Cambridge Technicals Engineering

Unit 24: Project management for engineers

Level 3 Cambridge Technical Certificate/Diploma in Engineering
05873

Mark Scheme for June 2023

MARKING INSTRUCTIONS

PREPARATION FOR MARKING

TRADITIONAL
Before the Standardisation meeting you must mark at least 10 scripts from several centres. For this preliminary marking you should use **pencil** and follow the **mark scheme**. Bring these **marked scripts** to the meeting.

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 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 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.

      Rubric Error Responses – Optional Questions
      Where candidates have a choice of questions 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. (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 lined pages 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 an annotation to confirm that the work has been seen.

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 isn't an attempt at the question
   Note: Award 0 marks - for an attempt that earns no credit (including copying out the question)

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

9. 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

10. **Annotations**

Annotation	Meaning
Tick	Valid point, mark awarded
Cross	Incorrect
Question mark	Response unclear
BOD	Benefit of doubt (mark awarded)
TV	Too vague (mark not awarded)
REP	Repetition (no additional marks awarded)
NAQ	Not answered question (incorrect focus)
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)

11. **Subject-specific marking instructions**

For Level of Response marked questions marked over 4 levels, the candidate can access at L1 or L2. In either case, they can analyse the point made and proceed directly to L3.

L3 analysis is required before L4 can be accessed.

Question			Answer	Marks	Guidance
1	**(a)**		Indicative content: Benefits to Nina include: • to learn about the documents the company requires • to show her the project management process • to give her examples of what final project reports look like • to show what a project manager is expected to produce • to learn about what went well on previous projects • to learn about what went wrong on previous projects. Exemplar responses: She will get an idea of what documentation she is expected to produce. This will be particularly useful to Nina as she has not had any project management training (CONT) (2). Reading previous project documentation will give Nina an idea of the various documents she needs to produce (1).	**2**	One mark for a non-contextual benefit. Two marks for a benefit + contextual explanation.

Question			Answer	Marks	Guidance

1	**(b)**		Responses include:
			
			• resource plan
			  ○ to identify what, where and when physical, technological and human resources are required, etc.
			• quality plan
			  ○ to identify quality targets and quality control methods, etc.
			• project schedule
			  ○ to identify the order of the activities involved and timings, etc.
			
			Exemplar responses:
			
			One purpose of the resource plan is to identify what date equipment will be required (1) so that it can be requested in time (+1).
			
			One purpose of the quality plan is to identify quality control methods (1) so that team members are aware of the procedures that will be used (+1).
			
			One purpose of the project schedule is to set deadlines for various tasks (1) so that performance can be monitored against the plan (+1).
				2 x 3	One mark for a correct identification up to a maximum of three identifications, plus one further mark explanation.
					
					One mark for each correct purpose (maximum 3 marks) + one mark for each explanation (maximum 3 marks).

Question			Answer	Marks	Guidance
1	**(c)**		Use level of response criteria. Responses include: • directive • supportive • collaborative • responsive Exemplar response: Nina could use a directive leadership style (L1). This would mean that she gives the orders and tells the three team members how they should go about achieving these (L2). This may make Nina come over as bossy and annoy the team members who have worked at the company longer, especially Amir who was the previous project manager (L3). Nina could use a collaborative leadership style (L1). This style encourages the team members to participate in all decisions (L2). This should lead to better decisions being made because the team members are the ones who work with the three different production cells on a day-to-day basis (L3). I advise Nina to use a collaborative leadership style. As she is new to the company (CONT), with very limited experience, she needs to rely on the skills and abilities of her team (L4). She certainly cannot afford to annoy her team by using a directive style as she needs to keep them onside to maximise their input into the project (L4).	12	Level of response: Level 4: 10-12 marks Candidate evaluates leadership styles Nina could use. Level 3: 7-9 marks Candidate analyses leadership styles Nina could use. Level 2: 4-6 marks Candidate explains leadership styles Nina could use. Level 1: 1-3 marks Candidate identifies leadership styles Nina could use. **Level 4:** Award 10 marks for a justified overall judgement with no context. Award 11 marks for a justified overall judgement with contextual reference. Award 12 marks for a justified overall contextual judgement which uses context NB To access L4, three leadership styles must have been identified (one of which has been analysed). Also accept: autocratic, democratic, paternalistic and laissez faire.

Question			Answer	Marks	Guidance
2	**(a)**		Responses include: • general public (1), low power, low interest (+1), monitor (+1) • UK Injection Moulding Society (1), low power, high interest (+1), keep informed/up-to-date (+1) • Customers (1), high power, low interest (+1), keep satisfied/happy (+1) • <u>Robot</u>ic suppliers (1), high power, high interest (+1), manage closely (+1).	**12**	Up to 12 marks awarded as follows: One mark for each correct identification of an external stakeholder group, to a maximum of four. Plus one mark for each pair of power/interest levels, to a maximum of four and/or one mark for each way to manage a stakeholder group, to a maximum of four. A correct external stakeholder group must be identified to award marks for that row.

Question			Answer	Marks	Guidance
2	**(b)**		Responses include: • praise • verbal encouragement • motivational speeches • group gelling exercises • social events e.g., visit pub • give them responsibility • communicate clearly • set smart targets • fight for a bonus for them • asking for their input/listening to their feedback • engage with them on a personal level e.g., ask Jamal how his preparation for his conference speech is going, or Kofi's plans for retirement. Exemplar response: Nina should use praise (1). This will make employees feel valued (+1) without taking up much of Nina's valuable time (+1).	**3 x 2**	In each case, award: One mark for a correct method identified Two marks for method identified and explained Three marks for method identified and analysed Analytical impacts can be positive or negative. Accept analytical impacts on Nina, the project or the business. Do **not** award motivation techniques only applicable to the employer e.g., profit-sharing schemes, performance based bonuses, workplace pensions, extra time-off, etc.

Question			Answer	Marks	Guidance
3	(a)		Indicative content: $E = \dfrac{O + 4M + P}{6}$ M = 8, 0 = 6 4M = 32 If P = 16: $E = \dfrac{6 + 32 + 16}{6}$ = 9 months If P = 28: $E = \dfrac{6 + 32 + 28}{6}$ = 11 months 11 months – 9 months = **2 months**	7	Up to seven marks. Award full marks (7 marks) for correct answer (correct units required) irrespective of workings of working. i.e. 2 months. Award max 6 marks for an answer of '2' with incorrect units (or no units) given. Else award: 3 marks for each of '9 months' and '11 months', if seen. or 2 marks for each of '9' or '54' and '11' or '66', if seen. or 1 mark for '32' and/or 1 mark for correct formula in words, if seen.
3	(b)		Responses include: • <u>helps</u> illustrate dependencies • <u>helps</u> with timings • <u>helps</u> display complex information • <u>helps</u> break down the project into manageable parts • <u>helps</u> set realistic schedules • <u>helps</u> organise tasks clearly.	1	One mark for a correct identification. Accept any beneficial feature. Do **not** accept uses i.e., do not award 'can be used to monitor progress against the schedule' or 'can tick off tasks'. Do **not** award for what a Gantt chart is i.e., do not award 'a visual tool' or 'shows durations'. Benefit required.

Question			Answer	Marks	Guidance
3	(c)	(i)	Indicative content: • Activity I – activity time 7.5 – 8.5 months • Activity C – slack time 3 – 4 months 	2	One mark for shading of activity time for Activity I. One mark for shading of slack time for Activity C.
3	(c)	(ii)	Indicative content: • no disagree • it has slack/float/can be delayed by 1 month (without affecting the duration of the project). Exemplar response: I disagree (1) because Activity C has slack time (+1).	2	One mark for a correct identification plus one further mark for explanation. Explanation must relate to the schedule, not to the importance of finalising the specification requirements.

Question			Answer	Marks	Guidance
3	(c)	(iii)	Indicative content: Adjustment to 5 months instead of scheduled 2 months. 5 – 2 = 3 additional months. Original minimum duration of project = 9 months. Adjusted minimum completion time = 9 months + 3 months = **12 months**.	2	Up to two marks. Award full marks (two) for the correct answer, with or without workings. Correct unts required. I.e., 12 months. Award max 1 mark for '12' with no units (or incorrect units). Else award one mark for '3 months', if seen. No marks for '3'.
3	(d)		Indicative content: <table><tr><th>Factor:</th><th>Internal factor</th><th>External factor</th></tr><tr><td>Nina's own lack of skills as a project manager</td><td>✓</td><td></td></tr><tr><td>Sykes Components Ltd's policies and procedures</td><td>✓</td><td></td></tr><tr><td>Market dynamics in the robotics industry</td><td></td><td>✓</td></tr><tr><td>The scope of the project</td><td>✓</td><td></td></tr></table>	4	One mark for each correct identification. Contradictory response rule applies (see preamble item 5) e.g., if both items in a row are ticked, award zero for that row.

Question			Answer	Marks	Guidance
3	**(e)**		Responses include: • regular (review) meetings • frequent (status) reports • milestones slip chart • s curve monitoring • RACI chart (responsible, accountable, consulted, informed) • quality assurance checklist • requirements traceability matrix • RAID log (risks, assumptions, issues, dependencies) • value analysis • Kanban.	**1**	One mark for a correct identification. Accept any reasonable suggestion.

Question			Answer	Marks	Guidance
4	**(a)**		Responses include: borrowing/owed/loan/money lent that has to be paid back/needs to be repaid.	**1**	One mark for a correct identification. Meaning required, not advantages or disadvantages e.g., do **not** award 'interest will be charged'. Do not award 'being in debt' as that is the term in the question.
4	**(b)**	**(i)**	Indicative content: • GAIM = 0.12/2 x100 = **6%** • MMIM = 0.56/16 x100 = **3.5%** • RIM = 1.5/150 x 100 = **1%**	**3**	One mark for each correct calculation to a maximum of three calculations. Percentage signs not required.
4	**(b)**	**(ii)**	Indicative content: • Y axis labelled accurately labelled e.g., '<u>%</u> <u>cost</u> <u>reduction</u>'; • 3 bars drawn labelled 'GAIM', 'MMIM' and 'RIM' • all 3 bars drawn correctly to 1.d.p. (OFR applies to answers in Q4bi)	**3**	Up to 3 marks.

Question			Answer	Marks	Guidance
4	**(b)**	**(iii)**	Responses include: • achieved e.g., Overall mean average improvement was (6% + 3.5% +1%)/3 = 3.5%; Median average = 3.5%; More processes achieved it than not; two of the three (GAIM and MMIM) achieved the objective. • not achieved e.g. Only two of the three process achieved the target; RIM did not achieve the objective, it only got 1%. • more information needed e.g. overall cost reduction depends on the volume of output produced by each process; if RIM has a lower output than GAIM then RIM's modest 1% saving may be more than compensated for by GAIM's 6% cost saving, 6 GAIM cells but only 4 RIM cells, however RIM has higher absolute costs per item; impossible to say as different components are likely to have been made before and after the introduction of the robots because the components are custom-made. Exemplar responses: I think the one month of testing has met (1) the required objective. Despite RIM only achieving a reduction of 1% the mean average overall reduction is exactly 3.5% (+2). I think that the required objective has been met (1) because two of the three production processes have met or exceeded the target (+1).	**3**	One mark for a decision plus up to two marks for explanation. Award one mark for a clear decision. Award two additional marks for explanation of a valid reason supported by numerical calculation. Award one additional mark for explanation of a valid reason (without supporting numerical calculation). NB Candidates can argue any conclusion i.e., objective achieved, objective not achieved or more information required. The first mark is for making this decision clear. Answers which give reasons for and against with no clear decision cannot be awarded. OFR applies to answers in 4bi.

Question			Answer	Marks	Guidance
4	**(c)**		Responses include: • interest rates • exchange rates • inflation • unemployment • taxation • a recession/economic slump. Exemplar responses: Interest rates (1). If interest rates go up, the cost of borrowing rises. This will affect Sykes Components Ltd because they have borrowed the money to buy the three robots (CONT) (+2). Unfavourable exchange rates (1) will mean goods bought from abroad become more expensive (+1).	**2 x 3**	In each case award: One mark for identification plus: two marks for a contextual explanation or one mark for a non-contextual explanation.

Question			Answer	Marks	Guidance
4	(d)	(i)	Indicative content: <table><tr><td>**Feedback**</td><td colspan="2">**Type of feedback**</td></tr><tr><td>**Opinions of project board members**</td><td>Objective</td><td>(Subjective)</td></tr><tr><td>**Issue logs**</td><td>(Objective)</td><td>Subjective</td></tr><tr><td>**The reputation of Sykes Components Ltd as perceived by the UK Injection Moulding Society**</td><td>Objective</td><td>(Subjective)</td></tr></table>	3	One mark for each correct row. Contradictory response rule applies (see preamble item 5) e.g., if both items in a row are circled, award zero for that row.
4	(d)	(ii)	Indicative content: • meeting • questionnaire • reports. Exemplar response: One formal method that Nina could use to obtain feedback from different stakeholders is to issue questionnaires (1). An advantage of questionnaires is that they can be anonymous so the technicians may be more honest (+2).	3	One mark for formal method. Plus Two marks for a contextual advantage OR One mark for a non-contextual advantage.

Question			Answer	Marks	Guidance
4	**(d)**	**(iii)**	Responses include: • to ensure similar mistakes are not made again on future projects • to improve future decision-making • to improve contingency planning for future projects • to develop better risk analysis techniques for future projects. • to inform (future) training needs • to recommend changes to procedure for future projects • improve future projects.	**1**	One mark for a correct identification.

Need to get in touch?

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01223 553998

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