement about whether Johnny has made the correct decision, with contextual reference.Award 12 marks for a justified overall comparative

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Question	Answer	Marks	Guidance
			NB Only accept argument relating to the all day nature of the focus group e.g. time, cost, detailed feedback, etc. Do not award benefits of focus groups in general.
			L1 – states a factor.
			L2 – any development of cause or consequence (that falls short of being analytical).
			L3 – impact on business or project of L1/L2 point made. E.g. go over budget, delays project, more sales, more profit, lose competitive advantage, unable to afford further investment, etc.
			L4 – accept improved suggestions for collecting the information so long as justification for the choice is given e.g. cheaper than all day focus groups, etc.

(Question	Answer	Marks	Guidance
2	(c)	 Responses include: complexity how difficult, how hard to understand, how complicated/complex the information is degree of detail how much information, the quantity or depth of information, the amount of description Exemplar response: Complexity relates to how difficult the information is to understand (1). Whereas degree of detail considers whether the information is extensive or in-depth (1). For example, Johnny needs to collect in-depth opinions from potential users of the In-control device, but this information will be non-scientific and easy to understand (1). 	3	One mark for 'complexity'. One mark for 'degree of detail'. One mark for a suitable example. NB: the example must show understanding of both terms.
2	(d)	 Responses include: develop a similar/better/worse product develop a product with similar/better/worse features/design develop a product with a similar/cheaper/dearer price release rival product ahead of Better Health plc superior advertising of rival product Exemplar response: If the competitor develops a better product (1) then Better Health Ltd may have wasted the money it spent on this project (1).	2	 One mark for a correct identification plus one further mark for explanation. Effects must be on project outcomes: Cost Quality of deliverables (product) Time Effects can be positive or negative. Do not award effects on the company itself e.g. loss of sales/profit, improved reputation, insolvency, etc.

(Quest	tion	Answer	Marks	Guidance
3	(a)	(i)	Indicative content:	2	One mark for correctly shading the slack time for Activity K. One mark for correctly inserting the dependency arrow for Activity C.
3	(a)	(ii)	 Indicative content: Activity O should be 20 days/increased by 10 days Activity B should be 20 days/reduced by 20 days Activity H should start after G completes (rightward shift to breach the gap, commence at 120) 	3	One mark for each correct identification, to a maximum of three identifications. Question requires corrections (rather than errors). E.g. Do not award 'Activity O is too short'. But do award 'Activity O needs extending by 10 days'.

(Quest	tion	Answer	Marks	Guidance
3	(b)	(i)	Indicative content:	6	Up to six marks.
			$E = \frac{O + 4M + P}{6}$ M = 240 4M = 960 O = 240/2 = 120 P = 240 $E = \frac{120 (OFR) + 960 (OFR) + 240}{6} = 220 \text{ days}$		 Award full marks (6 marks) for 220 days, irrespective of working. Correct units required. Award 5 marks for correct answer without units (or with incorrect units). Award equivalents e.g. 31 weeks and 3 days. Else award 1 mark for each of the following, if seen: 120 960 Attempt to divide <u>own workings</u> by 6 Correct formula in words or figures.
3	(b)	(ii)	 Responses include: most likely chart not match/higher than Gantt chart pessimistic time is not long enough optimistic time is too short the notes are subjective/based on incorrect assumptions/tentative figures Johnny has taken insufficient care something likely/could go wrong Johnny is overconfident not accounted for external factors Johnny has been unrealistic/cannot work 24/7 members can only spend 25% of working time on the project 	2	One mark for each correct identification, to a maximum of two identifications. Do not award 'the Gantt chart is incorrect'.

Q	Question		Answer	Marks	Guidance
3	(c)		 Responses include: time cost quality Exemplar responses: Poor planning might lead to errors being made (1), reducing the functionality of the product (1) leading to lower quality deliverables (1). Poor planning may lead to spending more (1) on unnecessary resources, leading to the project overspending (1) and running over its final budget (1). Poor planning means that progress may be slow (1), delaying some tasks (1), leading to the final deadline being missed (1). 	2 x 3	In each case: Up to three marks for linked consequences. Do not award marks for reasons or causes of these consequences. Identification mark must be for a consequence to the project (rather than a generic consequence to the business). Answer must be about poor planning. Do not award answers relating to poor communication or poor leadership.
4	(a)	(i)	Indicative content: Issue 1 - High Issue 2 - Medium Issue 3 - Critical Issue 4 - Low	4	One mark for each correct identification, to a maximum of four identifications. Do not award contradictory responses e.g. 'critical/high' or 'medium/low'.

Question		ion	Answer	Marks	Guidance
4	(a)	(ii)	Responses include: Johnny may have: • delegated too many tasks to Tariq • given inadequate support to Tariq • given Tariq too high a workload • overwhelmed Tariq • unresolved conflict with Tariq • put too much pressure on Tariq • ignored Tariq's concerns/complaints • required Tariq to work 24/7 • undermined Tariq in front of his team • treated Tariq unfairly Exemplar response: Johnny may have contributed to Tariq's stress by failing to listen to his concerns (2). Johnny may have given Tariq too high a workload (1).	2	Award: Two marks for an aspect of poor leadership explicitly linked to Tariq's stress levels. OR One mark for an aspect of poor leadership which may have contributed to Tariq's absence. NB The answer must relate to a possible <u>reason</u> for Tariq's absence. Do not award answers relating to poor communication skills or poor planning skills. The question is about poor leadership skills.
4	(a)	(iii)	 Responses include: shortage of human resources need to wait for engineer availability tasks take longer to complete slower progress/delay Exemplar response: Time creep caused by needing to wait for engineers to do the functionality testing (2). Time creep caused by being understaffed (1). 	2	Award: Two marks for an aspect of time creep explicitly linked to functionality testing. OR One mark for an aspect of time creep caused by lack of resources. NB The answer must relate to a possible <u>reason</u> for time creep. Do not award 'engineers distracted' as this relates to quality control rather than time control.

Q	Question		Answer	Marks	Guidance
4	(a)	(iv)	 Responses include: request correct items be sent request supplier correct their error negotiate a fast turnaround of the correct clip find a different supplier Exemplar response: Contact the supplier and request the correct clips (CONT) be despatched (2). Request the correct component be sent out immediately (1). 	2	Award: Two marks for a contextual remedy for the supply of incorrect clips. (CONT annotation required). OR One mark for a generic remedy. NB The answer must relate to incorrect supply. To award the action must lead to the receipt of the right clips. Do not award answers which solely suggest complaining, making the supplier aware, telling the supplier the correct specification or sending back the items.

Question	Answer	Marks	Guidance
4 (b) (i)	 Responses include: identifying project strengths finding out what the company is good at, able to build on the strengths identified, can strengthen the core business, improved corporate image, improved reputation, steer future projects, make the business more successful, etc identifying lessons learned find out what did not work well/what needs improving, avoidance of repeating mistakes, driving business improvement, improving procedures, focus for training, amending documentation, steer future projects, make the business more successful, etc Exemplar response: Identifying project strengths tells the company what worked well (1), so that hopefully they can repeat this in future projects (1). Identifying lessons learned is also beneficial to the business because it can help them avoid mistakes made in this project (1), hopefully leading to smoother development of future health devices (1). 	2 x 2	In each case: One mark for a correct identification, plus one further mark for explanation. Benefits to the business required. Do not award benefits that are solely to the project team. Do not award responses relating to evaluating an individual's performance.

Q	Question		Answer	Marks	Guidance
4	(b)	(ii)	 Responses include: identify strengths (or weaknesses) of the product further improve the product set prices identify specific customer groups to target identify relevant channels of distribution identify popular features/functions promote the product include satisfaction statistics in marketing campaign to inform how to advertise the product Exemplar response: Sarah could use the feedback to determine how the In-control device could be upgraded in future years (2). Sarah might wish to use the feedback to identify the best way to sell the product (1). 	2 x 2	In each case, award: Two marks for a contextual use of the feedback relating to the In-control device. (CONT annotation required). OR One mark for a non-contextual use of the feedback. Answer should relate to feedback about the product, rather than the project. Do not award vague answers e.g. 'to find what works best', etc. Accept 'device' for context.
4	(c)		 Responses include: biased subjective/based on opinion hyped/exaggerated untruthful/lies incorrectly focussed Exemplar response: In order to sell newspapers the media coverage of a health device (CONT) is likely to be narrowly focussed on the benefits of the product (2). The opinion of the media is likely to be biased (1).	2	Award: Two marks for a contextual limitation of the device. (CONT annotation required) OR One mark for a generic limitation. Accept 'device' for context. Inaccurate TV. Do not award 'cannot control', 'lack of prestige' or 'incorrect audience'.

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